Exploring the Relationship Between Outer Space and World Politics: English School and Regime Theory Perspectives

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for the degree of
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Author Declaration

I certify that the thesis I have presented for examination for the MPhil/PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

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Abstract

This thesis uses regime theory and the English School of International Relations (and particularly the social constructivist reformulation by Buzan in *From International to World Society: English School Theory and the Social Structure of Globalisation* 2004) to address the question: Why have actors decided to cooperate on outer space issues, and what does that cooperation tell us about wider international politics and international society? Rational actors have at times determined that it is in their interest to coordinate activity for outer space. This coordination has led (either intentionally or unintentionally) to the creation of international regimes, and those regimes have conversely come to exert influence over actors' interests and behavior over time. Processes within international society (such as the rise, evolution, and decline of international society institutions, and shifts between pluralism and solidarism) also influence—and are influenced by—outer space politics.

The thesis focuses on five case studies: geosynchronous orbit, the International Space Station, Global Navigational Satellite Systems, the company Sea Launch, and comets and asteroids. Pre-existing outer space treaties ("diffuse regimes") have established basic understandings between states about governance over outer space, and implicit or explicit regimes have also evolved to facilitate coordination amongst actors on the specific issue-areas of each case study. The tools used by regime theorists help explain the development of these various regimes and the relationship between them; however, because of regime theory's relatively narrow focus (on actors' rational interests in specific issue-areas) it provides few insights into how outer space politics are embedded in wider world politics and international society. An English School approach expands the analysis and puts into perspective how the Space Race was mutually constitutive of Cold War pluralist international society, and how space cooperation and commercialization over time also reflected and reinforced globalization and cooperative international society. However it is extremely difficult to operationalize the English School in order to draw more specific explanatory conclusions about individual case studies. It is necessary to use both approaches together to develop a thorough explanation of actors' behavior with regards to outer space politics, as well as an understanding of how outer space politics relate to wider world politics.

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"See, in all our searching, the only thing we've found that makes the emptiness bearable, is each other."

—Alien to astronaut in the movie *Contact*
(based on the book by cosmologist Carl Sagan)

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Acronyms

ABM	Anti-Ballistic Missile
ACS	Assembly and Command Ship
ASAT	Anti-Satellite weapon
ASTP	Apollo-Soyuz Test Project
IGA	Intergovernmental Agreement
CCIR	International Radio Consultative Committee (from the French "Comité consultatif international des radiocommunications")
CCITT	International Telegraph and Telephone Consultative Committee (from the French "Comité consultatif international téléphonique et télégraphique")
CPR	Common Pool Resource
CoCC	Code of Conduct for ISS Crew
ESA	European Space Agency
FOC	Flag of Convenience
G77	Group of 77
GEOSAT	Geostationary Satellite
GNSS	Global Navigational Satellite System
GPS	Global Positioning System
GSO	Geosynchronous Orbit
ICSU	International Council of Scientific Unions
IGY	International Geophysical Year
IMF	International Monetary Fund
ITF	International Transport Workers' Federation
ISS	International Space Station
JU	Joint Undertaking
LDC	Less Developed Country
LEO	Low Earth Orbit
LOS	Law of the Seas
MOU	Memorandum of Understanding
NASA	National Aeronautics and Space Administration
NEO	Near-Earth Object
NIEO	New International Economic Order
NWICO	New World Information and Communication Order
OFC	Offshore Financial Center
OST	Outer Space Treaty of 1967
PHA	Potentially Hazardous Asteroid
NTBT	Nuclear Test Ban Treaty
PPP	Public Private Partnership
PRS	Public Regulated Service
RARC	Regional Administrative Radio Conference
RSA	Russian Space Agency
SA	Selective Availability
SL	Sea Launch
SPREP	South Pacific Regional Environment Program
UNCOPUOS	United Nations Committee on the Peaceful Uses of Outer Space
UNCLOS	United Nations Convention on the Law of the Sea

VfR	Verein für Raumschiffahrt (German for "Spaceflight Society")
WARC	World Administrative Radio Conference
WRC	World Radiocommunication Conference
WTO	World Trade Organization

Chapter 1: Introduction

"Theoretically, a mass projected from the surface of the earth with a velocity of 6.95 miles/second would, neglecting air resistance, reach an infinite distance, after an infinite time; or, in short, would never return...."

—Robert Goddard, "A Method of Reaching Extreme Altitudes" (1919)

In 1920 the Smithsonian Institute issued a press release on a grant application produced by the American scientist Robert Goddard. Couched within the richly detailed proposal was a passing comment that eventually the moon could be reached by human-made objects. Although Goddard's paper was focused on experimenting with rockets at high earth altitudes, within days the American press had seized upon and sensationalized the moon claim. The media coverage sparked a widespread reaction, from enthusiasm for such a mission ("the Bronx Exposition, Inc offers the use of Starlight Amusement Park for the purpose, and at the same time will be happy to provide all of the facilities needed for the occasion"[1]) to disdain for the science behind it ("Of course he only seems to lack the knowledge ladled out daily in high schools"[2]).

Goddard, a shy and private man, was mortified by the attention and felt ostracized and isolated by the experience—yet he was far from alone in his aspirations for reaching high earth altitudes and beyond. In the 1920s and 1930s rocket scientists in Germany and the USSR had begun to form nongovernmental organizations in order to collaborate on the challenge of reaching space with rockets for the purposes of science and space

[1] Quoted in Burrows 1999, 46.

[2] An anonymous writer to the *Times'* editorial page on the 13th of January, 1920. Quoted in Burrows 1999, 46.

exploration.[3] During that time scientists were also communicating transnationally regarding their work—and in the 1920s even the reticent Goddard communicated with the German scientist Hermann Oberth regarding his work.[4]

In the inter-war period rocket science was therefore carried out by non-government funded scientists who were motivated by space exploration. However in the buildup to World War II the German and Soviet governments came to see rockets as a potential military tool. If rockets could carry objects to high altitudes and travel long distances, they could prove to be a powerful force multiplier.[5] German and Soviet rocket scientists soon had their work militarized by their respective governments—either through coercion or by being tempted with funding. [6] Goddard's work took longer to attract the attention of the US military, but after Pearl Harbor it too was militarized (Sheehan 2007, 37).[7] In the World War II era rocket science was thereby directed towards missile development and away from exploration: "Their governments told them to prepare to go to war and not the planets" (Burrows 1999, 61).[8] The politics of the build up to World War II shaped the goals and abilities of the earliest groups of scientists who were experimenting seriously with space exploration.

The Cold War once again caused the politics of rocket science to be redefined. Leaders within the USSR and the US once again invested in rockets, but for the purpose

[3] Two examples of such organizations are the All-Union Society for the Study of Interplanetary Flight (a non-military society in the USSR) and the Verein für Raumschiffahrt (VfR, or "Spaceflight Society) which existed in Germany from 1927-1933 (Burrows 1999, 64).
[4] Though Goddard was a very private person, he sent Oberth a copy of his publication quoted above and they engaged briefly in correspondence about their research (Burrows 1999, 48).
[5] A force multiplier being, "technology to increase the potential of success for traditional forces" (Johnson-Freese 2007, 83).
[6] For example, the work of scientist Wernher Von Braun in Germany was militarized, as well as that of Sergei Korolev in the USSR (Burrows 1999, 63-64).
[7] Goddard had also had funding from the Army Signal Corpos in 1917, but that funding was cut promptly after WWI ended (Walter 1992, 26).
[8] For a more detailed analysis of the history of rocket science and rocket scientists, see for example Burrows 1999, Sheehan 2007, Walter 1992.

of space exploration. Actors' reasons for doing so were embedded in a discourse about science and space exploration—but there was also a clear sub-text about political, ideological, military and economic competition between the two remaining superpowers. In the 1950s the superpowers also began to negotiate, through the United Nations, how outer space would be governed.

The International Geophysical Year (IGY) began in July 1957, and was organized by the International Council of Scientific Unions (ICSU), a nongovernmental organization made up of scientists. The IGY challenged the global scientific community to undertake a worldwide study of the human environment, including earth's atmosphere—a challenge which inherently implied that satellite launches should be attempted as part of the IGY (Galloway 1992, 240; Sadeh 2002, 281). On 5 October 1957, "The 'new Soviet society'...turned the boldest dreams of mankind into reality" and launched Sputnik, earth's first human-made satellite.[9] Humankind had entered the Space Age. Once again, the intentions behind this first step into space were defined both by science and exploration (through scientists and their transnational work), and also power politics and competition in the bipolar system.

In the half century since Sputnik's launch outer space has played various roles in society and international politics; inspiring and at times requiring coordination, cooperation, and conflict on a range of projects and amongst a variety of actors. As global politics changed—from the Cold War era, to the Post Cold War era, and into the era of globalization—so too did actors' interests and understandings about outer space. Conversely, outer space itself sometimes played a role in influencing international

[9] The quote is from the front page of the *New York Times* the day after Sputnik was launched (Sullivan 5 October 1957, A1).

politics. By focusing on specific cases within the timeframe of the past 50 years, and focusing on how and why actors developed their motivations with regards to outer space, it is possible to explore this dynamic relationship between outer space and world politics.

Main Question

This thesis uses regime theory and the English School of International Relations to address the question: *Why have actors decided to cooperate on outer space issues, and what does that cooperation tell us about wider international politics and international society?* This thesis undertakes an in-depth analysis of five cases. The cases were selected in order to present a diverse range of issues to which the theoretical approaches could be applied. Each case has at least one common element—that actors had the opportunity to cooperate on a certain outer space issue area—but I have also chosen cases that have differences between them in order to garner broad conclusions about outer space cooperation, regimes, international society, and also the approaches themselves.

The cases chosen (geosynchronous orbit, the International Space Station, Global Navigational Satellite Systems, the company Sea Launch, and comets and asteroids) cover a broad chronological range—from the early days of the Space Age, to the Cold War era, bridging into the Post Cold War era, to contemporary outer space politics in an era of globalization, and also moving into issues that will likely be important in the future. The cases also vary in the number of actors that are potentially relevant to the issue-area. For example, some of the regimes analyzed in the cases effect a limited number of states, whereas others potentially effect all states. The cases also vary in the type of actors relevant to each issue-area; for example state, non-governmental, or individual actors. They also vary with regards to the number and type of broader diffuse regimes and international society institutions that each case issue-area is influenced by, and also has an influence on. Having five cases allows for the analysis to be broad enough to cover a range of issues over a significant period of time, while still being narrow enough to allow for in-depth analysis of each case.

Explaining cooperation within these cases requires investigating what various actors' interests and motivations were with regards to specific outer space issue-areas, and how actors came to develop those interests and motivations. Regime theory is used because the approach is traditionally directed towards explaining why actors cooperate. In addition there is scope to see many different regimes (and also different types of regimes—e.g. formal, informal, diffuse, specific) within the case studies, and therefore regime theory has the potential to offer useful tools to help understand outer space politics. Various multi-issue treaties and practices (diffuse regimes) form broad background understandings about outer space governance, and must be considered when seeking to understand cooperation in more specific outer space issue-areas. Why and how did rational actors calculate and negotiate their interests in each specific case, and how did diffuse regimes such as outer space treaties influence those calculations and negotiations?

The English School is used because it is more broad and historical in its approach, and its terminology and tools have the potential to expand an analysis of outer space politics to considering the international social context of each specific case studies. The reflectivist and constructivist aspects of the English School also present the opportunity to consider how outer space politics are both a reflection of, and on, wider international politics. If each case were treated as a microcosm, what sort of international society would it represent? How did the evolution, rise, and decline of international society institutions influence actors' interests and understanding in each case study, and how did each case and outer space in general influence those institutions? What does each of the cases tell us about changes in wider international society over time?

Local and Global Commons

The international community's collective understanding of outer space is founded on the basic premise that it is a global common. A common is a resource to which no single decision-making unit holds exclusive title (Vogler 2000, 2); an "environmental object" which should not be appropriated to any individual group (Crowe 1969, 1103).[10] Local and global commons are also sometimes referred to as common pool resources (CPRs). The high seas, Antarctica, and outer space are all considered global commons. International actors have established collective understandings of these areas as global commons, which is in itself a form of coordination. Why and how were these areas defined as global commons? Treaties developed for these areas use normative language, by including the clause that such territories should be used "for peaceful purposes" or by establishing them as *res communis* (or the common property of all). However there are also strategic and selfish reasons why actors may agree to defining an area as a local or global common. Certain territories are inherently difficult to control by a single actor. In such areas exploitation by one user reduces resource availability to others (subtractibility), but potential beneficiaries cannot be excluded by a single actor (Ostrom et. al 1999, 3). Thus the resource is inherently communal and actors will calculate the

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[10] Many cultures have historical examples of such commons, but the legal tradition can be traced to Medieval England. Common law and local custom ordered relations among villagers who shared joint pasturelands for grazing their animals, and ordered the usage of other resources from common areas (such as the collection of wood) (Vogler 2000, 2). These commons were not open access, but restricted to local commoners, who had packages of rights to the territory.

benefits of coordination (as well as the risk of being taken advantage of by freeloading—as in the prisoners' dilemma[11]). Rational, self-serving actors will find that they must coordinate behavior in commons areas in order to avoid mutually undesirable outcomes.

This understanding of actor behavior echoes long-standing political theory debates that have been around for millennia. Aristotle wrote, "...what is common to the greatest number has the least care bestowed upon it. Everyone thinks chiefly of his own, hardly at all of the common interest" (*Politics* 350 BCE, Book II, ch.3). The image of humans as selfish, norm-free, utility-maximizers also clearly echoes Hobbes' writings in the 17th Century. David Hume's boat and oarsman scenario ([1740] 1976) and Rousseau's stag hunt scenario ([1755] 1984, Part 2, section 1) also both express early versions of the prisoner's dilemma.

Contemporary discussion of subtractibility and the local commons was sparked by the seminal article written in 1968 by Garrett Hardin in the journal *Science*, titled "The Tragedy of the Commons." In the article Hardin, a professor of biology, outlines a simple scenario in which commoners who share a joint pastureland in England overgraze and under-fertilize their communal field until erosion significantly degrades the resource.

Hardin's article generated extensive discussion and criticism, much of which did not challenge Hardin's explanation of humans as rational and egotistical, but rather disputed "the tragedy" on factual, empirical-evidential, and logical bases. Elinor Ostrom and

[11] The prisoner's dilemma will be familiar to most readers, but in review: Two criminals are arrested under the suspicion of having committed a crime together, but the police lack proof to convict them. The two prisoners are separated and the police offer each of them a deal: the one who offers evidence against the other one will be freed. If neither criminal accepts the offer, they will both get a relatively short imprisonment (and in that sense would be cooperating against the police). However, if one of them confesses to the police, he will be freed completely, and the one who remained silent will receive a heavy punishment. If they both confess, they will both get a medium-length punishment. Each prisoner has a choice between two options, but must make their decision without knowing what the other one will do.

others have pointed out that Hardin's account of local commons is simplistic, if not incorrect, in that he confuses anarchic open access (public) property for the exclusionary, norm- and custom-governed commons that actually existed.[12] Ostrom has studied the governance of local commons around the world and found that long-lasting institutions of governance for sustainable resource management are frequently established for communal areas.[13] Ostrom et al. also argued that rational actors will not always conclude that more and more exploitation is in their best interest (1999, 6). The tragedy of the commons is a real possibility, but is not inevitable. In some instances, actors will determine to cooperate and establish "governance without government" (Rittberger 1995, xiv).

Although the literature of the "commons" has often been related to transborder resources such as the oceans and atmosphere (as with Hardin), an explicit discussion on the connection between the study of local and global commons did not emerge until the 1990s. Elinor Ostrom notably crossed over from writing on local commons to regional commons, and Robert Keohane crossed over from writing primarily on international relations to producing work on local commons.[14] The definition of a global commons is the same as that for a local commons. However there is a significant difference in the context of scale when considering the challenges of collective action in relation to

[12] Ostrom 1994. See also for example Dietz, Dolsak, Ostrom and Stern 2002, 11-12.
[13] Institutions in this context meaning, for example, irrigation institutions in Italy and the Philippines to high mountain meadows and forests in Switzerland and Japan. Ostrom 1985, 1986, 1987, 1989, 1990; Ostrom, Wynne and Schroeder 1990; Ostrom and Walker 1990.
[14] Ostrom wrote a *Science* article in 1999, in conjunction with five other authors, discussing the "Lessons from Local and Regional CPRs" for the study of global commons. Robert Keohane wrote a pamphlet in 1995, outlining the role of institutions in local commons, and the implications for study of global institutions in resource management. Keohane and Ostrom also collaborated on an edited text, *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains,* which was originally published as a special issue of the *Journal of Theoretical Politics* 1994, and later as a text in 1995.

transborder or non-state resource areas (Keohane and Ostrom 1995, 11-12; Snidal 1995, 57). In addition to this "scaling-up" problem, there are additional challenges that are magnified in the management of global commons, such as: dealing with cultural diversity; dealing with interlinked global commons; the accelerating rate of change (which reduces the opportunity to learn from past lessons); and the fact that implications for global commons management are global, and there is only one planet to experiment on (Ostrom et al. 1999, 7-8). However the general consensus amongst global commons authors after Hardin's publication was that rational actors will sometimes cooperate, so the question should be, "Under what conditions can institutions be created that make it possible for actors to make credible commitments, as well as to coordinate behavior—and hence to cooperate?" (Ostrom et al. 1999, 9).

Outer Space Law: An Overview

As a transnational and norm-governed area, outer space inherently has the characteristics of a global common. However defining an area as a global commons doesn't automatically have straight-forward implications for how it will be governed. Outer space law is covered in more detail in the case study chapters, including analysis of how and why certain outer space treaties came about and how those treaties influenced actors' interests and understandings regarding other specific outer space issue-areas. However, this section offers a very general overview of current outer space law.

The United Nations (UN) first focused on outer space issues in the General Assemblies Twelfth Session in 1958 (White 1970, 179). In 1958 the UN Committee on the Peaceful Uses of Outer Space (UNCOPUOS) was created, and in 1959 it was made permanent (Vlasic 1991, 37). In 1961 the General Assembly passed Resolution 1721 which established that international law, including the UN Charter, was applicable to outer space.

The first treaty drafted by the COPUOS was the Outer Space Treaty of 1967 ("the OST"—also sometimes called the "Constitution of Outer Space," Appendix A) which was widely ratified.[15] The OST stated in part that Outer Space was to be used for "Peaceful Purposes" (Preamble), that it was to be used for the "benefit of all peoples irrespective of the degree of their economic or scientific development" (Preamble), and that no nation-state may lay sovereign claim to a celestial body (and hence was *res* communis, Article II).[16] On the issue of territory in outer space the OST stated that, "A State Party of the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body" (Article VIII). This essentially established satellites, shuttles, and even debris as floating pieces of the country that owned them (Arnopoulos 1998, 205; Johnson-Freese 1990, 87).

The OST was followed by the 1968 Agreement on the Rescue of Astronauts and the Return of Objects Launched into Outer Space (the "Rescue Agreement," Appendix B). The UN recognized that with the imminent placement of expensive equipment and also astronauts into outer space the issue of rescue and recovery needed to be addressed. This Treaty, which was also widely ratified, required states to behave humanely toward

[15] By 1 January 2008, 98 countries had ratified the OST (and another 27 had signed but not yet ratified it). For a regularly updated list see http://www.unoosa.org/oosa/en/SpaceLaw/outerspt.html.

[16] On "Peaceful Purposes" Article IV reads, "The moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military maneuvers on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration of the moon and other celestial bodies shall also not be prohibited."

astronauts and/or spacecraft in trouble—whether they be in trouble in outer space or having crash-landed on earth.[17]

By the early 1970s, a decade of human activity in space had generated debris in earth orbit. Satellite parts, rocket boosters, and even chips of paint littered earth orbit and had the potential to cause substantial damage to other objects that they encountered.[18] In 1972 the UNCOPUOS produced the Convention on International Liability for Damage Caused by Space Objects (the "Liability Convention," Appendix C).[19] The Treaty essentially assigned responsibility to the state for damages resulting from their space objects on earth and in space (Preamble, Article II). Although the vast majority of space-object launches were still government-sponsored, the Convention also clarified that private satellites would be the responsibility of the "launching state"—that is, the state where the private company that commissioned the launch was based.

The 1974 Convention on Registration of Objects Launched into Outer Space (the "Registration Convention," Appendix D) led to the establishment of a registry run by the United Nations (Article II) to which all states were to submit details of their launches of objects into outer space, including the object's orbital pattern and purposes.[20] As with the Liability Convention, private objects would be registered with the "launching state."

The last major outer space treaty drafted by the UN was the controversial 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies

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[17] By 1 January 2008, 90 countries had ratified the Rescue Agreement (and another 24 had signed but not yet ratified it). For a regularly updated list see http://www.unoosa.org/oosa/SpaceLaw/rescue.html.
[18] For example, NASA has yet to eliminate space junk as the possible cause of the damage to the Columbia Shuttle's heat tiles that eventually lead to its disintegration (Revkin 2003).
[19] By 1 January 2008, 86 countries had ratified the Liability Convention (and another 24 had signed but not yet ratified it). For a regularly updated list see http://www.unoosa.org/oosa/en/SpaceLaw/outerspt.html.
[20] By 1 January 2008, 51 countries had ratified the Registration Convention. Another 4 had signed but not yet ratified it, and two European intergovernmental organizations (including the European Space Agency) had accepted the Convention's rights and obligations. For a regularly updated list see http://www.unoosa.org/oosa/en/SORegister/regist.html.

(the "Moon Treaty," Appendix E).[21] The Moon Treaty sought to assure the safe and orderly development of the moon's natural resources. Article IV stated that, "The exploration and use of the moon shall be the province of all mankind and shall be carried out for the benefit and in the interests of all countries..." and Article XI stated that, "The moon and its natural resources are the common heritage of mankind..." Few states have ratified the Treaty, primarily due to the vagueness of the "common heritage of mankind" clause (Otchet 1999, 5).

Regime Theory

The tragedy of the commons debate helped to inspire a group of theorists working on a new area in International Relations: regime theory.[22] In 1975 John Gerald Ruggie wrote an article titled "International responses to technology: concepts and trends," which introduced the concept of regimes as a way to understand international cooperation on transnational issue-areas. He defined regimes as, "a set of mutual expectations, rules and regulations, plans, organizational entities, and financial commitment that have been accepted by a group of states" (1975, 570). Three important texts on international regimes followed: Keohane and Nye's *Power and Interdependence* (1977), Stephen Krasner's article in *International Organization* "Structural causes and regime consequences: regimes as intervening variables" (1983a), and Robert Keohane's *After Hegemony* (1984). The literature on regime theory proliferated throughout the 1970s and

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[21] By 1 January 2008, 13 countries had ratified the Registration Convention (and another 4 had signed but not yet ratified it). For a regularly updated list see http://www.unoosa.org/oosa/en/SpaceLaw/moon.html.

[22] Several other phenomena are noted as reasons for the development of regime theory in the United States in the mid-1970s. New and global problems such as environmental degradation, resource depletion, and problems associated with the spread of technological knowledge gave need for discussion of pragmatic solutions (Ruggie 1975, 557-583). Regime theory was also developed as a way of explaining the trade regime established by Americans after WWII, and the 1971 collapse of the world monetary regime gave rise to the question of how that system would be maintained in the potential absence of US dominance (Vogler 2000, 39).

1980s, and despite suggestions that it would fade in the Post Cold War era (Strange 2002, 159) has continued to engage authors in the 1990s and 2000s.

The definition of a regime has evolved but is generally accepted and widely quoted as, "A set of implicit or explicit principles, norms, rules, and decision-making procedures around which actor expectations converge in a given area of international relations" (Krasner 1983a, 2). Krasner defines "principles" as standards or rules of personal conduct, and "norms" as valued, socially established, or even merely average behavior (1983a, 2). The distinction between norms and principles is not always clear, and their relationship is not necessarily distinct—norms are defined in terms of standards of behavior, rights and obligations, and are often derived from principles (Vogler 2000, 33). Krasner defines "rules" as "specific prescriptions or proscriptions for action" (1983a, 2). Vogler is more specific in stating that rules are usually codified in formal multilateral agreements (2000, 37). A further distinction must be made between regimes and agreements. Agreements are *ad hoc* and often relate to one particular event, whereas regimes are longer standing—regimes facilitate the achievement of agreements (Krasner 1983a, 2).

Regime theory seeks to explain under what conditions rational actors will determine that it is in their interest to cooperate, despite the lack of a hierarchical system of governance, and despite the fact that the international system is anarchic. Theorists seek to understand how regimes facilitate cooperation; how and why they matter; and how they are formed, sustained and changed over time. Most regime theorists believe that regimes are an important source of stability in the international arena, particularly as states increasingly confront problems that do not fall clearly within territorial boundaries (and/or are in neutral territory) and that require international cooperation. Through regimes, actors in international politics can coordinate activity and expectations, thus improving collective outcomes. Theorists have listed several roles that regimes play. Keohane notes that they reduce uncertainty and transaction costs (Keohane 1995, 32). Ruggie writes that they allow for the acquisition of new capabilities (including research, development and hardware construction), that they make effective use of capabilities that already exist, and that they help actors cope with the consequences of the use of capabilities, including over-exploitation (1975, 571). Functionally, regimes provide information and management (Ruggie 1975, 572-573).

There is some variation in the methodology of regime theorists (explored more in the subsection below on "categorizations of regime theorists") but many regime theorists rely on rational choice theory. Rational choice theory is a methodology with origins in microeconomics and uses rational actor models. Rational choice theorists assume all individuals choose the best action according to stable preference functions and constraints facing them. Actors are presumed to be utility-maximizers and to calculate their interests based on the use of logic and cost-benefit analyses. Rational actor models are positivistic and oriented towards behavioralism (Evans and Wilson 2002, 347). For example, they tend to derive testable hypothesis for determining why states obey unenforced rules (Hurrell 1995b, 54-55). Modeling and game theory are common methods in regime theory literature.

Regime theory literature usually focuses on specific organizations and how those organizations' rules and procedures generate more rules and constraints on state behavior. Regime analysis often focuses on the constitutions, organizational structures, decision-making processes and bureaucratic practices of key international organizations (Evans and Wilson 2002, 340). Through case studies regime theorists usually look at how organizations develop rules that constitute regimes, and why and how those regimes change over time. Actors' interests are explored and then applied to the negotiations context. Some authors also take into account the influence of international institutions (which are explored further below in the section on the English School), particularly with mention of the effects of sovereignty (for example Peterson 2005), ecological interdependence (for example Young 1994 and Hurrell 1995a) and economic interdependence (for example Keohane 1984) on outcomes.

Regimes may be formal or informal. Formal regimes are "legislated by international organizations, maintained by councils, congresses or other bodies, and monitored by international bureaucracies" (Hopkins and Puchala 1983, 65). Informal regimes are "created and maintained by convergence or consensus in objectives among participants, enforced by mutual self-interest and 'gentlemen's agreements,' and monitored by mutual surveillance" (Hopkins and Puchala 1983, 65). Regimes may be spontaneous, negotiated, or imposed (Young 1983, 98-101). Members of international regimes are usually assumed to be sovereign states, though private entities may be involved in carrying out the actions governed by international regimes (Young 1983, 93).

Different Regime Theory Strands

I adopt the terms used by Krasner and several other authors in dividing regime theorists into three different "strands": the structuralist approach, modified structuralist approach, and the Grotian approach (2002, 330).[23] These three approaches can be seen as

[23] Some authors recognize different titles for the various strands of regime theory; for example Evans and Wilson recognize the three categories: realist (where I use structuralist), modified realist (where I use

a continuum, moving from rationalist and positivist at the structrualist end, to more focused on social factors at the Grotian end. The structuralist approach to regimes asserts that actors are egoistic, self-interested power-maximizers (and hence the affiliation of this approach with realism). Regimes are primarily formal and often created by system hegemons to maintain and advance their own interests (so-called strategic regimes [Strange 1983]). Regimes are a way for great powers to formalize rules and norms that benefit themselves.[24] Powerful states will engage in international cooperation, but based on calculations for how the negotiation outcomes benefit them relative to others (relative gains). Thus regimes are merely epiphenomenon. Basic causal factors such as power, economic interests, and personal values may be channeled through regimes. The regimes themselves have no causal effect on either the regeneration of interests or on behavior and outcomes (Krasner 1984, 5-10). Actors' motivations can be explained by considering the basic causal factors that inform their interest formation, and by then assuming that actors will behave rationally and shrewdly to advance their own interests. This approach is most commonly associated with the writings of Susan Strange.

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modified structuralist), and Grotian. I prefer Krasner's terms in order to avoid confusion with the wider realist approach. Other authors only distinguish two regime theory strands; for example, Andrew Hurrell distinguishes between a realist and a liberal institutionalist approach (2002, 133), and Edward D. Mansfield identifies realist neoliberal approaches (1994, 96). I prefer Krasner's three-tiered taxonomy because the three separate categories allow for more detail in recognizing the differences between regime theorists.

[24] A further development of this idea within structuralist approaches is hegemonic stability theory. Hegemonic stability theory states that the country that has the biggest stake in the preservation of the system (the hegemon, who possess a preponderance of material resources—raw materials, sources of capital, control over markets, and a competitively advantageous position in the production of goods in great demand [Keohane 1984, 32]) will be willing to act in accordance with the rules and to bear most of the transaction costs for maintenance of the system, as a rational decision based on medium-term self-interests (Keohane 1984, 32-39). Weaker states will take full advantage of the system, in some cases cheating or free riding, resulting in sub-optimal outcomes for all. Eventually the power of the hegemon is eroded, and as its power declines, its actions become more selfish, and delegitimizing the hegemon and the regime for weaker states, in a feedback loop that eventually results in the disintegration of the regime (and indeed, the undermining of the hegemon's power).

Modified structuralists are more optimistic about the existence of opportunities wherein rational actors will calculate that it is in their interest to cooperate. While some regimes are merely strategic regimes established by hegemons, sometimes actors will rationally conclude that cooperation is the most reasonable action to take for certain issue-areas (especially when that issue-area is inherently complex, and/or inherently transnational). Once in place, a regime may then come to act as an intervening variable, pushing down on actors to influence their interests, and also pushing up to have an influence on outcomes and behavior (Krasner 1983a, 5-10). Once established, regimes have their own momentum and "compliance pull," and thus maintenance of a regime is less difficult than the establishment of a regime. Therefore a hegemon may be needed to establish a regime, but the regime becomes self-sustaining regardless of whether the hegemon declines (Keohane 1984, 32-39). Thus modified structuralists still assume rationality on the part of actors, but believe that there is broad scope for cooperation amongst international actors. Authors associated with the modified structuralist approach are, for example, Arthur Stein, Robert Keohane, and Robert Jervis.

The Grotian strand of regime theory asserts that regimes are an unavoidable feature of international life, and that when actors engage in any social practice they are constrained by rules and norms (Young 1980, 331). The Grotian approach asserts that patterns of behavior over time generate social expectations, and those social expectations constitute a regime (albeit an informal regime). Formal regimes may also be negotiated and serve to establish patterns of behavior which then generate social expectations. Thus regimes, patterns of behavior, and social expectations all mutually reinforce each other (Young 1983, 94-96). Regimes are not empirical facts but "attitudinal phenomena" that exist primarily as participants' understandings, expectations, or convictions about legitimate, appropriate, or moral behavior (Evans and Wilson 2002, 330-331).[25] Therefore basic factors such as actors' interests in obtaining power are not the only cause of behavior; actors are embedded in a social structure of which they are mutually constitutive and that structure may also cause actors' basic interests and identities to change. This logically leads Grotian practitioners to break in their methods and methodology from the structuralist and modified structuralist strands of regime theory. Grotian approaches focus on the patterns or life cycles of regimes over time (Young 1983, 94) and adopt a more reflectivist or interpretivist methodology in order to understand how actor are mutually constitutive of the social context that they find themselves in. Regimes are seen as intervening variables that pattern expectations, behavior, and interests. The Grotian approach is largely associated with Oran Young, Raymond F. Hopkins, and Donald J. Puchala.

A concept unique to Grotian regime theory is diffuse regimes (and the idea that there is a continuum of types of regimes, ranging from specific to diffuse). Specific regimes are single-issue and diffuse regimes are multi-issue (Hopkins and Puchala 1983, 64). Diffuse regimes are more likely to have a significant number of actors who subscribe to their principles or at least adhere to their norms (Hopkins and Puchala 1983, 64). Specific regimes are often embedded in diffuse regimes (Hopkins and Puchala 1983, 64). In this thesis, long-standing and highly internalized regimes (such as those embodied by the four widely-ratified outer space treaties introduced above—the OST, Rescue Agreement, Liability Convention, and Registration Convention) are considered to be diffuse regimes,

[25] Informal regimes in particular "human artifacts" that derive their meaning and influence from the individuals or groups of actors that believe them to exist (Young 1983, 95).

in that they have come to regulate multiple issue areas and in that they are widely accepted by actors (as evidenced by wide ratification). Although they are formal in that they have been codified in treaties, the meaning that they portray and the influence that they have on behavior elevate their status to that of a diffuse regime. This also opens up the possibility for exploring how more specific regimes may be influenced by less-specific diffuse regimes (nested regimes), or how one regime may be established to mediate between two or more other regimes (mediating regimes).

Applications of Regime Theory to Outer Space Politics

Two texts in the existing literature use regime theory techniques to analyze outer space activity: John Vogler's *The Global Commons: Environmental and Technological Governance* (1995), and MJ Peterson's *International Regimes for the Final Frontier* (2005) (preceded by his article "Diverging Orbits: Situation Definitions in Creation of Regimes for Broadcast and Remote Sensing Satellites," in *American Political Science Review* 2004). Other articles such as Peter Cowhey's article, "The International Telecommunications Union" (1994) focus narrowly on individual regimes that have some relation to outer space politics. However I will focus in this section on Vogler and especially Peterson, as their analysis is more in-depth and focused on a wider range of outer space issues.

Vogler starts from the Common Pool Research literature before introducing the concept of regimes and then applying regime theory to his case studies: the atmosphere, oceans, Antarctica and outer space. His chapter on outer space introduces outer space law and then addresses the issues of outer space militarization; environmental degradation and space debris; information flow; and the use of orbits and the radio-frequency spectrum. Vogler outlines principles and norms (such as the principle that the radio frequency spectrum is open to all), decision-making procedures of specific organizations such as the United Nations and the International Telecommunications Union (ITU) (such as that the ITU's Administrative Council consists of members elected from the membership) and rules (such as the distribution rules for geostationary orbit) (2002, 112-199). He then analyzes the effectiveness of these regimes, measured in four respects: the status given international laws and the extent to which they are considered binding on sovereign states; the degree to which governance over the relevant resource has been transferred from national to organizational authority; the degree to which the regime has modified and sustained actor behavior as part of the fulfillment of its purposes; and whether the regime has succeeded in providing for sustainability and equitable management of the resource ("problem solving") (2002, 155-179). He concludes his text by analyzing why the various regimes have developed and why they have changed.

Peterson's text focuses on space activity from 1957-1988 and explores how actors determined their interests and approaches to negotiations based on the collective development of situation definitions. Peterson writes that situation definitions are the product of individual actors' cognition, but that as actors convene in negotiations a "group" perception of that situation definition develops (2005, 8). Once a situation definition has been established actors form their preferences and then move to preference aggregation, which leads to negotiation outcomes (2005, 9 and 66). Peterson uses situation definitions to explore "how actors' interests converge" as part of the process of preference aggregation. The author's premise is that situation definitions help actors decide how to behave by providing them with a framework for understanding—in the case of outer space by drawing on analogies of the high seas and Antarctic regimes (2005, 6-7).

Peterson's case studies are all from the Cold War era, and include: the decision to make outer space *res communis;* negotiations regarding rescue and registration; liability; military activity in outer space; uses of the moon; and the orbit-spectrum resource. In each of these analyses he traces individual actors' interests, the use of terrestrial analogies in developing situation definitions, and the role of individual states in negotiations.

Both Vogler and Peterson provide useful insights into outer space politics and regime theory, but also leave open the scope for further study. Vogler's dedication of only one chapter to outer space restricts the breadth of his analysis, and Peterson's analysis stops at the end of the Cold War. This thesis considers in great detail five cases that bridge the Cold War era, and deal with historical, contemporary, and future issues and international regimes for outer space politics. Both authors also neglect the international social aspects of outer space politics—how international institutions and international society have created the context in which actors and regimes are constituted, and also how outer space politics are part of the wider reconstitution of that international society. Peterson goes some way towards analyzing ideational and institutional factors (as "situation definitions" can be understood as ideational factors, and he also acknowledges the constitutive role of Westphalian sovereignty which I consider to be an international institutional factor) but that analysis still falls short of appreciating the complexities of those factors. This thesis seeks to analyze how actors came to calculate their interests and how regimes helped to coordinate behavior and reconstitute interests—but I also consider how international society and institutions created the wider context in which actors developed interests and identities.

In focusing on the Space Age up until 1989 Peterson's text also necessarily does not engage with questions regarding fundamental changes in international relations in the Post Cold War era and in the era of globalization. Outer space politics are increasingly influenced by commercialization and non-state actors, and Peterson's analysis fails to consider such influences, largely due to his focus almost exclusively on treaties in the Cold War time frame. This thesis takes into consideration the myriad types of actors (particularly in more contemporary cases) that have interests and influence in outer space politics, and how they are at play with state actors. By taking a more historical approach (particularly in using the tools of the English School) this thesis seeks to consider more fundamental international social changes that occurred over the Cold War and Post Cold War eras, and how outer space politics both reflected and reconstituted those changes.

The English School

The English School approach has the potential to generate greater understanding about how the international social context has influenced actors' interests and behavior with regards to outer space politics. The English School approach can also be applied to the second part of the main question of this thesis: What does cooperation with regards to outer space tells us about wider international politics and society? The English School has a long and rich history, most commonly associated with the British Committee on the Theory of International Politics. The Committee was formed in 1959 and brought together distinguished authors from the tradition such as Hedley Bull, Martin Wight, and

Herman Butterfield.[26] Some of the key texts that make up the "canon" of English School thinking (and that are drawn upon in the rest of this thesis) are: *Diplomatic Investigations: Essays in the Theory of International Politics* (edited by Herman Butterfield and Martin Wight 1966), *The Expansion of International Society* (edited by Hedley Bull and Adam Watson 1984), *Systems of States* (Martin Wight 1977), and Hedley Bull's *The Anarchical Society* (1977). However other contemporary English School texts are also highly relevant to the analysis here, and in particular those that are engaged with the Post Cold War constructivist "turn." From these more recent works, this thesis in particular engages with Barry Buzan's *From International to World Society: English School Theory and the Social Structure of Globalisation* (2004), but also the essays in *International Society and its Critics* (edited by Alex J. Bellamy 2005) and the forum on Buzan's "From International to World Society" in the *Millenniun: Journal of International Studies* from August 2005.

The core argument made by English School theorists is that states are members of an international society despite international anarchy. International society establishes a norm-governed relationship wherein members accept that they have at least limited responsibility towards each other and society as a whole.[27] Hedley Bull's oft-quoted definition is that, "A *society of states* (or international society) exists when a group of states, conscious of certain common interests and common values, form a society in the

[26] A detailed history of the English School is not necessary for this thesis, but for a thorough review see for example Dunne (1998). It is noteworthy that the "English School" was not defined as such until, ironically, Roy Jones gave the affiliated thinkers that title in his article that called for the School's closure (1981).

[27] English School theorists do not assert that such a society is necessarily universal, or that it has always existed. For a review of various international societies across history and across regions, see Wight's *Systems of States* (1977).

sense that they conceive themselves to be bound by a common set of rules in their relations with one another, and share in the working of common institutions."[28]

Institutions

The English School's definition of institutions is broader and less tangible than that of regime theory "organizations." Bull called institutions "habits and practices."[29] According to Buzan they are, "recognized patterns of shared practices rooted in values held commonly by the members of interstate societies, and embodying a mix of norms, rules and principles (2004, 181-182). Institutions generate a sense of obligation to act in the interests of international society as a whole (Dunne 1998, 98). They are normative and ideational structures, and not necessarily clearly observable phenomenon. Institutions do not exist as social facts, but are social practices that are part of the construction of both the actors and the rules of the game (Adler 2005, 175). Returning to Buzan, institutions are, "relatively fundamental and durable practices, that are evolved more than designed, and... they are constitutive of actors and their patterns of legitimate activity in relation to each other" (2004, 167). It is this dynamic of being constitutive which distinguishes institutions from the Grotian concept of informal and pervasive regimes. Young, for example, believes that regimes are human constructs ("human artifacts"; 1983, 95), which bears some similarity to the English School concept ofnstitutions. However English School theorists emphasize more clearly how institutions play a constitutive role in relation to both the pieces and the players of the game (Buzan 2004, 181-182). Institutions are also more broad than regimes (and even diffuse regimes)/ Regimes apply to a specific issue-area—either narrowly defined (e.g. orbital positions) or more broad

[28] *The Anarchical Society* (1995 edition), 13.
[29] Noted in Dunne 1998, 98.

(e.g. outer space governance)—but this is still more narrow than English School institutions, which may influence any area of international politics at varying periods of time (e.g. sovereignty).

Various authors select and define the institutions of international society differently. Buzan thoroughly reviews the myriad categories of "institutions" that English School authors have used over time (2004, 161-204) and then develops a revised taxonomy, which is used in this thesis. According to this framework, primary institutions are divided into master and derivative institutions, as follows:[30]

Primary Institutions		Secondary Institutions
Master	Derivative	(Examples of)
Sovereignty	Non-intervention	UN General Assembly
	International Law	Most regimes, ICJ, ICC
Territoriality	Boundaries	Some PKOs
Diplomacy	Bilateralism	Embassies
	Multilateralism	United Nations
		Conferences
		Most IGOs, regimes
Great Power Management	Alliances	NATO
	War	UN Security Council
	Balance of power	
Equality of people	Human rights	UNHCR
	Humanitarian intervention	
Market	Trade liberalization	GATT/ WTO, MFN agreements
	Financial Liberalization	IBRD, IMF, BIS
	Hegemonic stability	
Nationalism	Self-Determination	Some PKOs
	Popular Sovereignty	
	Democracy	
Environmental Stewardship	Species survival	CITES, UNFCC,
	Climate stability	Kyoto Protocol, IPCC,
		Montreal Protocol, etc.

According to Buzan's taxonomy, the primary institutions of international society are sovereignty, territoriality, diplomacy, great power management, equality of peoples, the

[30] Reproduced with permission from the author from Buzan 2004, 187.

market, nationalism, and environmental stewardship. Although English School authors argue that institutions are knowable but not necessarily observable, it is necessary to lay out some basic ways in which the institutions may be understood as having an influence on actors (how they may be "seen" throughout the case studies).

Sovereignty is a master institution, with the derivatives non-intervention and international law. Sovereignty as an institution has served to constitute world politics by pre-establishing that states are the primary actors in world politics. Sovereignty can be seen as a pre-constitutive factor when actors accept states as the main actors in international politics. It can be seen when actors behave in a way which indicates pre-existing shared understandings about the identity of states and their role in international politics—for example, if actors approach an issue area and already have a shared understanding that the issue will be dealt with by (and between) states.

Buzan suggests that international law may be a derivative of the institution of sovereignty, although other authors such as Mayall (1990) consider it independently from sovereignty. Bull defined international law as, "A body of rules which binds states and other agents in world politics in their relation with one another and considered to have the status of law" (1995, 122). It is not necessarily relevant whether international laws are enforceable; what is important is that actors believe certain rules to have the status of law (Bull 1995, 131). International law as a constitutive institution can be seen when states join, or continue to adhere to, treaties that are not obviously in their basic interests. While rational actor accounts may lead to an explanation of why states only enter into treaties when they advance their interests, states can also act in a way that suggests a desire to invest in a law-impregnated international society by committing themselves to treaties that may not obviously advance their interests (and/or feeling obliged to justify behavior that challenges or undermines existing laws, as above). It is also apparent that international law as an institution is influential when states feel obliged to provide an explanation or justification for their violation of international laws.

While sovereignty since the time of Westphalia has been associated with territoriality—with the atomistic state demarcated by physical boundaries—the two are not *necessarily* linked, and territoriality can be seen as a separate master institution. Sovereignty can, in principle, exist without being territorial (Buzan 2004, 182) and (as the global commons or extraterritorial domains such as embassies demonstrate) territory can also exist with something other than a straightforward relationship to sovereignty.[31]

Diplomacy was defined by Bull as, "The conduct of relations between states and ot her entities with standing in world politics by official agents and by peaceful means" (1995, 156), and Buzan writes that it refers to messengers, conferences and congresses, diplomatic language, arbitration, and multilateralism (Buzan 2004, 183). It is easy to identify when diplomacy occurs (for example, bilateral or multilateral meetings between state-leaders), but it is also worth considering the circumstances under which actors decide to turn to diplomatic means for negotiations. That is, the very possibility for diplomatic means to be pursued can at times be understood as pre-constituting the context in which actors develop their interests in that diplomacy. Diplomacy as an institution can also be seen as influential when actors pursue diplomatic negotiations when there are other viable alternatives (for example if an actor pursues diplomatic resolution of an issue when they could feasibly act unilaterally instead).

[31] See for example Ruggie 1994 for an analysis of "unbundling sovereignty" and extraterritoriality.

Great power management is not to be confused with states merely acting in their interest and based on their capabilities defined in terms of power. However great power management as an international society institution is based on the responsibilities that great powers have for managing the system (Bull 1995, 200). According to Bull, "Great powers are powers recognized by others to have, and conceived by their own leaders and peoples to have, certain special rights and duties" (1995, 196). According to Bull, being a great power carries with it specific responsibilities, which include avoiding disorderly acts themselves, showing themselves responsible to demands for just change, and co-opting aspiring powers into the great power club (1995, 200). The management function that great powers perform can be seen as a matter of practice (Wight 1977, 136) and hence an English School approach contributes to an understanding of actor behavior when powerful states are seen to perform the role of "great power." Similarly, the balance of power can be understood as an institution when states pursue it for the sake of promoting and maintaining international order, and not simply for their own interests. This balance of power as an institution can also be distinguished from a fortuitous balance when the system becomes balanced not as a matter of intention by states.

Equality of peoples as an institution was established as part of decolonization, and has the derivative institutions of human rights and humanitarian intervention. Equality of peoples can be understood as influential in an international society where appeals to the rights of individuals, or for greater equality for collectives of individuals, are present in the language used by actors. The institution may also be seen as influential where actors rely on the discourse of human equality for legitimizing their actions.

The market has not traditionally been considered an institution by English School theorists, but Buzan makes a good argument for it being included.[32] According to Buzan, "The market means more than just trade, or even trade and finance together. It is a principle of organization and legitimation that affects both how states define and constitute themselves, what kind of other actors they give standing to, and how they interpret sovereignty and territoriality" (2005b 126) (sovereignty and territoriality because a liberal economic state must have to be permeable to trade, travel, ideas, capital, and a wide range of INGOs [Buzan 2005b, 128]). Given liberal economics is, at the most basic level, about collective commitment to joint gains, the market potentially has close ties to solidarism in international society. The market as an institution can be understood as constitutive when actors' identities are influenced by the market—for example as a "liberal state" or a "transnational corporation." It can also be understood as constitutive where opportunities arise for actors to undertake commercial activity—that is, the market institution should be understood as "visible" not only by considering what commercial activities actors undertake, but also in considering how it was that such activities became a possibility in the first place.

Nationalism and its derivatives self-determination, popular sovereignty, and democracy makes territory sacred by making sovereignty popular (Buzan 2004, 183). Nationalism can be seen as influential as an institution when actors already have as part of their identities a sense of connection to a specific territory and where this influences their interests and behavior.

Environmental stewardship has emerged as an institution particularly since the 1970s. Although Bull discusses environmentalism in *The Anarchical Society* (1995, 282-284), it

[32] See Buzan 2004 and also Buzan 2005b, 115-134.

hasn't been given significant attention within the English School literature.[33] For Buzan environmental stewardship refers to, "an area of responsibility involving stewardship or trusteeship of the planet" (2004, 183), and has the derivative institutions of species survival and climate stability. Environmental stewardship as an institution may be associated with pluralism given that the root concern is coexistence; however when environmentalism appears to be internalized as a shared value and/ or has led to more and complex joint projects, it may also reflect solidarism. Environmental stewardship may be understood as influential where actors express concerns about the environment (that is, use language which suggests that environmental concerns are part of their interests and/or influencing the development of other interests), and particularly where such concerns are accepted by the international community as legitimate.

Although durable, primary institutions are neither permanent nor fixed, and undergo a historical pattern of rise, evolution and decline that is long by the standards of a human lifetime (Buzan 2004, 181-182). Some practices become over time institutionalized (are constitutive and come to have the status of an institution) and are hence "new"; for example, the emergence of environmental stewardship in the 1970s, or the growth of the free international market over time. Others decay and eventually disappear; for example colonialism. Institutions also may evolve. Buzan offers as an example of evolution of an institution the changes that sovereignty has undergone in the last 200 years (2004, 182). Evolution of that type may be a sign of vigor or adaptation. In the analysis that follows, I consider an institution to be rising when there is evidence that it is increasingly influential on actors' interests and identities. For example, if actors behave in a way which indicates that concerns about climate change are influencing their interests, this would indicate that

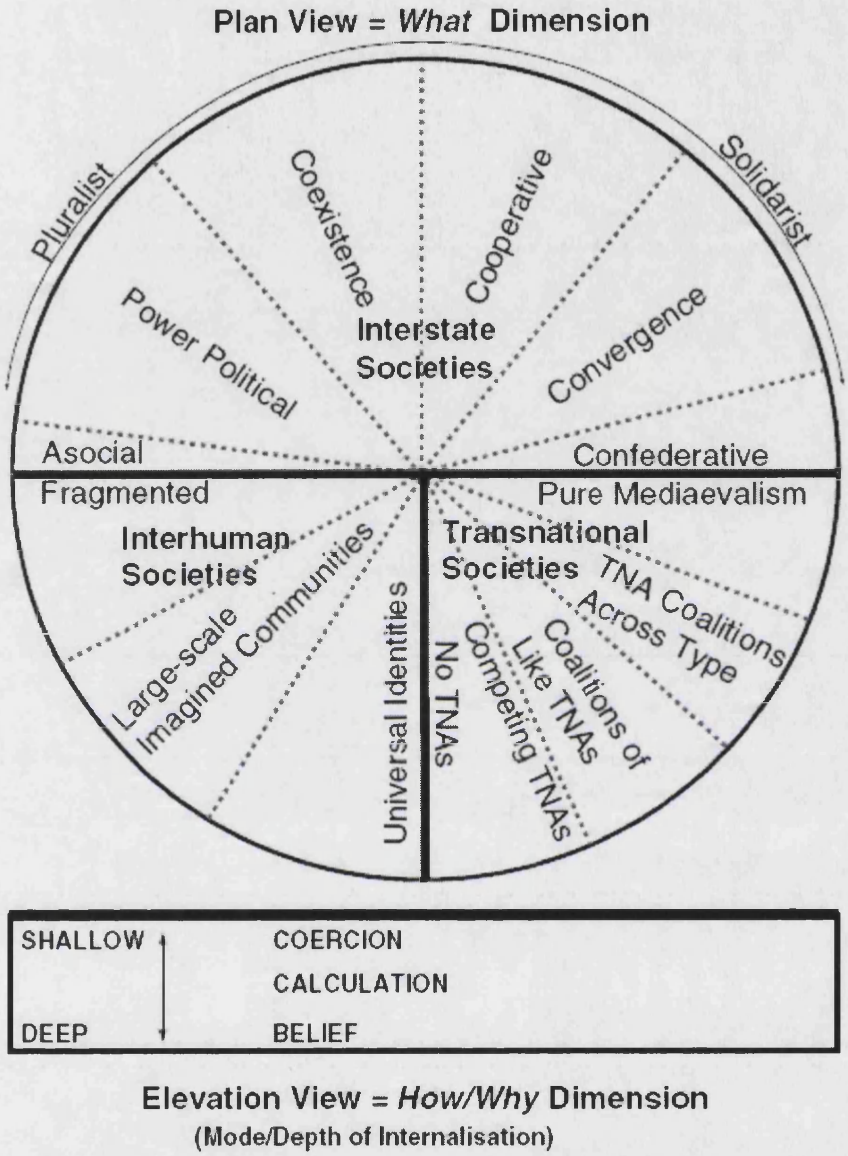
[33] A notable exception is Paterson 2005.

the institution of environmental stewardship is rising. I also consider an institution to be evolving if its relationship with other institutions is undergoing significant change (as for example with the evolving relationship between sovereignty and territoriality in an era of globalization). Primary institutions constantly effect and are effected by other primary institutions, and their gradual processes of rise, evolution, and decline is directly related to the changing relationship between institutions themselves.

A key discussion within the English School is with regards to pluralism and solidarism in international society. Pluralism represents a "thin" interstate society, meaning that there are few shared values, and actors focus on devising rules for coexistence and the maintenance of order within a framework of sovereignty and non-intervention.[34] Solidarist international societies are "thick," meaning there is a wider range of shared values, and rules not just about coexistence but also pursuit of joint gains and the management of collective problems in a range of issue-areas (Buzan 2004, 59). English School authors have argued that solidarism exists when diverse communities develop shared values and agreements regarding moral standards such as human rights.[35]

As the following graphic shows, Buzan conceives of pluralism and solidarism as a continuum rather than two distinct categories (Buzan 2004, 154). In the following graphic, the continuum from pluralism to solidarism is reproduced at the top half of the circle labeled "interstate societies":[36]

[34] For more on thick pluralist international society for coexistence and justice but with limited values, see for example Dunne 1998, 100; Mayall 2000, 14; Vincent 1986, 114.
[35] For more on solidarism, shared values, and moral standards, see for example Bellamy 2005, 11; Dunne 1998; Linklater 1998, 166-167.
[36] Reproduced with permission from the author from Buzan 2004, 159.



According to Buzan's graph above, interstate societies fall somewhere along the pluralist/solidarist continuum, which ranges from asocial (on the furthest pluralism end) to confederative (at the furthest solidarism end). Starting from the pluralist end: An asocial interstate society would have no interstate social contact at all except wars of extermination (Buzan 2004, 159). Power political interstate society would be based on survival and have little or no shared values (Buzan 2004, 159-160). A coexistent interstate society would be based on the core institutions of the balance of power, sovereignty, territoriality, diplomacy, great power management, war and international law (Buzan 2004, 160). At this point the continuum moves to the solidarist side with cooperative interstate societies, in which more values are shared, and war is likely downgraded as an institution. Joint projects may arise that are undertaken for coexistence or even for joint gains or the pursuit of knowledge for knowledge's sake (Buzan 2004, 160). In a cooperative society other institutions such as equality of peoples might be stronger and reflect shared values (Buzan 2004, 160). Convergent interstate societies would have a significant range of shared values, substantial enough to generate similar forms of government (Buzan 2004, 160). Finally a confederative interstate society would have converged governments as well as significant intergovernmental organizations (such as the European Union) (Buzan 2004, 160).[37]

The graphic above also depicts Buzan's distinction between three domains: the interhuman, interstate, and transnational. Each of the three domains is linked to a society. The interstate domain is linked to interstate society (what English School theorists have traditionally called international society). The interhuman domain is linked to interhuman society, which is characterized by, "social structures based on interactions amongst individual human beings…and mainly manifested as large-scale patterns of shared identity (Buzan 2004, xvii). The transnational domain is linked to transnational society, which refers to, "social structures composed of non-state collective actors" (Buzan 2004, xviii).

Buzan's elaboration of domains ties into another key discussion within the English School literature, which is with regards to world society. Buzan states that a world

[37] Reproduced with permission from the author from Buzan 2004, 159.

society exists where the interhuman, interstate, and transnational domains are all present and where there is no clear hierarchy in the dominance of one domain over another (2004, 59-60).[38] International (or interstate) society is state-based, and world society also encompasses elements of global society that are non-state; that is, on the graph above a world society exists when the interstate, interhuman, and trasnantional societies are all equally developed in world politics. Although solidarist international society may require a higher degree of the sense of community (Buzan 2004, 146), world society in particular implies a stronger sense of "we-feeling" and common culture within a community (Buzan 2004, 110-111). International and world society are not absolute categories, but may exist in various forms at the same time (Buzan 2004, 117).

For English School authors, entities such as the state, international society, and the diplomatic community are knowable, but not necessarily observable. Actors' understandings about structures in the state system are inter-subjective rather than material (Wendt 1994, 385). Constructivist ideas contribute to an English School understanding that states are embedded in networks of social relations that shape their perceptions of the world, their role in that world, and what their interests are within that system (Finnemore 1996, 10). Ideational structures (including institutions) shape the identities and interests of actors in world politics and are also mutually constituted by those actors.[39] Although actors are constituted and constrained by ideational and material structures, structures would not exist without the knowledgeable practice of actors (Reus-Smit 2001, 218). Actors in this case may be individuals (such as state-leaders) but states

[38] Buzan argues that English School theorists have been vague as to the definition of "world society," and goes through a detailed review of the concept in both International Relations and non-International Relations literature before outlining the definition given above in the main text. See Buzan 2004, 56-100, and for a reaction to Buzan's definition see Dunne 2005b.
[39] See for example Wendt 1992.

also have a degree of agency and play a role in constructing societal structures (which in turn influence agents and perceived forms of legitimate agency) (Dunne 2005). State identities and interests are an important part of these social structures rather than given exogenously to the system by human nature or domestic politics (Wendt 1994, 191).[40]

Given these methodological complexities, the question arises as to how pluralism/ solidarism and international/ world society can be analyzed. The English School "lens" developed by Buzan offers certain methods applicable to the project undertaken in this thesis. Application of the English School includes considering how pluralism and solidarism are reflected in each case; considering the role of primary institutions in international society (how they may be in rise, evolution, or decline, and how they relate to each other within that context, sometimes complimenting or contradicting each other); and where relevant, considering the interplay among the three domains (interhuman, transnational and interstate).

Applications of the English School Approach to Outer Space Politics

International Relations theorists have not applied the English School to outer space politics. Buzan makes reference at various points to "big science" projects, primarily in suggesting that big science projects tend to reflect solidarism because they are directed towards achieving knowledge for its own sake (2004, 151). Buzan also states that war as an institution cannot be a core institution of a society that is undertaking big science projects (2004, 193). He also suggests that big science projects may fulfill a "vanguard" role in that they may increase the number of shared values between actors and lead to

[40] While constructivism is largely accepted as a key component of English School thinking in the post-Cold War era (Bellamy 2005, 2), it is noteworthy that this move has also been critiqued by some self-proclaimed constructivists; for example, Immanuel Adler's (2005) critique of Buzan's (2004) constructivism.

further joint projects (2004, 225). Otherwise the analysis of outer space politics has been largely neglected by English School authors.

This is in part related to the general lack of work by English School authors applying the approach to more specific empirical material. Bull and Watson's exploration of international societies throughout history in *The Expansion of International Society* is a notable exception where the English School has been applied in detail to empirical material. However, given that this work was completed in 1984, it does not cover contemporary cases, and the analysis in the text is also still relatively broad—focusing on international society on a global and sub-global scale, as opposed to looking at international and world society with regards to more specific issue-areas. Buzan applies his English School "lens" in the final chapter of *From International to World Society,* but again this analysis is very broad and relatively brief in its scope. If the English School is to continue to develop as an approach and maintain its relevance in International Relations, such empirical applications need to be undertaken—and especially if it is to achieve status as "grand theory," as Buzan suggests that it should aspire to do.

Regime Theory and the English School: Similarities and Differences

Neither Regime Theory or the English School are coherent traditions and the extent to which there are similarities and differences between them depends on which authors or strands of theory are being used. However some general points can be made. The most important point of crossover between regime theory and the English School is the assumption that cooperation between states occurs despite the reality of state-centricism and international anarchy. Both approaches assert that rules are important in guiding and restraining states even though enforcement of those rules is generally not practical (Evans and Wilson 1992, 335), and hence the (development of the) interests of states in adhering to those rules is a point of interest. However the approach to explaining and understanding the development of those interests is a key point of departure between the two theories. Particularly for the structuralist and modified structuralist strands of regime theory, states are presumed to calculate and then pursue self-interest, which may lead them to create regimes for their own self-advancement. However the Grotian strand of regime theory and the English School are more interested in the common interests and shared values—the social context—in which states both develop their interests, and act on them (Evans and Wilson 1992, 337-339).

Thus causality is presumed to be located in different places—for structuralist regime theorists, causality is rooted in basic interests. Modified structuralists also consider actors' basic interests, but presume that there is more scope for regimes to develop a causal status in their own right; that is, regimes can cause actors to change their behavior (and therefore act as intervening variables). For Grotian regime theorists causality flows from both basic interests and also the social context (of which regimes are a part); that is, actors create regimes (formal and informal) and those regimes also serve to reconstitute actors' interests and identities, so regimes are both cause and effect. This Grotian approach is closest to Buzan and the social constructivist English School approach which sees the institutions of international society and its members as mutually constitutive (Buzan 2004, 162). However the English School approach is more explicitly focused on wider social and ideational factors, and how they both pattern behavior and are constructed by the agents within the system.

Regime theory is more focused on specific issue areas and contemporary events, and tends to be disconnected from the historical context in which cases occur (Evans and Wilson 1992, 336; Buzan 2004, 161). Although English School authors (and particularly the British Committee members) have been concerned with individual statesmen, regime theory is more explicitly focused in its methods on studying specific diplomatic relations, treaties, and agreements (Evans and Wilson 1992, 161)—that is, specific arrangements, as opposed to historical and normative structures that are embedded in a social context (Buzan 2004, 161). Even Grotian regime theorists such as Oran Young emphasize that regimes, "govern the actions of those interested in specifiable activities (or accepted sets of activities)" (1983, 93). The English School is therefore more concerned with shared cultural elements that precede cooperation (Buzan 2004, 162), while regime theory focuses on the actual processes of interest formation, negotiation, and cooperation for certain issue-areas.

Regime theorists and English School theorists also differ in their approach to non-state actors in international relations (Evans and Wilson 1992, 337). Most regime theory authors have written that only states can be members of international regimes (or else implied this by focusing on states in the analysis of regimes)—including those Grotian regime theorists such as Young (1983, 93) that are otherwise more broad in their definition of regimes. A notable exception is Virginia Haufler, who argues that international regimes may be created by or have members that are non-state (1995). English School authors have, through the concept of world society, been more open to the inclusion of non-state actors in the analysis of world politics. Buzan's concept of domains expands the potential of the English School to incorporate non-state actors into the analysis of world politics. However it is noteworthy that most English School authors also believe that non-state actors can be participants but not members of international society.

Regime theory and the English School do have elements in common and particularly when the continuum of strands within regime theory is considered, but there are also differences between the approaches. This opens up spaces for considering what unique tools regime theory and the English School each offer to analysis of empirical case studies in international relations. However is there a risk that the two approaches are so different that they cannot be usefully applied together; that they are incommensurable? If regime theory and the English School are considered as a spectrum of approaches, at the two extreme ends of that spectrum they almost appear to be rooted in separate paradigms, with unique terminology as well as different epistemological, methodological and ontological starting points. Applying the approaches to the following case studies will bring to light the ways in which the approaches are conflicting or complimentary; incommensurable or compatible. However the degree to which they are incommensurable because of their use of different language can be partially clarified at the outset by establishing a common terminology. Regime theory and the English School use some different terms for the same concept, or conversely the same term for different concepts, but clarifying these terms eliminates this problem at a basic level, and allows for the two approaches to be used in the same "discussion."

Three terminological points lay the groundwork for applying both regime theory and the English School to common empirical material. Regime theory and the English School use the term "institutions" to mean different things. For this thesis the term "organizations" will be used to indicate "palpable entities with headquarters and letterheads, voting procedures, and generous pensions plans" (Ruggie 1994, 35). "Institutions" will be taken within the English School context as ideational and social structures that exist deeper than organizations, as part of international society.

A second point of clarification needs to be made with regards to the term "rationalism." Wight used this term to refer to the international society approach that is now commonly associated with the English School in general. However for the sake of clarity, "rational" and its derivatives will be used in this thesis in relation to rational choice methods and actors' use of reason and logic to calculate interests and consequently motivate behavior. As such, "rational" is more clearly related in the material that follows to the regime theory approach.

Another point of clarification must be made with regards to "international law" and treaties. In subsequent case studies, "treaties" refers to specific, negotiated documents that have been ratified by actors (positive law). "International law" may be used as a synonym for treaties, but it will also be highlighted at times as the primary derivative international society institution of international law, as associated with the English School.

Thesis Plan

In line with the core question of the thesis, each chapter asks why cooperation was undertaken (or avoided) for each of the case study issue areas, and what this reflects about world politics. Regime theory and the English School are used where relevant to enhance explanation and understanding with regards to this question. Each case study comprises of an in-depth analysis of a particular issue-area of outer space politics, and also draws more general conclusions about the relationship between outer space politics and world politics.

Application of the Regime Theory Approach

The tools of regime theory are specifically directed towards addressing questions about why actors cooperate, and I use rational actor models to analyze where actors' interests and motivations were a result of strategic calculations. I also look for evidence of when and where regimes were not merely epiphenomenon, but served to change actors' interests and behavior, and thus outcomes; where regimes acted as an intervening variable. In line with Grotian regime theory, I also look for where specific regimes were influenced by or nested in diffuse regimes. As part of the process of explaining why actors cooperate (and what role regimes play in such cooperation) it is also necessary to trace how regimes arise, what challenges there may be for their continued effectiveness, and how they change over time.

Application of the English School Approach

The English School is less specifically focused on cooperation, but can also be directed towards the question of why actors cooperate. I look for evidence of when and how international society and international institutions have influenced actors' interests and identities in a way that helps explain their interest in cooperation. One way to see elements of international society as present is when actors behave in a way that is not explicitly in their interest (where rational actor models do not fully explain behavior) (Morris 2005, 266-268). This is particularly significant when it is powerful actors like the US that behave in a way that either indicates that they are compromising their own interests, or that their interests have been adjusted because of the international social context (Morris 2005, 266-268).

The influence of international society can also be seen when actors behave in a way that suggests they feel obliged to justify their actions in terms of international law or norms, and continue to act as though they are bound by rules (Morris 2005, 266-268). "International action which, although it is contrary to recognized principles...is accompanied by pretexts stated in terms of those principles, attests the force in international relations of right and wrong, just as does action which conforms to them."[41] This indicates that states have an underlying interest in having their actions seen as legitimate. This also indicates how actors are both constituted by and constitutive of the social structure in which they operate—states may try to justify legitimate changes to the rules of the game, but they express those changes in the language of those rules (Dunne 1998, 166).

The tools of the English School are also useful in considering the second part of the main question of this thesis: What does cooperation tells us about wider international politics and international society? In each chapter I consider how that specific case may be envisioned as a microcosmic international or world society, and what sort of society such a microcosm would be: pluralist or solidarist, international or world society. This also requires considering what institutions were influential in each case. I also consider how each case reflects wider international society during the time frame that the case study covers. Do trends regarding international or world society in each case reflect wider international world society in the timeframe under consideration? Finally, in line with the constructivist turn of the English School, I consider if and how aspects of each specific

[41] Hedley Bull, quoted in Dunne (1998, 99).

case may reconstitute aspects of wider international society or trends in world politics. This includes analyzing how the politics of each case were influenced by, and also an influence on, wider world politics.

In analyzing the relationship between outer space politics and international society, it is necessary to consider how international institutions have created the broader context in which actors are determining their interests and identities, and how those institutions relate to each other and may be in a state of rising, evolution, or decline. These institutions are also considered in relation to pluralism and solidarism, and to the transnational and individual domains (and what this tells us about wider international and world society).

Chapter Outline

Chapter Two addresses the case of geosynchronous orbit (GSO), an orbit which is highly valued because of unique geophysical characteristics that make it useful in satellite telecommunications. Geostationary orbit is by nature a finite resource, and satellites placed there must have their radio-frequency usage and location coordinated with other satellites (in order to avoid mutual signal interference) and to prevent satellite collisions. The first geostationary satellite was placed into GSO in 1963 by the United States, and use of the orbit was largely dominated by that country for several years. The US deferred to the diffuse regimes established by the Outer Space Treaty and the International Telecommunications Union for registering their geostationary satellites, but less developed countries challenged the system of governance over the orbit, as well as challenging the very definition of outer space on which that system of governance rested.

The chapter analyzes how these issues were embedded in wider (Cold War) world politics and international society, how the issues were addressed and eventually resolved.

Chapter Three analyzes space stations, and particularly focuses on the regime established for the International Space Station (ISS). During the Cold War space stations played a role in the Space Race between the US and USSR, as part of the efforts by the two hegemons to achieve bigger and better "firsts" in outer space. Space Station Freedom (which preceded the ISS) was formed in part to demonstrate American leadership in the "free" world, and hence the Station both reflected and reinforced wider Cold War competition and politics. However in the Post Cold War era Russia joined the space station project, which both reflected and reinforced changes in actors' interests and motivations towards the project and also wider international politics more generally. Adding the Russians to the project also resulted in the redesign of the Station (and its relevant regime), in a way that caused the project to become more interdependent. The Chapter explores the ways actors' interests towards the Station over time were influenced by strategic factors, wider world politics and international society, and also the influence of the regime itself. The chapter also considers how these changes in interests both reflected and reinforced changes in international society in the Cold War and Post Cold War eras.

Chapter Four addresses Global Navigational Satellite Systems (GNSSs). The United States operated a GNSS system (the Global Positioning System, or GPS) which was available only to US government organizations throughout the 1980s. However in 1983 the US made certain segments of the GPS signals publicly available (in part because of Cold War politics), at which point an informal international regime was created for GPS.

In the 1990s Europe undertook plans to create a separate GNSS system—Galileo—and the chapter analyzes why such a decision was taken, and how a mediating regime developed to coordinate activity between the GPS and Galileo systems. These events surrounding Galileo and the mediating GNSS regime reflect wider trends within global politics and international society in the Post Cold War era towards European independence and integration, and also the re-emergence of the balance of power and coexistent pluralist international society.

Chapter Five focuses on the company of Sea Launch, Limited. Sea Launch (SL) was created in the Post Cold War era as a commercial endeavor between companies based in the US, Russia, the Ukraine, and Norway. The multi-national company intended to launch privately commissioned satellites into outer space from the neutral high seas. The governance of Sea Launch was inherently challenging to traditional state-centric international law, as well as being inherently challenging to International Relations conceptualizations of actors as either state or non-state. The chapter considers how Sea Launch adhered to, but also undermined, state-centric international laws. However Sea Launch became mired in several controversies, originating from various state and non-state actors. The case of Sea Launch reflects globalization and the increased interplay between the different domains, although the resolution of the controversies surrounding Sea Launch also suggest that the interstate domain and institutions such as great power management maintain significant influence in the current international society.

Chapter Six addresses the issue of comets and asteroids. Comets and asteroids could represent a threat to humanity (in terms of colliding with the earth) or an opportunity (should humans develop the technology to mine them). The interpretation of such risks and opportunities are continually redefined by terrestrial politics, and the chapter considers why the issue of comets and asteroids has become popularized in the Post Cold War era. The chapter considers the regime that has developed to coordinate international research on such objects, but also considers why that research been limited. Finally the chapter offers informed speculation about how such issues surrounding comets and asteroids may develop in the future.

The conclusion Chapter Seven analyzes what themes have emerged from the five case studies when they are considered together. The Chapter considers how the tools and ideas of the regime theory and the English School approaches (as outlined in this introductory Chapter) have been borne out in the case studies. General conclusions are drawn about the two approaches, as well as what the case study analysis tells us about cooperation in outer space politics, and world politics more generally.

Chapter 2: Geosynchronous Orbit

"A true broadcast service, giving constant field strength at all times over the whole globe would be invaluable, not to say indispensable, in a world society."

—Arthur C. Clarke, *Wireless World* 1945

As early as the 17th century, physicists understood that objects placed in a specific orbit above the equator and traveling east to west would move with the earth's spin and hence appear fixed in the sky. In the mid-20th century science fiction author Arthur C. Clarke predicted how such satellites could be used for telecommunications purposes, providing domestic and international linkages around the globe.[42]

As humanity entered the Space Age utilization of such a geostationary orbit by geostationary satellites (GEOSATs) became a real option for the spacefaring powers—the US and USSR. However this usage was tempered by controversies about what GSO was by legal definition, and how access to and use of it should be governed. GSO came to be perceived as a finite resource and issues over efficient versus equal usage became an issue of intense debate. These issues were embedded in the geopolitical context of Cold War bipolarity and the non-aligned movement that was balancing against it.

What issues surrounded the use of GSO and why did they arise? What influenced the development of actors' interests, and how were those interests expressed? What does the controversy, and eventual resolution of these issues tell us about both outer space and wider politics and international society during the time of the case study? This chapter

[42]Clarke 1945; Clarke 1992, 164. Konstantin Tsiolkovsky, Herman Oberth, and Herman Noordung all wrote in the 1920s about the potential of an orbit in which objects were geosynchronous (Clarke 1992, 165). However the idea is best known for being popularized by Arthur C. Clarke in the article quoted at the start of the chapter.

considers the influence of diffuse regimes and international society on the GSO issue area and also addresses the specific international regime that was eventually created to govern the orbit.

The Inception of Outer Space Governance: What and Why?

The Space Race between the US and USSR is commonly understood to have been ignited by Cold War competition. While the Cold War context did indeed inspire the two superpowers to compete in outer space, it is less commonly known that the launching of Sputnik (and other early satellites that followed it) was officially part of the International Geophysical Year.[43] The IGY was a program conceived of by scientists to challenge the global scientific community to undertake a worldwide study of the human environment—the earth, oceans, atmosphere, and outer space (Galloway 1992, 240).[44] World War II had led to significant developments in rocket science in Russia, Germany, and the US because of the role that rockets played in the missile and weapons industry. The IGY laid out a specific challenge: to assess the earth's spatial environment from Low Earth Orbit (LEO) through a human-made satellite—a project that was feasible given 1950s rocket technology (Sadeh 2002, 281). In the Cold War context the satellite challenge also manifested itself as a competition between the two superpowers. The politics of WWII had generated improvements in technology, and now that technology was helping to create the possibilities for new political action directed towards outer space exploration and competition. From 1958 onward the UN had addressed issues of outer space

[43] Domestic politics also played a role in leading the Soviet Union to launch Sputnik. For more on this see Sheehan 2007, 25-28.

[44] The IGY was to occur from July 1957 to December 1958. The IGY was modeled after two previous international scientific cooperative efforts, the First and Second Polar Years (beginning 1882 and 1932, respectively) (Dolman 2002, 106). Sixty-six nations (then the majority of those in existence) and approximately 60,000 scientists partook in the program (Dolman 2002, 106). Another IGY is, at the time of writing, in progress (to last from 2007-2009).

governance. Ongoing discussions used airspace law, the law of the high seas and ongoing plans for the Treaty of Antarctica (signed in 1959) to conceptualize how outer space could be governed. If based on a high seas analogy, outer space would remain under the sovereignty of the state "beneath" it. If based on a high seas analogy, outer space would be deemed "neutral territory" *(res communis)* and "for the common heritage of mankind." Plans for Antarctica helped representatives conceptualize how *terra firma* such as celestial bodies could also be deemed "neutral" and free from appropriation.[45]

Although these discussions were ongoing after the launch of Sputnik (and subsequent satellites launched in the following months and years by both the US and USSR), Sputnik itself played a role in establishing norms that would later influence actors' understanding of how outer space should be governed. Sputnik passed over non-Soviet territory without serious objection from the international community. If an air space analogy were adopted countries could have objected to Sputnik passing through their sovereign territory "above" earth.[46] Subsequent satellites were also *de facto* accepted as passing through neutral outer space.

Prior to the international community formally codifying the definition of outer space, norms and expectations had already been established, both through reasoning by analogy from other global commons, and also by the normalized practice of already-launched satellites. In 1967 the Outer Space Treaty was completed and widely ratified, thus officially establishing that outer space is neutral territory, "the province of all mankind," to be used without discrimination and based on free access (Article 1), and not subject to

[45] Islands in the high seas are subject to appropriation, and hence a strict high seas analogy for outer space would mean that celestial bodies could be appropriated. Antarctica provided a useful analogy for how "islands" of terra firma could also be conceived of as neutral. For more on this see Peterson 1997, 2004, 2005.
[46] For more on the Free Passage norm and Sputnik, see for example Peterson 2007; McDougall 1985.

"national appropriation by claim of sovereignty, by means of use or occupation or by any other means" (Article 2).[47] The Treaty codified pre-existing norms and expectations into a negotiated regime for outer space.

However it is still not adequately explained why the high seas analogy was chosen over other options. Though the USSR implicitly validated the "neutral territory" norm by launching Sputnik, the Soviets had initially preferred an air space analogy for outer space governance. Basic strategic calculations and causal interests on the part of the two most powerful actors in the Cold War system help explain actors' interest with regards to the OST (and the diffuse regime that the Treaty established). In determining jurisdiction over outer space, the issue of reconnaissance was a primary factor in the Soviet Union's initial preference for airspace analogies, and of US preference for high seas analogies. The US had a stronger interest in using satellites for reconnaissance purposes because the closed Soviet political system greatly limited American information on their enemy (Peterson 2004, 49-51). The Soviets had an advantage over the US in information gathering because the American political and media system was open (Peterson 2004, 49-51). As such, it was in the interest of the Soviets to support an airspace analogy that would protect the USSR from spying from outer space, and in American interests to advance free passage and a high seas analogy from which reconnaissance would be legal (Peterson 2005, 49-51).

Practical considerations regarding how to delimit sovereignty in outer space eventually led to the Soviets becoming more amenable to the high seas analogy: in the 1960s the Soviets were also increasingly interested in reconnaissance satellites due to the

[47] The full name of the Treaty is "The Treaty on Principles Governing Activities of States in Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies between the United States and Other Governments."

growing rift with the equally secretive China (Peterson 2004, 52-53).[48] However having established the norm of free passage with Sputnik could also have played at least a minor role in the USSR's interests. While the Soviet Union could have later countered the norm of free passage and argued for an airspace analogy, reversing their position would have had negative implications for that country's international image and caused diplomatic tensions within the UN. Some developing countries also backed the high seas analogy because of their efforts to make "mankind" a distinct legal subject (Peterson 2005, 51), which indicates that outer space neutrality was also for some actors a normative issue. However less developed countries (LDCs) had limited input on the negotiations. Eventually negotiations led to the adoption of a high seas analogy, wherein outer space was conceived of as neutral territory.

While the OST clarified how human-made objects in outer space would be regulated and established that outer space was "neutral territory," it did not specify a clear definition of "outer space." Two main positions dominated arguments on how space should be defined: the spatialist and funtionalist positions. Advocates of the spatialist position argued that a geographical line located a set distance from the earth's surface should define outer space. Advocates of the functionalist position argued that states should not set a fixed boundary between outer space and airspace, but should concentrate on the regulation of activities in space as based on the nature of those activities (Oduntan 2003, 69).[49] While these discussions had not been resolved by the 1960s, the issue was not considered urgent. For spatalists, airplanes (and other objects) traveled well below the

[48] For a more complete analysis of the decision to implement high seas analogies for outer space, see the very thorough texts by Peterson 1997 and 2005 (especially 2005, 41-74).
[49] For a thorough review of these arguments and other less-supported but equally interesting propositions, see Oduntan 2003.

height at which outer space could be seen to begin, and satellites traveled much higher.[50] For functionalists, no activities had yet been undertaken that could be considered to fall into a "gray" area (such as transport) that would challenge the demarcation of function between "space activity" or "not space activity."

By considering rational actor calculations, ideational factors, reasoning by analogy and the influence of norms it can be understood why one particular form of governance for outer space was chosen. However a further question is still not answered: why was it assumed that any sort of governance would be established for outer space in the first place? Why wasn't outer space left as anarchic and free to unregulated exploitation and exploration by spacefaring actors? The spacefaring powers were the two system hegemons, so why submit themselves to diplomatic negotiations to generate an internationally validated treaty? In part the decision to pursue an outer space treaty was strategic. The hegemons knew that they may not be able to physically or technologically dominate outer space (as was the case for all global commons), so their best option was to ensure that rivals could not either. Given the level of knowledge possessed about outer space, it was in those actors' interests to proceed with caution by agreeing to mutual self-restraint. Submitting to constraints meant that each superpower could (at least in theory) count on the other superpower to reciprocate and also accept constraints. As such the outer space issue area was inherently conducive to a regime, and even egotistical calculations could lead to the decision to cooperate to create such a regime.

Deferring to analogies and pre-established regimes was not merely a matter of creativity on the part of the actors in transferring their understanding of outer space. The

[50] With current technology, in the lowest orbit satellites circle the earth approximately 200 kilometers above earth's surface, and airplanes have yet to go beyond approximately 30 kilometers.

influence of prevalent regimes had already served to constitute actors' basic understands with regards to global commons. Actors understood their interests in terms of governance over pre-existing analogous commons. Sovereignty and state-centricism also pre-established that the actors relevant to the negotiations of outer space governance would be states—that is, the international social context determined who the players were in the game.

Geostationary Satellites

By the 1950s scientists had a solid understanding of the potential benefits of placing satellites in geostationary orbit. Such satellites would eliminate the need for complicated tracking devices both on the ground and on satellites because they orbit the earth in 24 hours and thus remain "fixed" in the sky (Macauley 1998, 742).[51] Receiver stations would not need to regularly switch satellites to maintain their earth-to space link.[52] From a position above the equator GOESATs would also have a significant footprint (or area of coverage) of the earth below—GEOSATs would be able to "see" 43% of the earth's surface, radiating out from the equator (Soros 1982, 667; Kellerman 1993, 40).

The United States was the first country to exploit geostationary orbit, and launched experimental GEOSATs Syncom 2 and Syncom 3 in 1963 and 1964, respectively.[53] The satellites were launched as part of a program run by the National Aeronautics and Space

[51] The actual exact period of a geosynchronous satellite's orbit is 23 hours, 56 minutes, 4.091 seconds, which is the same amount of time it takes the earth to complete a full rotation.
[52] Satellites could also circle the earth at much lower or much higher heights , travel in different directions (i.e. north to south), and in different shapes (i.e. an ellipse as opposed to a circle) but doing so would require receivers to regularly switch the satellites that they are in communication with, and also "follow" those satellites through their "movement" across the "sky." Objects can have a geosynchronous orbit while traveling in various directions; for example, north to south over the earth's pole, but in order to be geostationary they must travel east to west with the turning of the earth.
[53] Syncom 1 was also launched in 1963 and reached orbit, but failed to communicate back to earth. Syncom 2 had an imperfect geosynchronous orbit, but communicated back to earth. Syncom 3 telecasted parts of the Tokyo Olympics to the US, making it the first telecast across the Pacific Ocean.

Administration (NASA). NASA was created in 1958 as the civilian arm of the American space program. The USSR did not place a satellite in GSO until 1974, and the US remained the dominant user of the orbit into the 1970s.

Given the extremely heated nature of the Cold War Space Race this raises the question as to why the US and USSR did not compete over dominance of GSO. One reason was technical: given their position over the equator, GEOSATs were not useful for territories of very high or very low latitude, such as that which was occupied by the USSR. Soviet telecommunications satellites were much better placed in the higher and elliptical Molinya orbit (and the USSR launched its first satellite into Molinya orbit in 1965). A second reason was political: after the launch of Sputnik, the Space Race had largely moved on from satellites towards achieving other "firsts"—first man in space, first woman in space, first space platform and first moon landing. The US therefore enjoyed dominance of GSO with limited competition from the USSR. Other countries did not challenge US dominance because in the 1960s no other countries had significant space capabilities.[54]

GSO Radio-Frequency Usage: Why and How to Coordinate?

Behavior with regards to GSO launches indicates that the US understood the governance of early GEOSATs to rest within two pre-existing regimes: the Outer Space Treaty (which granted satellites free passage through neutral outer space) and the regulations of the International Telecommunications Union (ITU). Satellites require the

[54] Although many countries were gaining tangential benefits from satellites through programs such as Intelsat and Intersputnik, few were trying to develop their own satellite capabilities. Intelsat was created in 1964 and was a US-dominated intergovernmental consortium that owned communications satellites. Intersputnik was created in 1971 and was an USSR-dominated international satellite communications services organization. For a more detailed discussion on the cooperation between countries for Intelsat and Intersputnik, I recommend Johnson-Freese 1990.

use of one frequency for uplink from the ground, and a second for downlink to the ground (Kellerman 1993, 39). Two or more users radiating signals on the same frequencies, at the same time, and in the same geographic area can cause interference that makes one or all signals unintelligible.[55] The ITU had, since 1865, played a role in standardizing and facilitating transnational communications (originally through telegraph technology, and later through radio technology).[56] For earth-based applications, the ITU operated registration of frequency spectrum use based on an *a posteriori* (or first-come-first-served) planning system: users began broadcasting on a frequency (albeit a frequency broadly allocated to a specific usage area, such as for a regional area) and then notified the International Frequency Registration Board of that usage (IFRB, which is administered by the ITU). If no interference took place within a two-month period, the frequency was automatically approved and entered in the Master Frequency List (MFL) and the user had "full legal rights" to that signal (Savage 1989, 19-20).[57]

At the time of the emergence of GEOSATs, radio users were presumed to have the right to use the radio spectrum regardless of equipment used (i.e., reception could not be refused based on the use of a competitor's equipment for the transmission) (Vogler 2000, 113). The ITU implicitly operated on the principle that the organization would act in a

[55] For more on this see Vogler 1995, 113; Levin 1971, 17.
[56] The radio frequency spectrum is the portion of the electromagnetic spectrum that can be used to convey information of widely varying sorts at varying speeds over varying distances (Vogler 1995, 113; Levin 1971, 15). The ITU has three main spheres of governance: Firstly, the coordination and allocation of radio services and assignments; secondly the recommendation of international technical standards enabling or frustrating international telecommunications; thirdly defining and regulating international telephony, telegraphy, and new "telecommunications services" (Savage 1989, 10). See also ITU 2004.
[57] The International Frequency Registration Board (IFRB) has five members, and is tasked with recording, registering, publishing and assessing the legality of every radio frequency used in the spectrum (Savage 1989, 18). As of 1959, the IFRB also had the role of consulting (advising) states on spectrum matters when that state didn't have domestic resources for independent spectrum management (Savage 1989, 41-42). There is no clear definition of "telecommunications," but it generally refers to all aspects of voice and data transmission by radio, television, wire, mircrowave and satellites (Savage 1989, 1). Most individual countries also have their own telecommunications regulations and procedures, generally referred as "administrations" within the ITU (Vogler 2004).

manner directed towards "rational use" of the radio frequency spectrum and towards maximizing efficient use of the resource (Vogler 2000, 113). The ITU was also founded on the belief that the radio-frequency spectrum should be used efficiently and should allow capable users unfettered (though coordinated) usage in order to maximize that efficiency. The ITU's discourse was largely based on technocracy and efficiency rooted in *a posteriori* coordination. The ITU was portrayed as a technical and not a political organization (Savage 1989).[58]

The US followed routine ITU procedure and registered the radio-frequency usage of their GEOSATs' with the ITU.[59] Given that the US was the dominant (and for a time, only) actor using GSO, why did US actors register their frequency usages at all? Straightforward rational calculations explain in part why the US volunteered to register its frequency usages. As above, uncoordinated signal usage could result in mutual interference, and uncoordinated usage could result in suboptimal outcomes for all actors. Therefore in order to avoid mutual losses, exploitation of the spectrum inherently required some coordination when there were (or could be) multiple users. Hence there was an inherent potential for users to injure each other (though at the cost of also potentially injuring themselves). Thus based on reciprocity, any user wanting to avoid future interferences would have an interest in submitting their own radio-frequency uses to a coordinating actor like the ITU. The regime was inherently interdependent, as defectors could cause a tragedy of the commons-type scenario where no one could efficiently use the radio-frequency spectrum.

[58] However it is noteworthy that the ITU had, prior to the launch of the first satellites, become partially tasked with improving its technical assistance to LDCs. This occured when it joined the UN Expanded Program of Technical Assistance (UNEPTA) (Coddington and Rutkowski 1982, 284).
[59] For more on the role of routines in regimes, see Arts 2000, 530.

Some level of frequency coordination was therefore necessary for areas of overlapping use, but the US could have established itself as the coordinator for GSO frequency use (and bypassed the ITU). Given its dominance of GSO, the US could have simply used the signals it needed and coordinated bilaterally with the USSR or any other future GSO users. Assuming such a coordinator role could have led to any other actors whose signals overlapped with US GEOSAT signals having to go to the US for resolution of the problem. The US had the opportunity to set the precedent that GSO frequency usage was managed by the US. Therefore why did the US turn to the ITU?

Rational calculations could lead the US to determine that relying on the ITU was in their interest. The ITU's staff had significant expertise in the complicated and highly technical area of radio frequency coordination. For example, the ITU's International Radio Consultative Committees and International Telegraph and Telephone Consultative Committees were highly technical groups that support other ITU committees.[60] However the long history of coordinating radio-frequency usage through the ITU had also established expectations amongst users—both that the ITU would provide a certain service and that users were obliged to submit their radio-frequency usage to the ITU. While doing so was largely practical, the internalized sense of obligation to the ITU's guidelines (which were commonly understood to carry the weight of international law) shows how the norms, principles, and expectations embodied by the ITU system had the status of a diffuse regime—of regulating multiple aspects of the radio-frequency issue-area (with non-space applications clearly transferring to space-based applications). The regulations of the ITU created not only "paper laws" but constitutive rules that served to

[60] These committees are known by their French acronyms CCIR and CCIR respectively, and referred to collectively as the CCIs.

create intersubjective understandings about the radio-frequency as a common resource. The infrastructure of the ITU was solidly established (the ITU, formed in 1865, being the oldest intergovernmental organization in the world).[61]

A posteriori frequency registration was also already favorable to US interests. By registering signal usage and orbital positions with the ITU the US was protecting its GEOSATs and their signals from interference by any future users. Yet the *a posteriori* registration also meant that the US could place as many satellites as was physically possible in GSO (while only the USSR was also capable of doing so) and thus suited the expanding US satellite industry (Staple 1986, 717). Collaborating through the ITU therefore benefited the US by assuring the coordinated frequency usage with any future users of GSO, at no cost for the moment to the US except the process of registering their signal usage. Compliance with the ITU's regime, as applied to GSO, was relatively easy for the US.

GSO Orbital Placement: Why and How to Coordinate?

Geostationary satellites' signal interference would be avoided through ITU signal regulation. However there was still a potential risk of satellites colliding in GSO. The ITU first convened a meeting on GSO at the WARC-ST (WARC Satellite Telecommunications) in 1963 (Vogler 2000, 112), the year that the first GEOSAT was launched.[62] It was then established that the ITU would (through WARCs and RARCs)

[61] The International Telegraph Union was formed in 1865, and merged with the International Radio Conference in 1932 to become the International Telecommunications Union (Savage 1989, 10). In 1947 the ITU came under the umbrella of the UN.

[62] The ITU operates according to a complicated system of meetings and groups, of which the following is only a brief overview: The Plenipotentiary Conference lays down general policy according to one member, one vote. The Administrative Council has fewer members and chooses the Plenipotentiary Conference agendas, and implements Plenipotentiary Conference decisions (Savage 1989, 14). The World Radio Administration Conferences (WARCs) and Regional Radio Administration Conferences (RARCs) are technical meetings, organized on an ad-hoc basis, and oversee the distribution of the radio frequency

also register the occupation by a GEOSAT of a GSO orbital position. In line with ITU tradition, the orbital slots would be registered *a posteriori*; that is, after the satellite had come to occupy the orbital position (Savage 1989, 35).

However the issue was also raised as to whether *a priori* orbital slots should be allocated to each country. This would establish a new norm within the ITU regime, based on a newly introduced principle of equitable access (as opposed to efficiency). "Equitable" in this context would not necessarily mean equal, but rather "justice and fairness in relation to the facts and circumstances of a particular case" (Sheehan 2007, 129). However the term still implied that political and normative concerns should play a role in the allocation of outer space resources. Concerns were also raised as to the vague implication of the "legal rights" of occupiers to an orbital position and radio frequency allocation, and whether this could potentially imply quasi-ownership (or sovereignty) over an orbital slot. If a GEOSAT occupied a consistent "fixed" position above a certain territory, how could it be ensured that this did not contradict outer space neutrality? The significance of these "full legal rights" were unclear, indicating no ownership to the frequency, but giving "priority rights" to the registered user (Savage 1989, 20). Though no agreement was reached on these issues at the WARC-ST, Spa 2.1 was passed and stated that occupation of an orbital slot did not imply permanency.[63]

The issue was also raised as to whether a portion of the radio frequency should be deemed for in-space use. Throughout the development of radio and telecommunications,

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spectrum (Savage 1989, 17). The CCIs meet before every WARC, and provide the WARCs with necessary technical information, in particular regarding technical standardization (Savage 1989, 18). The CCIs also make "recommendations" that the vast majority of states adhere to (Savage 1989, 18-19). For further reviews of the ITU's organization and functions, see for example Codding and Rutowski 1982; Levin 1971; Savage 1989.

[63] Resolution Spa 2.1, 1971 Partial Revision of the Radio Regulations and Final Act of WARC-ST.

the radio frequency was portioned out so that some sections would be used for either particular uses or for specified geographical regions. The US in particular wanted a segment to be specified for in-space use. Doing so would result in the setting aside of certain signals for GEOSATs. The US's interest in a frequency allocation related in particular to a desire to encourage a nascent telecommunications industry, and also from that country's plans for a large international consortium of telecommunications satellites through INTELSAT (McDougall 1985, 352-360).[64] Although the USSR had also launched GEOSATs, the Soviets were opposed to such a frequency allocation. The Soviets' strategic resistance reflected their aversion to commercialism and the US-led INTELSAT (McDougall 1985, 359-360). Thus it was a combination of rational calculations and also beliefs regarding commercialism which led actors to determine their position on the issue of in-space allocations of the radio-frequency. The principle established by the OST of neutral territory "for the common heritage of mankind" was also potentially in conflict with the ITU's norm of *a posteriori* registration. In the 1970s these issues were of increasing concern, particularly as wider politics influenced actor interests in GSO.

Controversy Regarding GSO Governance

The ITU Plenipotentiary Conference of 1973 was the second significant conference at which the issue of *a priori* planning for orbital slots and frequencies was addressed. It was apparent at this meeting that the issues were divided between some industrialized states (led by the US) and an increasingly collaborative block of Less Developed Countries. Representatives of the US argued that *a priori* allocation of orbital slots was

[64] For a thorough analysis of the American decision to pursue INTELSAT, as well as the decision of other countries to join (or not join—i.e. the USSR) see for example Johnson-Freese 1990.

not an efficient use of the orbit/spectrum resource. They also argued that using the resource today would not negatively impact the potential use of it tomorrow (assuming of course that a user of today would hand over their allocations later on).[65] LDCs for their part continued to push for *a priori* planning out of concersn that GSO would be saturated by the time LDCs had the capabilities to launch GEOSATs.

However until 1972 when Telesat Canada launched a GEOSAT, GSO remained the exclusive domain of the US, which gives rise to the question of why LDCs cared about GSO at all? On a basic level, actors representing LDCs could appreciate that satellites in geostationary orbit offered unique benefits in telecommunications, despite not having their own technology to exploit that orbit directly. The market for satellite TV and satellite telephony had become increasingly apparent by the 1970s, thus reinforcing the perceived value of GEOSATs.

Yet the broader context must be considered by asking why it was that LDCs perceived their access to GSO to be threatened in the first place—that is, what were the conditions (as actors representing LDCs understood them) in which actors were calculating their interests, and in which they came to understand GSO to be a scarce resource? From a strictly geophysical perspective it is logical to conceive of GSO as finite. It can be calculated that, were it laid out flat, GSO would be 17,000 miles long (Macauley 1998, 742), and satellites naturally "inhabit" a part of that orbit, including room to drift slightly back and forth.[66] The number of satellites that the orbit can carry is also, in theory, limited because of signal interference. However the usability of the radio

[65] The spectrum is a "flow" resource in that it is restorable, replaceable, and reproducible, as a opposed to a "stock" resource, such as fish stocks (Levin 1971, 27).

[66] Satellites will naturally drift within their orbit slightly due to gravitational forces of the moon and sun, solar wind, radiation pressure, and variations in the earth's gravitation field (which are normally offset by thrusters on the satellite).

spectrum is also affected by technical developments that potentially expand the intensive and extensive margins of the spectrum (Levin 1971, 15), and developments in satellite technology change the amount of safe distance needed between objects in orbit. Thus the amount of space needed between satellites to avoid signal interference also changes with technological developments and based on complicated engineering calculations (Vogler 2000, 112; Levin 1971, 15).[67]

Therefore the actual carrying capacity and scarcity of the GSO resource is subject to technological developments, and the significance of those developments is subject to interpretation. In 1972 there were five GEOSATs in orbit, and in 1977 there were twenty (Peterson 2006, 177)—however the significance attributed to those numbers is controversial and ultimately related to individual actors' interpretation of technical factors. Throughout the 1960s and 1970s there was limited intersubjective agreement amongst actors as to how limited the orbit-spectrum resource actually was.

There was genuine concern amongst LDCs about future access to GSO, but the complicated nature of understanding GSO scarcity meant that interests and interpretations regarding scarcity were also potentially influenced by wider international politics; at times a perceived understanding of scarcity was preceded by actors' other political agendas. In the 1960s and 1970s LDCs were posing challenges to other areas of international law and expressing concerns over permanent ownership of resources such as the sea bed. Challenging outer space law fit into the discourse of those wider challenges

[67] The intensive margins of the frequency spectrum can be expanded when technological developments allow for the currently used spectrum to improve its information carrying capacity along its dimensions of time, space, and frequency (Levin 1993, 15); that is, the currently used range of frequencies can be made to convey more information. Extensive margins of the frequency are expanded as technology allows for the use of higher and higher frequencies (Levin 1993, 15); that is, the radio frequency spectrum expands within the context of the entire electromagnetic spectrum.

(Bull and Watson 1984, 234). The ITU's system of *a priori* planning fit into the wider agenda of LDCs of demanding greater equality within the Cold War system.

The LDC challenges to GSO governance were initially coordinated under the Group of 77, which had been formed in 1964 with the purpose of providing, "the means for the developing world to articulate and promote its collective economic interests and enhance its joint negotiating capacity on all major international economic issues in the United Nations system, and promote economic and technical cooperation among developing countries" (Group of Seventy Seven 2007). LDCs proposed the New International Economic Order (NIEO) in 1973, and the New World Information and Communications Order (NWICO) was announced within the NIEO context shortly thereafter (Savage 1989, 5). While the NIEO sought to address the imbalance of international economic progress and wealth, the NWICO sought to reaffirm the sovereign rights of states to control the dissemination of information to its citizenry (Savage 1989, 5 and 44). This related to deeper concerns amongst LDCs that not only were they not able to exploit telecommunications technology, but that widespread broadcasting made possible by satellites meant that the developing world was able to propagate its own information and culture (Savage 1989, 44). Therefore issues of access to GSO governance tied in to concerns not only of how international society and the international system were organized, but also how it was spread, controlled, and recreated.

Therefore the GSO issue-area must be considered with relation to the international social context in which actors were embedded, and how that context generated understandings about various transnational resources. Given the LDCs' broader agenda of challenging international law, GSO was a reasonable extension of that challenge because the ITU rules and decision-making procedures give each member of the organization one vote. Therefore (unlike the UN) less developed countries could coordinate their position within the ITU with regard to GSO and be more effective as a voting block.

In seeking to understand the politics of GSO, it is useful to consider how actors' perceived identities created the context in which actors determined their interests with regards to the issue-area. Less developed countries had hugely variable interests, ideologies, and resources, yet formed a perceived shared identity as "non-aligned" and "developing." The structure of the international system, in which certain countries were less developed, helped to shape the actors' identity and subsequently their interests.[68]

Actors also understood their circumstances in accordance to their acceptance of Westphalian statehood. The institution of sovereignty can be understood as pre-establishing mutual understandings amongst actors (in conjunction with state-centric international law) that it would be states who were the main actors in space, and hence that states would be responsible for registering signal-usage and for claiming liability for their satellites. The international society institution of equality of peoples can also be seen as an influence on (and also reconstitutive of) the GSO issue area—albeit through the dominant institution of sovereignty. The institution of equality of peoples can be understood as present because of the discourse LDCs constructed around the GSO issue-area and the NWICO (with regards to equitable access as a right to all communities). Equality of peoples also influenced the wider Group of 77 agenda, and hence the language used by LDCs with regards to equality of peoples was mutually reinforcing across multiple-issue areas. The institution can be seen as rising and being both an

[68] Wendt, referenced in Alderson and Hurrell (2000, 35).

influence on, and reconstituted by, the GSO issue-area. However the institution of equality of peoples was at play with that of sovereignty in that equality was to be guaranteed through greater equality for individuals via states. Therefore the interhuman domain, which could be associated with the equality of peoples institution, was not a significant influence on negotiations.

The balance of power can also be seen as rising, as LDCs sought to redress the balance in the bipolar system by asserting their collective influence—both in the case of GSO and also through the wider Group of 77 agenda. As such the international society reflected in the GSO case at this point was coexistent international society—as actors sought to establish governance that would allow coordination but not cooperation in geosynchronous orbit. This reflected wider Cold War pluralism in international society in the 1960s, 1970s, and 1980s. However the GSO issue-area also had the potential to challenge basic coexistence in international society by leading to cooperation and the integration of issues such as equality of peoples. As such the GSO case reflected wider international Cold War society, but also embodied dynamics that could challenge that pluralism.

Bogota Declaration

By the mid-1960s discussions regarding orbital and frequency allocation were underway within the ITU, and the Group of 77 had consolidated their position on GSO governance (i.e. demanding *a priori* allocations). In 1976 a sub-group of less developed countries launched a separate challenge to GSO governance, which specifically targeted the lack of a definition for "outer space" and proposed a radically different definition of GSO. The resultant document was the Bogota Declaration, signed on 3 December 1976 by eight equatorial countries: Brazil, Colombia, Congo, Ecuador, Kenya, Uganda, and Zaire (hereafter the "Bogota group").[69] The Bogota Declaration ("the Declaration," Appendix F) asserted that GSO should not be considered part of outer space (and hence not neutral territory), and contingent on this fact should fall within the jurisdiction (sovereignty) of the nation-states that are geostationary "beneath" it (Section 1, Paragraph 3).[70] The Declaration quoted the UN General Assembly Resolution which says states have sovereignty over their natural resources.[71] The final section detailed the implications of the claim: (Section 3, a) that there will be tangible benefits for the equatorial states, "to their respective people and for the universal community," as opposed to only the most developed countries; (b) that orbits above the high seas will still be considered the common heritage of mankind;[72] (c) that other orbits and satellites are not implicated in the claim; (d) that GEOSATs "shall require previous and expressed authorization on the part of the concerned state, and the operation of the device should conform with the national law of that territorial country over which it is placed," as separate from the ITU's regulations; (e) and that current GEOSATs are in violation of the Declaration.

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[69] At the time the Declaration was made, there were 10 countries with territory beneath the equator (Peterson 2005, 73), and hence the Bogota group was supported by the majority of equatorial states.
[70] Paragraph one of Section 4 reads specifically that the OST cannot be a definitive decision on ownership, "...even less when the international community is questioning all the terms of international law which were elaborated when the developing countries could not count on adequate scientific advice and were thus not able to observe and evaluate omissions, contradictions and consequences of the proposals which were prepared with great ability by the industrialized powers for their own benefit." The section then goes on to argue why equatorial claims do not refute the Outer Space Treaty, since the Treaty does not formally define outer space (paragraphs 2-4).
[71] UN General Assembly Resolution 2692 (XXV) and 3281, quoted in the Bogota Declaration Section 2, paragraphs 1 and 3, respectively. The Bogota Declaration concludes Section 2 by stating, "Consequently, the above-mentioned provisions lead the equatorial states to affirm that the synchronous geostationary orbit, being a natural resource, is under the sovereignty of the equatorial states."
[72] Collectively the area of the GSO that would be under specific sovereignty (i.e., above equatorial countries) would be approximately 25%. Seventy five percent of the GSO arc would be above the high seas, and hence remain neutral (Peterson 2004, 73).

Why did the Bogota group choose to draft a separate challenge to ITU governance, distinct from the wider LDC challenges to GSO governance? On explanation is that if the Bogota Declaration was adopted, it would give financial benefits to the relevant equatorial countries. According to the Declaration, states placing objects in GSO above equatorial states' territory would need "authorization" for dong so—a process which would likely carry a fee payable to the equatorial country. The Bogota states would also gain power and prestige by having control over the sections of GSO above their respective territories. Brazil had also come to see itself as a leader in the non-aligned movement and saw its participation in the Bogota Declaration as a bargaining chip in its wider policy of the NIEO (Peterson 2005, 74). As such, for Brazil the GSO issue-area was connected to its sense of identity as an LDC leader—GSO was not a primary issue but rather part of wider preference formulations on broader geopolitical concerns about power and economics within the international system. For Colombia, the issue was more intimately related to issues of domestic politics in that the country's constitution made mention of geostationary orbit and the electromagnetic spectrum as part of its territory (Gorove 1991, 41).[73] Indonesia's reasons were largely practical in that, as a geographically large territory with some remote reaches, satellite communications were particularly important for providing the population of the country with communications (Peterson 2005, 181-182).[74] For all Bogota group countries pooling efforts with other equatorial countries increased the strength and legitimacy of their challenge.

[73] The Colombian Constitution 1991 Article 101, paragraph 4, quoted in Peterson 2005, 74.

[74] Indonesia was also one of the earlier developing countries to use satellites for domestic communications. India was also using satellite technology for domestic communications in the 1970s, though it was not a part of the Bogota Declaration. India was instead a strong supporter of *a priori* planning within the network of the Group of 77.

Thus strategic calculations and perceived identity influenced the actions of various Bogota group actors. The Bogota group decide to formulate its challenge in the way that they did? Considering the language of the Declaration shows how international society institutions also created the context in which the Bogota actors formulated their interests and identities. As above, the Bogota Declaration was embedded in the language of territorial Westphalian sovereignty and hence indicated the internalization of the institution of sovereignty. Outer space was deemed "neutral territory," the very concept of which could inherently challenge the institution of sovereignty and lend itself to arguments against great powers assuming the right to maintain ownership over satellites in space, and to maintain *de facto* ownership of orbital slots (through satellite occupation). Despite additional references to the category of "mankind" and "universal society," the Bogota group appealed for their legitimacy through the institution of sovereignty over resources and territory to establish the legitimacy of their claim. The Bogota Declaration was contrary to recognized principles of outer space neutrality, yet stated in the terms of those principles (by arguing that GSO was not part of outer space), which attests to the internalization of sovereignty and its influence on constructing the context in which actors calculated their interests.

The Bogota claims to sovereignty were also carefully constructed to argue that such appropriation would not be a violation of existing international outer space law. The actors could have challenged the nascent regime established by the Outer Space Treaty (for example by appealing to alternative analogies such as the airspace analogy) but instead they worded their argument to work within the pre-established OST. This indicates both the compliance pull of the diffuse OST regime, and also how the institution of international law was constitutive of actors' interests—actors' basic interests were already influenced by the context created by an international society rooted in sovereignty and international law, and the Bogota Group sought to justify their actions with reference to those institutions (Dunne 2005, 166). This is particularly significant given that the Bogota states were mostly "outside" of original Western international society—but had internalized sovereignty and were playing the "game"' of that society (Dunne 1998, 187).

Interim Outcomes of GSO Governance Challenges

The Group of 77's general concerns over GSO and the Bogota Declaration were considered within the UN and the ITU throughout the 1970s. Although no major agreements were reached, at the ITU Plenipotentiary of 1973 the members of the ITU agreed to amend the ITU Convention.[75] Article 33 was re-written to acknowledge that GSO and the radio-frequency spectrum are limited resources and that the issue of equity should be accounted for in their use. This took into account that all countries had "equal rights in the use of both radio frequencies allocated to various space radio-communication services and the geostationary satellite orbit for these services" (Article 33). At the 1973 meeting it was also decided to allocate a portion of the radio-frequency to in-space uses.

The UN (through UNCOPUOS) avoided serious engagement with the Bogota Declaration. In 1976, the UNCOPUOS discussed the Bogota Declaration, but postponed giving serious attention to the issue by requesting a further secretariat study on the matter (Peterson 2004, 63-64). However the UN did re-engage with issues regarding the

[75] The ITU's governing document is the International Telecommunications Convention (Savage 1989, 14), which is regularly updated but was originally signed in 1865 (ITU 2004).

definition of outer space and its boundaries, and with regards to equitable access to GSO. In meetings in 1977 and 1978 the UNCOPUOS discussed the issue of where the boundary to outer space is, although this topic had secondary importance to the Moon Treaty, which was now dominating discussions (Peterson 2004, 63-64).

The Bogota Declaration was not officially raised in the forum of the ITU until 1979 at the WARC-79. At this meeting participants avoided serious engagement with the issue by stating bureaucratic difficulties: that the issue was not on the conference agenda and hence could not be addressed (Staple 1986, 712). In 1982, the ITU once again changed Article 33 of the ITU Convention to indicate further the needs of developing countries and "the geographical situation of particular countries."[76]

Why did the UN and ITU avoid seriously engaging with the Bogota Declaration and challenges to *a posteriori* GSO planning? The ITU had for over a century been a technical organization tasked with coordinating complex procedural necessities for the radio-frequency spectrum. The Bogota Declaration and G-77 proposals required the ITU to consider politically charged issues far beyond its normal responsibilities. The NWICO sought the "controlled, balanced" flow of information (Savage 1989), while Article 4 of the ITU's Convention states that the organization's central function is facilitating unrestricted international communications. As such accommodating the challenges being raised by LDCs would require significant changes within the decision-making procedures and also the norms and principles of the ITU diffuse regime. Combined with the ITU's tradition of avoiding political issues, it can be understood why the initial reaction of ITU actors was to avoid addressing the challenges.

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[76] Quoted in Peterson 2005, 194.

The UN avoided formulating a serious response to the Bogota group for several reasons. The UNCOPUOS was, at the time of the Bogota Declaration, focused on the drafting of the Moon Treaty. It was also becoming clear that the Bogota Declaration lacked support amongst other LDCs, and hence UN actors strategically avoided engaging with the issues while the group itself hegan to unravel (Peterson 2004, 63-64). Furthermore it was normal practice for the UN to defer to the ITU on most issues regarding the orbit/spectrum resources and thus the main implication of the Bogota Declaration for the UN was in terms of the definition of outer space. However the issue of the definition of outer space was within the UN's remit and was still avoided. Beyond the Bogota Declaration, issues of the definition of outer space were not pressing, as satellite and airspace technology still did not drastically challenge the issue: From a spatialist perspective, satellites did not yet fly low enough, nor planes high enough, to make the issue urgent. From a functionalist perspective, all objects launched into GSO remained for general outer space use. Therefore, combined with the other incentives to avoid the issue as listed above, the UN had reason to avoid the Bogota group's assertions.

The Bogota Declaration shows how non-governmental or intergovernmental organizations can become entwined with international regimes, and how such organizations (through their representatives and bureaucrats) can assert agency and play a role in various issues. However the power of such organizations must be considered in relation to the structure of the international system. The ITU and UN already arguably represented the interests of more powerful actors in the international system. Although challenges were mounted against the pre-established method of governance over GSO, the strategic avoidance of seriously addressing these challenges within the organizations also reflects power politics. The US was expressly against the Bogota Declaration and in favor of *a priori* planning, and this influenced the UN and ITU's likelihood to back the existing system.

A More Specific GSO Regime with Shifting Principles

Although the challenges to GSO governance were partly avoided by the UN and the ITU, the changes to the ITU Convention Article 33 represented a small but significant shift in the GSO regime. The arguments over GSO revealed that the diffuse regimes in which GSO governance was presumed to be embedded were not specific enough for the particular issue-area of GSO. The discussions and evolution of documentation regarding GSO indicated the development of a nascent specific regime for GSO, as embedded in more diffuse outer space and radio-frequency regimes.

Less developed countries had demanded through the Group of 77 and the Bogota group changes in the rules for GSO. Rule change was not initially achieved, but the wording used by the ITU and UN with regards to the GSO issue-area did reflect an imposed change to the underlying principles of the GSO regime. While the shift in wording may have been in part superficial and even placatory, the linguistic changes did do two things: firstly, it represented a superficial change in the regime's principles, as imposed by some members of the regime; and secondly it placed the principles of the regime (now partly emphasizing "equality") at odds with its rules (which remained rooted in efficient distribution through *a posteriori* planning).

Once again the question arises as to why, if regimes are merely strategic, the most powerful actor in the regime (the US) tolerated any compromise with regards to its interests through the introduction of the language of equality into the ITU and UN regimes that related to GSO? The conclusion must be drawn that the regimes had acted as an intervening variables. Rational actor calculations don't explain why an actor such as the US would spend the time and effort to participate in diplomatic negotiations over the wording of ITU documents regarding equality, and subsequently accept those changes once they were voted through. While the US would rationally not want to defect from the GSO regime (via the ITU) because of potential future coordination problems, nonetheless that country was the dominant actor and the main actor utilizing GSO at that time. Defection would have been an option, but the acceptance of compromise suggests that the regime served to shift interests and change outcomes, and that actors were also bound to each other through pre-existing regimes and the obligations they created.

Resolution of GSO Governance Issues: Bogota Declaration

In the 1980s, the equatorial nations who had asserted the Bogota Declaration struggled to maintain cohesion and momentum for their position. Their ability to do so was challenged by fractures within their own group, lack of support for their claim from many other LDCs, and outright dismissal of their claims by many others. Within the Bogota group, Ecuador and Indonesia first distanced themselves from the Declaration at the UN in 1982 (Peterson 2005, 68-69 and 74). However in April of that year the group reconvened and changed their document to avoid the word "sovereignty" and rather note their "preservation rights" to GSO arcs above their territory (Peterson 2005, 65). By 1984, Brazil had essentially abandoned the Bogota group, and in March 1984 it was only Colombia, Ecuador, Indonesia and Kenya who remained to propose draft principles regarding the use of GSO to the UN Outer Space Committee. At WARC-ORB 1985 representatives of Indonesia changed their position to join the Brazilians in opposition to the plan, and Kenya became a leading proponent of *a priori* planning, leaving only Ecuador and Colombia as serious advocates of the Bogota Declaration (Peterson 2005, 194-196). Bureaucratic technicalities regarding the meeting's agenda were again used to deflect serious discussion of the issue at WARM-ORB 1985. At WARC-ORB 1988, Colombia announced that it would not raise the Bogota Declaration with the ITU again.

The Bogota group had failed to capture the serious attention of the US, the ITU, the UN, and even other LDCs. Actors such as Brazil had investments in both the Bogota Declaration and also the wider Group of 77 movement, and eventually reassessed their interests with the Bogota Declaration based on its likelihood of success. The UN and ITU's avoidance of the Bogota Declaration (but engagement with discussions of *a priori* planning) indicated that LDCs could only hope to achieve certain more moderate gains with regards to GSO. Other developing countries had made serious headway in the ITU in pushing for a hybrid system of *a priori* and *a posteriori* planning for GEOSATs (Savage 1989). Many other developing countries supported the proposal for *a priori* orbital position planning, and in fact seriously questioned the Bogota Declaration because it challenged normalized behavior and challenged the Outer Space Treaty (through which GSO was accepted as part of outer space and hence neutral territory). Hence while the Bogota Declaration states had incorporated "equity" as part of their claim, the *a priori* planning option to improve fairness of resource distribution proved a better alternative for many developing countries, and eventually for Bogota group members themselves. The Bogota group sought to embed their claims over GSO in the context of pre-existing regimes, but the Declaration was still too far beyond the accepted legal outer space framework to attract adequate support.

Resolution of GSO Governance Issues: Efficiency versus Equality

The issue of GSO was discussed at UNCOPUOS meetings throughout the 1980s. In 1984 the UN Outer Space Legal Subcommittee adjusted the name of the issue on its agenda to include recognition of the need for equality in addressing GSO, and to emphasize GSO as a "natural resource."[77] In 1985 the agenda item name was changed again in order to recognize the ITU's role in the issue.[78] By 1985 concerns were also heightened about GSO scarcity when President Reagan made moves to privatize the US satellite industry (thus potentially increasing the number of GEOSATs launched). NASA had been slowly and reluctantly accepting the commercialization of some aspects of space exploration and exploitation, particularly since the 1970s when US President Nixon banned NASA from continuing to fund certain space research and development, and later when (under Reagan and then Clinton), Congress passed legislation encouraging the privatization of space (Macauley 2002, 205). This move was backed by a growth in private groups and companies advocating the opening up of space to the private sector (such as with American lobbying group Spaceshare, and the investment company SpaceHab). Such privatization raised concerns that GEOSATS would proliferate and that GSO would become saturated.

However changes in GSO governance remained only linguistic (in terms of changes to the wording of UN agendas and the governing doctrines of the ITU) until WARC-88, when a hybrid system of open access and also part-controlled access was signed, to go

[77] Specifically, the agenda item was changed to read, "Matters relating to the definition and delimitation of outer space and to the character and utilization of the geosynchronous orbit including the elaboration of general principles to govern the rational and equitable use of geosynchronous orbit, a limited natural resource" (quoted in Peterson 2005, 65).

[78] Specifically, the agenda item was changed to read, "Matters relating to the definition and delimitation of outer space and to the character and utilization of the geostationary orbit, including consideration of ways and means to ensure the rational and equitable use of the geostationary orbit without prejudice to the role of the International Telecommunications Union" (quoted in Peterson 2005, 65).

into effect on 16 March 1990 for twenty years. The plan was complicated, but essentially broke down allocations according to the three main regions within the ITU.[79] For Regions 1 and 3, allotments were roughly proportional to the geographical area of the country.[80] This meant that small- to medium-sized countries generally received four to five orbital positions, and larger countries such as China and the USSR received more (Coddington and Rutkowski 1982, 50). A specific plan for Region 2 was delayed, largely at the behest of the US, but it was eventually agreed that the orbit above the region would be divided into four alternating segments for the fixed and broadcasting satellite services (Coddington and Rutkowski 1982, 50).

This hybrid system of *a priori* and *a posteriori* planning represented a compromise for both LDCs and the US on the issue of GSO governance. The LDCs had consolidated a voter position within the ITU's one member one vote system, and especially after the Bogota splinter group position was abandoned, so why would they also agree to a hybrid system? The LDC's concessions can partly be understood considering the implementation of "Improved Regulatory Procedures" passed at WARC-79 (Peterson 2005, 197). These established (amongst other things) that newcomers to GSO (i.e. someone wishing to launch a GEOSAT and needing to coordinate with other users) could have a multilateral planning meeting instead of the traditional bilateral meetings, and developing countries felt they would have more influence in multilateral meetings (Peterson 2005, 197). It also established that the burden of coordination fell on existing users and not just newcomers (Peterson 2005, 197). The pre-existing decision-making

[79] Regions 1 and 3 being Europe, Africa, Asia and Oceania, and Region 2 being the Americas (Coddington and Rutkowski 1982, 49).
[80] Allotments consisted of "nominal orbital position, channel number, boresight, antenna beamwidth, orientation of ellipse, poliarization of e.i.r.p." (quoted in Coddington and Rutkowski 1982, 50).

procedures of the regime had been changed in order to better facilitate the functioning of the regime. Doing so gave LDCs a greater sense of control over their interests within the regime. In particular, LDCs had felt abused because their interests were previously not considered based on their lack of information about space exploitation in comparison to the spacefaring powers. New procedures would guarantee the opportunity to consider regulations prior to their inception. LDCs would benefit from consultations with the IFRB directed specifically towards states lacking in resources to determine a position on spectrum management matters.[81]

Compromise by LDCs was also influenced by the diplomatic campaign by the United States prior to the 1985 WARC. Negotiations at the meeting were predicted to be intense and preparatory action from many states preceded the actual meeting (Peterson 2005, 63-66). The US, for its part, undertook a campaign of bilateral discussions with other governments, and also campaigned epistemic communities by bringing together radio engineers and officials from several countries, in a set of government and privately sponsored seminars (Peterson 2005, 195).

The diplomatic campaign and eventual compromise on a hybrid planning system raises the question of why, conversely, the US accepted the new system. In the 1980s, more countries were acquiring satellite capabilities, which could lead to increased demand for geosynchronous orbital slots, particularly as the satellite TV and mobile phone industries developed. This increased US concerns over having adequate "space" within GSO for satellites—particularly as the US had interests in encouraging its own domestic space industry. Thus the US had interests in maintaining a regime that

[81] The IFRB had since 1959 the role of consulting (advising) states on spectrum matters when that states didn't have domestic resources for independent spectrum management (Savage 1989, 41-42) (thus making the IFRB closest to LDCs within the ITU).

coordinated usage in order to avoid satellite collisions or signal interference. As more actors came to use the orbit, the reciprocal ability of actors to mutually injure each other became viable.

Yet in conjunction with the increased usage of GSO, technical developments also caused actors to reconceive the scarcity of the GSO resource, and thus American concerns over the practicalities of GSO access were decreased. New calculations based on microwave technology increased the estimated capacity of GSO. While such developments in the past had not been enough to convince actors that GSO was not threatened by scarcity, fiber optic technology also made an immediate impact on the demand for outer space communications satellites. With fiber optic technology, global communications could be carried around earth through cables, and without the slight delay incurred from satellite telephone communications (due to the significant distance of GEOSATs from the earth's surface). Thus fiber optics shifted the burden of global communications to another medium (cables), and off of GSO (Ghatak and Thyagarajan 1998).[82]

Given the US's preponderance of power, understanding why the US undertook extensive diplomatic campaigns and eventually accepted a compromise requires considering how the GSO regime itself acted as an intervening variable with regards to actor interests. The initial changes in the wording used on agenda items and in the ITU's Constitution were arguably superficial. The changes in wording did not translate into obvious actionable points and this was partly due to the fact that various actors

[82] Fiber optics can be bundled into cords and carry telecommunications, and began to be used in telephony in 1977. The first transatlantic cable was laid in 1988 and since that time, have come to carry much of the world's telecommunications (Ghatak and Thyagarajan 1998). Fiber optics allow for faster and wideband communications, and are immune from electromagnetic interference (Kellerman 1993, 48).

interpreted the changes in wording very differently (Peterson 2005, 65-66). Actors representing the three main positions (industrialized states' support for no planning, many developing states' arguments for *a priori* planning, and the equatorial group's claim to GSO sovereignty) each interpreted the re-wording in a manner that potentially supported their position (Peterson 2005, 194 and 65-66). Thus the changes in wording can be seen as largely symbolic in the middle stages of regime development. However as the Bogota group collapsed and the US moved towards compromise, the significance of "equality" became more internalized and meaningful. Although the change in wording was imposed on some actors (notably the US representatives and many of the technocrats within the ITU), once in place it served to reconstitute the principles of the regime, and the shifted principles in turn influenced changes in actors' basic interests towards GSO. The fact that a hybrid system was eventually adopted can be seen as part of the slow shift of the regime towards integrating the principle of equality, and of the ITU's acceptance that its role in coordinating activity was political as well as technical.

America's concessions can also be understood as influenced by the institution of great power management. The institution of great power management in part pre-constituted American actors' identities and sense of obligation towards other actors. One obligation that great powers have is to show responsibility for demand for just change.[83] In order for both the regime and also the US's actions to be seen as legitimate, the regime needed to become more inclusive and reflect (at least to a limited degree) the interests and values of weaker members of international society.[84] The institution of diplomacy constituted the

[83] Bull 1995 edition, 220-222.
[84] Bull's position, summarized in Alderson and Hurrell 2000, 27-29.

structure through which actors could use bilateral and multilateral meeting to negotiate the GSO regime.

After Resolution

Following the collapse of the Bogota group and the agreement of hybrid planning, the principle of equality in GSO management was internalized—now not only through the language within the ITU and UNCOPUOS agendas but also through a hybrid system of governance within the specific GSO regime. The rejection of the Bogota Declaration suggested the preference to maintain the norm of free access to GSO, as well as the rejection (at least at this point) of a functionalist view of the definition of outer space, whereby GSO would be considered as something other than "neutral territory."

Ironically, after reaching agreement, many states concluded that instead of using their allocated GSO slot, it was financially more practical to participate in regional programs where multiple countries shared GEOSATs (Peterson 2005, 210-212). It was eventually agreed that, in order to maximize efficiency of the GSO resource, states deciding to do so could rescind their orbital slot allocations. This reinforces two points made earlier: firstly that concerns over GSO scarcity were largely a matter of perception wherein there was no consensus on the reality of the limitations of the resource; and secondly that the controversies surrounding GSO usage were partly significant because of the wider unaligned movement by LDCs in the 1970s and 80s. The North-South debate was an issue in other areas of outer space exploration and in 1997 the UN announced "The Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries (1997)." As with the original linguistic changes to GSO management, the Declaration gives little specific guidance but rather reiterates that equality should be a principle in outer space regimes. Strategically, the Declaration was also a useful diversion of attention away from the Moon Treaty, which went into force in 1984 and was largely considered a failure (Goldman 2002, 173).

The resolution of GSO issues in the 1980s shows that the specific GSO regime was flexible, durable, and adaptable (Coddington and Rutkowski 1982, 317). The regime came to accommodate the basic interests of the majority of its members and acted as an intervening variable by causing the regime members to pursue changes to the regime through pre-established decision-making procedures. The regime affected outcomes by influencing the eventual shift to a hybrid system for allocations of the orbit/spectrum resource. The regime also shifted the basic interests of some members (such as the US) by causing them to compromise on their interests in exchange for the preservation of the regime, the preservation of their reputation as a leader, and the continued coordination of the resource in order to avoid signal interference and GSO overcrowding.

Equality of peoples, though in play with the institution of sovereignty, was rising steadily during the time-frame considered. Equality of peoples was introduced during the first phase of the regime and gained more influence in the second stage of the regime's development. The rise of the equality of peoples institution can be seen in the discourse used by actors (through reference to the "common heritage of mankind") and as integrated into key documents to assert the intention of actors to further internalize and act upon the principle of equitable access. The institution of equality of peoples was an influence on the regime in later stages of its evolution, given that issues of equality influenced actors' interests and behavior, and especially when those changes were taken despite being contrary to the interests of the most power regime actor (the US).

The influence of equality of peoples was also at play with the institution of great power management. The US's major diplomatic campaign and eventual compromise on GSO governance indicates that the great power was accepting some of its "great responsibilities" in order to ensure order in international society. By taking the lead in pursuing a solution, eventually conceding some power to other countries and accepting demands for change, the US was fulfilling its duties as a system hegemon (Dunne 1998, 147; Bull 1995, 222). The actions of the US were not clearly a simple act of power, but a submission to a rule-governed regime that would serve to partially constrain its power for the sake of international order.

In the 1960s and 1970s the international relations as they occurred in this case reflected a wider pluralist coexistent international society.[85] States undertook cooperation to establish treaties and regimes to facilitate coexistence, as through the ITU. The Outer Space Treaty introduced terminology that reflects solidarism, by identifying space as for peaceful purposes. Yet (as explored above) there were also power political motivations behind the evolution of the Outer Space Treaty. The institutions of sovereignty (and state-centric international law), great power management, and the balance of power were deeply internalized in the Cold War and Westphalian context and helped create (and were mutually reconstituted by) actors' understanding of their interests and identity in the case of GSO. The gains that LDCs achieved regarding GSO can be understood as encouraging a shift towards cooperative international society. Although no mutual interests were

[85] Buzan specifically mentions orbital slot-allocations as reflecting coexistence in a technically advanced environment (2004, 144).

found between the LDCs and the US for GSO, a compromise was achieved through diplomatic means and as shaped by diffuse regimes and pre-existing norms. The significance of the difference between coexistence and cooperation through the case of GSO is shown by the fact that the ITU changed its 100-year-old principles to incorporate concerns regarding equality.

Despite these solidarist tendencies, wider international society throughout this case still primarily "separated and cushioned" actors, and hence was pluralist (Bull 1995). The pluralist international society "seen" through the GSO case reflected wider pluralist international society as it existed in the Cold War time-frame considered. However it is also worth considering how GSO may itself be part of the longer-term slow reconstitution of international politics towards solidarist international or even world society. Global telecommunications have served to connect individual humans around the world, spreading a common culture as part of globalization's shrinking of space and time. GEOSATs played a major role in establishing global communications and through the "CNN effect" real-time news can be broadcast in real-time around the world. The concerns of the NWICO highlight how this spread is not universally perceived as positive, as the homogenization of culture may be undermining some cultures at the expense of dominant cultures (the McDonaldization effect). However it could generate a stronger sense of collective identity and shared interests, which would in turn indicate a shift towards solidarism. This collective identity could also serve to undermine the state and empower the inter-human domain, causing a shift towards world society.[86] In encouraging collective (non-state) identities, it could empower the inter-human domain;

[86] For more on this, see for example Wilson and Vincent 1993.

and as GEOSATs are increasingly owned and operated by non-state actors (companies and NGOs) it could also strengthen the transnational domain.

Current Situation and Speculation About the Future

Despite increased reliance on fibre optic cables, GEOSATs are still used in telecommunications and are particularly useful in providing communications links to rural areas. They are also very important for satellite television broadcasting and in providing news agencies around the world with "live" coverage. They are also still important for meteorological monitoring which provides, amongst other things, weather forecasting.

Two specific issues with implications for GSO seem likely to re-emerge within the international community. One is the definition of outer space, and the other is outer space debris. Debate regarding the definition of outer space has continued for decades and serious discussions on the issue continue to be avoided, with some arguing that addressing it will open up extensive arguments (a "pandora's box") that may be difficult to resolve (Oduntan 2003, 66). Due to technological factors which are changing the purposes of space flight the issue is likely to re-emerge in the near future. Recent technological developments could cause the issue to be more pressing—for example, tourist space "flights" which only enter low earth orbit for a few minutes before returning to airspace.[87] However, future discussions on space boundaries will not likely implicate GSO again. The overwhelming rejection of claims to sovereignty over parts of GSO by the Bogota group indicates that the issue has been put to rest. Even if functionalist

[87] Space tourism "flights" are likely to commence within the next ten years. Such flights will spend only minutes in low-earth orbit and therefore raise the question as to what legal jurisdiction they fall under? Will they be governed by aviation law (because they are only temporary "flights" from the functionalist perspective) or fall under space regulations because the planes will have entered earth orbit (from the functionalist perspective).

arguments dominate future discussions of the definition of outer space (i.e., outer space is defined in part by the function of objects there), GSO has been confirmed as part of "outer space."

Outer space debris is already of concern to the international community. This issue has implications for areas other than GSO. However in the context of the GSO regime concerns over debris could once again cause fears about resource scarcity if orbital positions are compromised by debris.[88] A true tragedy of the commons scenario could occur if debris became a serious enough issue to limit efficient use of GSO and actors did not take action to prevent it. As such, problems with debris may one day need to be addressed more seriously for GSO and also other areas. Given the nature of outer space as a global commons, it is likely that the solution would again be resolved through an international regime, and indeed discussions on debris and monitoring programs are already being raised.[89]

Future changes in GSO regulation could again be influenced by further technological developments. Technological developments could theoretically increase or decrease demand for GSO (as it has in the past). New uses for GSO could increase demand for orbital positions (for example, ongoing discussions for the potential of using GEOSATs to beam solar energy back to earth). However it is equally likely that new technology will improve satellite positioning and broadcasting, thus reducing the amount of space needed for each individual GEOSAT. New technologies could also reduce GSO demand by allowing GEOSAT uses to be assumed through other means, in a manner similar to the

[88] Once GEOSATs run out of fuel for use in balancing their correct orbit with thrusters, they are either lowered to an "incline orbit," or lifted up to a "graveyard orbit" for "disposal". However this does not exempt GSO from debris problems. For more information on the issue see for example Vogler 1995, 104-108; Wilkinson, J et al. 1998.
[89] For example, the extensive discussions on debris at the 1999 UNISPACE conference.

transfer of telecommunications traffic to fiber optics in the 1970s. For example, recent technology has allowed for better utilization of other orbits for purposes that had previously required geostationary orbits.

Conclusion

Governance of geostationary orbit was originally presumed to be nested within diffuse regimes, but a specific GSO regime evolved over time as various actors came to believe that they had an interest in GSO. The Outer Space Treaty and International Telecommunications Union formed the diffuse regimes through which more specific regulations for GSO were established. Despite the preponderance of power over GSO usage, the US came into conflict with less developed countries that perceived the orbit as a limited resource. The controversies were embedded in wider international politics and movements, and especially the non-aligned movement of the 1970s, and generally reflected wider coexistent pluralist international society in the Cold War era. Compromise was reached with the hybrid allocation plan, which shows how those diffuse regimes had a compliance pull, and that general socialization also made actors (particularly the US) feel obliged to eventually cooperate. This resulted in the slow evolution of a specific GSO regime, based on old norms but infused with new principles and decision-making procedures, around which actors' expectations finally converged.

The next chapter considers the case of the International Space Station, and the evolution of understandings of space stations in general. The wider Cold War context and diffuse outer space regimes were also a background for the development of space stations, although the end of the Cold War also significantly changed what the International Space Station represented and how it was run. The chapter explores the influences, motivations, and consequences of conflict and cooperation with regards to space stations.

Chapter 3: The International Space Station

"Within the next 10 or 15 years, the earth will have a new companion in the skies, a man-made satellite that could be either the greatest force for peace ever devised, or one of the most terrible weapons of war—depending on who makes and controls it."

—Wernher von Braun in *Collier's* Magazine (1952)

The notion of a manned space craft has long captured the imagination of various authors and scientists—yet the essence of what space stations are and what they are for has been continually reconceived over time. In early fiction and non-fiction portrayals space stations were conceived of as bases or stopping-over points from which longer-term missions would be launched into deep space (Lanius 2002, 16). In Edward Everett Hale's 1869 story *The Brick Moon,* a space craft is placed into earth orbit and develops its own Christian utopian civilization. In 1948 Arthur C. Clarke wrote about a space station that traveled through space on exploratory missions—the story that became the basis for Stanley Kubrick's famous 1968 film *Space Odyssey: 2001.*[90]

In the Cold War context the motivations behind such a project shifted dramatically away from the utopian microcosms and far-flung exploratory missions often envisioned before. In the early years of the Cold War the US and USSR were both investing large amounts of money into space technology, achieving satellite launches and other space feats. In this context space stations were no longer merely fiction or theoretical science, but a feasible project for both spacefaring states. This chapter considers what those changing motivations were and how the conceptualization of space stations changed over time.

[90] *Space Odyssey: 2001* was loosely advanced from Clarke's conceptualization of space stations from his 1948 short story "The Sentinel". *Space Odyssey: 2001* was written in conjunction with Stanley Kubrik's synonymous movie, released in 1968, which famously depicted the round space station design.

Throughout the 1960s and 1970s the US and USSR continued to challenge each other in outer space, and space stations were yet another competitive outlet. In the 1990s the US announced plans for a new station, but for the first time invited international participants to collaborate on the project. The second section of the Chapter considers why the US opened up the project to international partners, and how such an international station would be governed.

At the end of the Cold War the US invited Russia to join the project, which resulted in a complicated set of renegotiations to the project's foundational regime. The Post Cold War station became known as the International Space Station, which was eventually launched despite serious political and financial challenges. This chapter concludes by considering how different actors came to invest in the ISS project, and how their interests in the station were formulated and changed in order to produce the largest collaborative multinational project ever undertaken.[91] What do actors' changing reactions to space stations (and the International Space Station in particular) over time tell us about the nature of regimes and also the changing nature of international society in the Cold War and Post Cold War eras?

Early Motivations for and Understandings of Space Stations

Space scientists have long envisioned space stations as part of the bigger project of human exploration of the universe. However in the Cold War context political and strategic interests also influenced actors' motivations for, and understanding of, space stations. The norms and laws that established outer space as neutral territory made reconnaissance from space a possibility and space stations were increasingly seen strategically as a platform for spying back down onto earth. Space stations were also seen

[91] UN 2000, 2; Devlin and Schmidt 1997-1998, 237.

less as tools for wider exploration, and more as orbiting laboratories focused on scientific experimentation and study (Lanius 2002, 16). The notion of space stations as a "base camp" for exploratory missions further out in space was considered too expensive, as funds were prioritized towards faster and high profile "firsts" in space. Expedited exploration programs were more highly valued than gradual multi-stage ones, and interplanetary missions (both robotic missions to other planets and the manned moon missions) were deemed to be deployable directly from earth.[92] As such by the 1960s, the perceived purpose of space stations had largely shifted to mean a semi-permanent outpost which more transient vehicles visit. Collectively these shifts indicate how outer space exploration had been reconceived in the Cold War context, particularly with the onset of the Space Race, and how that Race was mutually reinforcing the competition between the two system hegemons.

However the question arises of why these "firsts" in space—and the Space Race itself—were so powerful an influence on global politics? The launch of Sputnik made it clear that space exploration was a way to gain domestic and international prestige. US President Johnson stated that Sputnik had a "Space Pearl Harbor effect,"and Sputnik is now often referred to as the "shot heard around the world" (NASA 1995). [93] There are several reasons why space achievements were given such significance by nation-states as well as the global public and international media. To run a major space program is expensive, and hence suggests economic stability. Space achievements also demonstrate

[92] Wernher von Braun (who became the heart of the American space program after leaving Germany during WWII) long advocated a plan for space exploration that included gradual steps: first manned missions, then longer manned missions, then a space station, then a mission to the moon launched from the station, and then missions beyond the moon. However in the heat of the Cold War Space Race, this so-called "von Braun paradigm" was considered too slow (notably by President Nixon), and hence the direct Apollo missions to the moon (Burrows 1999).

[93] Johnson's comment is noted in Sheehan 2007, 48; and the analogy has been reproduced several times, including by NASA 1995.

a state's technological prowess. Space launches normally consist of two main pieces—the rocket (which may consist of multiple "stages" that break off as the rocket rises) and the "payload," which can be a satellite or other object, which eventually breaks away from the rocket once it reaches its intended location in outer space. Rockets can carry intercontinental warheads as well benign objects like satellites, and therefore launching space objects was a "cold" way of demonstrating strategic and military capabilities. By convention, "missile" denotes a military device and "rocket" implies that the payload is civilian—rockets are a means of flight, missiles seek to destroy targets (Easterbrook 2003, 66). Announcing technological, military, and economic capabilities through the Space Race was thus part of the wider ideological battle between the Soviet Union and the US.[94]

The Cold War context played a role in shaping actors' interests in pursuing space stations for the purpose of prestige, Space Race competition, and reconnaissance. However the power political and military-strategic motivations should not entirely eclipse the scientific motivations that actors also had in space stations. As with the launching of Sputnik, many of the early "firsts" were also rooted in a discourse of scientific achievement and rooted in the interests of epistemic communities: primarily groups of rocket scientists who had space and rocket science expertise and were primarily motivated by exploration, and not politics.

Space stations could be useful in several different areas of scientific research. A continually manned station would allow for studies on the effects of zero gravity on the

[94] For an analysis of America's concerns over image in relation to outer space during the Cold War, see Johnson-Freese 1990. For an older but interesting analysis of the role of prestige in outer space politics, see Johnson-Freese 2007; Sadeh 2004, 173; Van Dyke, 1964. On the specific role of Sputnik on international image (both American and Soviet) see for example Sheehan 2007, 36-64.

human body over extended periods of time. Such research was seen as having potential benefits for future colonization of space and also for long-duration, manned interplanetary exploration missions. Space stations also offered an opportunity to learn about the technological problems that may arise in long-term space missions and how astronauts and their ground-control counterparts could handle things such as fires, computer problems, and hardware damage—again with implications for future long-duration and/or interplanetary missions. Experiments on space stations were also said to have potential benefits for humanity as a whole, such as developing vaccinations in a zero gravity environment, or to grow plants (which would be necessary for longer-term space settlements and exploratory ventures) (Lanius 2002, 16).

In the US, both the Air Force and the civilian National Aeronautics and Space Administration had interests in launching space stations. (The Soviet space program was contained within the USSR Ministry of Defense and had no civilian equivalent.) Eventually NASA was granted the funds for creating a space station while the US military was denied them. While this does indicate on one level that the scientific and civilian motivations for the station had been deemed important, the decision was partly strategic in that a manned military space station was deemed unnecessary amongst American actors as robotic military space projects were cheaper and equally effective.[95] There were also concerns that such a project would be too "provocative" to the USSR and the international community (Sheehan 2007, 45). Soviet stations were considered dual-purpose (civilian-scientific and military) until the late 1970s when the Soviets made

[95] In 1961 the US Air Force proposed a military Manned Orbital Laboratory (MOL). NASA was also planning a civilian station "Skylab." After several years of planning (which cost $1.3 billion), the MOL was cut in 1969, due to the decision to allocate funds to NASA's civilian space station (Burrows 1999, 225-257).

a similar decision with regards to cost, after which point Soviet/ Russian space stations were also considered to be civilian and non-military.

Early Competition and Cooperation

At the end of the 1960s, both the Soviets and the Americans were dedicating funds and time to serious space station development plans—the Soviets to the "Salyut" station, and the Americans to NASA's civilian "Skylab" station. After NASA's successful Apollo moon landing in July 1969 the Soviets made a conscious decision to trump the Americans in the area of space stations (Zimmerman 2003, 446). The Soviets were aware that the American Skylab launch was imminent in the early 1970s and pushed for the earliest possible launch of their Salyut station. Salyut 1 was successfully launched on 19 April 1971, to become the world's first dedicated space station. A Soyuz spacecraft delivered the first crew on June 9 of the same year. However when the cosmonauts returned in the Soyuz capsule to earth on 29 June, it de-pressurized on re-entry and killed all three cosmonauts. In October the station was intentionally de-orbited and burned up in earth's atmosphere. In March 1973 NASA successfully launched Skylab, and in summer 1974 the Soviets placed Salyut 3 into orbit.[96] By the mid-1970s the Americans and Soviets both had successful orbiting space stations, with crews spending increasingly longer amounts of time in space (including 684 days logged by cosmonauts on Salyut 6) and conducting various scientific experiments.[97]

[96] Another Salyut station was launched shortly after Salyut 1 was destroyed, but did not make it into orbit and was thus never allocated a Salyut number. On 2 April 1973, Soyuz 2 achieved orbit, but only for a short period before disintegrating.
[97] Skylab was in orbit from 1973-1979, during which time 79 successful science experiments were conducted. The longest period a crew stayed on the lab was for 84 days, in 1974. It was intentionally de-orbited on 11 July 1979, after it became apparent that solar activity was decaying its normal orbit faster than expected. The Soviets launched Salyut 5 in 1976. After being launched in 1977, cosmonauts logged 684 days over five years on Salyut 6. Salyut 7 was launched in 1982. For a detailed review of the history of space stations, see Zimmerman 2003; Harland and Catchpole 2002; Sadeh 2004; Burrows 1999. It is also

The launches of Salyut and Skylab stations were conspicuously part of the Space Race between the USSR and the US—another competition to be "first," and then "better" as part of the wider ideological and cold military confrontation between the two superpowers. However in 1975 following extensive preparation, NASA's Apollo spacecraft docked with the Soviet Soyuz craft as part of the Apollo-Soyuz Test Project (ASTP).[98] Why was it decided to cooperate on this project, and what were the effects of those decisions? As previously noted, there was a pre-established norm amongst space scientists to cooperate transnationally, although this norm was in tension with the norm for states to use space as a competitive outlet. Public explanations for the project noted scientific benefits and the rectitude of cooperation in space, and emphasized the symbolism of spacecraft from two different nation-states linked up together in outer space for the first time. However the wider geopolitical context must be considered to completely understand actors' interests in the ASTP. The Partial Test Ban Treaty (1963), Nuclear Non-Proliferation Treaty (1968), and Outer Space Treaty of 1967 all reflected and also contributed to détente. The 1972 Agreement Concerning Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes had also led to some joint scientific unmanned space activities between the US and USSR (Sheehan 2007, 65). The ASTP was a high-profile opportunity to cooperate on a project which contributed to détente but required limited practical vulnerability. It was an opportunity to show openness and a willingness to ease tensions, in the highly symbolic area of outer space, through space scientists who already had a tradition of cooperation, and without

noteworthy that in the course of the Salyut program, the Soviets cooperated with other sympathetic countries to train and fly cosmonauts from Afghanistan, Bulgaria, Cuba, Czechoslovakia, East Germany, Hungary, Poland, Romania, India and Vietnam.

[98] Extensive interaction between the Soviet and American space programs preceded the docking, including work to design a transfer lock, because the craft had different sized openings.

extensive exchange of technology. From a rational actor perspective, the benefits of improving international image outweighed the costs in terms of conceding to cooperate with a rival and the actual financial costs of the program.

Through the ASTP, the norm of outer space cooperation was reinforced, as well as the principle that outer space exploration should be for science and the good of humankind—though the Cold War context meant that the nascent cooperation was dependent upon wider geopolitics. Shortly after the successful ASTP mission, Soviet-American relations deteriorated due to the Vietnam War and other political events that deepened the Cold War. This resulted in an end to any major cooperative space projects between the two superpowers for the next decade.

Space Station Freedom: Why and How to Cooperate?

On 19 February 1986 the Soviets launched space station "Mir" (meaning "peace" or "community")—a very large station intended to operate for 5 years.[99] The planning stage of Mir coincided with American efforts for another large station, Space Station Freedom (hereafter "Freedom"). In some ways, the conception of, and motivations behind these two new stations were the same as those that came before: they were built for the sake of science and learning about space, as well as being a continuation of competition in space between the two superpowers during the Cold War. However the moon landing in 1969 had been the climax of the Space Race, and the competition in space was no longer as fierce and urgent.

[99] Mir was launched in 1986, although the last Salyut station was also in orbit until February 1991.

US President Ronald Reagan announced his plans for a new space station during his State of the Union address in January 1984.[100] The most significant difference between the plans for Freedom and those American space stations that had come before was that the US announced that it would be a joint project, and international participants were asked to join.[101] As one of only two superpowers in the system and one of only two countries with major space programs, why would the US invite other countries to participate in the project? Why not simply pursue the project independently? Reagan noted in his speech that the station would be for "research in science, communications, in metals, and in lifesaving medicines which could be manufactured only in space," and cooperation with other participants would, "...strengthen peace, build prosperity, and expand freedom for all who share our goals" (Reagan 1984). However these words must be carefully considered to uncover the subtexts within the speech. An invitation to "our friends" implies those countries that were non-Soviet aligned and thus suggests that cooperation would occur with states traditionally subordinate to the US in the Cold War system, and with similar interests and beliefs in areas other than outer space (Johnson-Freese 2007, 177-178). The inclusion of the term "expanding freedom" implies that the station was very much a part of the Cold War confrontation—the very name of "Freedom" itself suggests how the discourse and politics of the new international station was mutually created by and playing into the larger Cold War political framework.

[100] The power of American presidents over space policy is interesting but beyond the scope of this text. For more I recommend Krug 2002, Johnson-Freese 2002, Sadeh 2002, McCurdy 2002.

[101] The Soviets had operated a program for cooperating with sympathetic countries in space activities since 1970s and 1980s, and particularly through the Intercosmos program, which began in 1976 (Sheehan 2007, 56 and 59). Under the Intercosmos program one of the two cosmonauts visiting the Soviet Salyut stations would be a non-Soviet national (Sheehan 2007, 58). By the end of the program cosmonauts from all over the Warsaw pact states and other communist countries had visited Salyut stations, as well as cosmonauts from France and India (Sheehan 2007, 59 and 62). For more on the Intercosmos program see for example Sheehan 2007, 56-61.

Calling for "participants" and not "partners" also implied that the US was looking to keep leadership over the project (Johnson-Freese 1999, 83). "Building prosperity" referred to how an international space station would help foster space industries in participatory countries, and it is noteworthy that such a capitalist intention would be inherently contrary to Soviet anti-capitalist ideology.

Less explicit reasons can be uncovered for why the US would calculate that it was in its interests to open up the project to cooperation. Leading a large international station would reinforce the image of the US as leader of the free world (just as the Soviet Intercosmos program, which took foreign nationals to the Salyut stations in the 1970s and 1980s, was intended to demonstrate the Soviet Union was a cooperative leader of the communist world [Sheehan 2007, 56]). While it can be understood how such interests were rationally calculated, it must also be considered how the context of the Cold War itself helped actors to understand their identities—as members of the "free world" or "Soviet alliance;" as "leaders" or as "followers." Through this pre-existing understanding of itself as a leader of the "free world" the US developed its interest in pursuing Freedom, and conversely other states would decide to join as followers. As in the case of GSO (where an understanding by the Group of 77 states of their identity as "LDCs" influenced their basic interest formations) ISS members' perceived identities were ideational factors which influenced how actors developed and understood their interests with regard to the space station project.

Recruiting junior partners for the station would also distribute costs and work load, and thus reduce the technical and financial costs of the station for the US. However this was done with careful calculation of how the rules and decision-making procedures would continue to reinforce the US as the dominant power in the project. The agreements over the station's management (discussed further below) served to solve specific problems that arose with regards to space station construction and management, and with regards to wider international law—and also served to reinforce the US as leader of the project. In this way the US gained the benefits of having partners, but protected its interests by keeping power over the project and reducing its own vulnerabilities with regards to it.

Conversely, why would partner countries want to join the space station project? Canada, Japan, and most members of the European Space Agency expressed interest in joining the project. The European Space Agency (ESA) decided at a Council meeting in Paris 1985 that it was in Europe's interests to participate because of the opportunity to learn and supplement its own space capabilities after recognizing its own technological and financial limitations in space (Johnson-Freese 1999, 84). The ESA expressed functional preferences aimed at fostering space science programs, acquiring large-scale systems management and administrative know-how and developing applied space technology capabilities (Sadeh 2002, 285).

The ESA also wanted to maximize its payoffs from participating in the program by pursuing a greater leadership role than NASA was initially offering. ESA had cooperated with NASA on other projects and many within ESA felt that Europe's own space capabilities warranted it a greater management role in the proposed space station (Sadeh 2002, 286). However ESA's contributions to the station and its technological know-how were still not enough to give them significant bargaining power, and thus they accepted NASA's leadership in the project. Europe eventually established an implicit understanding with NASA that their role in the project was as more of a "junior partner" than a "follower" (Sadeh 2002, 286).

Japan and Canada were content to accept NASA as the "leader" and have their role be as "followers" in exchange for being granted partnership in the station (Sadeh 2002, 285). Japan's primary objective in joining the project was to improve its involvement in manned space activities (Nomura 1995, 12). Canada's stated reason for joining the project was "noble purposes": to drive the development of Canadian space science and generic technologies of strategic importance (Doetsch 2005). The space station project would serve the purpose of helping actors to acquire new capabilities, including research development and hardware construction, which could eventually be useful at the national level.[102]

Space Station Freedom: A Specific Regime Embedded in Diffuse Regimes

Different actors therefore came to the space station project with differing interests, capabilities and leadership goals, and with an understanding of the station as being for scientific as well political and ideological purposes. Several practical, legal and management issues needed to be resolved through negotiations and agreements to create an explicit and formal regime for the station. One question arose as to who, legally, would own the space station. Official ownership of the station would imply financial liability should part of the station cause damage to another space object or in falling back to earth (because of the Liability and Registration Convention of 1972 and the Registration Convention of 1974). The Liability Treaty assigned responsibility to the state for damages resulting from their space objects on earth and in space.[103] The

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[102] Ruggie notes these advantages as reasons that actors may choose to participate in regimes (1975, 571).
[103] Preamble, Article II.

Registration Treaty required all space objects to be registered with the International Satellite Registry, in part to monitor space-object purposes and also so that liability over damage could be assigned to relevant states.

Another issue inherent in the discussion of Freedom ownership was technology transfer: as the leading space partner within the station project, the US was adamant that involving partners should not require NASA to share technological expertise or money ("no transfer of technology" and also "no exchange of funds").[104] Despite wanting to include other partners in the project, the US also wanted to protect its own technological outer space expertise. While liability and technology transfer issues suggested that accepting ownership of the station could be a burden, claiming ownership of the station also implied greater leadership in, and control over the project.

The resolution of the issue predominantly reflected the interests of the US. The resolution was detailed amongst the original space station partners in the International General Agreement of 1988 (IGA 1988) and also through individual bilateral Memorandums of Understanding between the US and each partner-country (and with Europe as a block).[105] These Agreements established a regime in which ownership was based on augmentation. NASA would provide key components for the station and partners were allowed to provide additions (Sadeh 2004, 173). It was agreed that the US would build, launch, and remain responsible for the "core" module of the station—a module on which the other components of the station were physically dependent. Other

[104] This may seem over-cautious, but some European partners in particular were in fact interested specifically in gaining on NASA's technological know-how through the space-station project (Harland and Catchpole 2002, 89). However for a strong critique of America's "no exchange of technology" policy, see Johnson-Freese 2007.

[105] The full title of the IGA 1988 being the "Agreement Among the Government of the United States of America, Governments of Member States of the European Space Agency, the Government of Japan, and the Government of Canada on Cooperation in the Detailed Development, Operation, and Utilization of the Permanently Manned Civil Space Station."

partners would contribute supplementary parts and maintain responsibility (and *de facto* ownership) over them. Each component of the station would be provided by different partners and be physically connected but have distinct technical responsibilities (Sadeh 2002, 285). This resolved the problem of liability by distributing legal responsibility amongst the partners—though the station was inherently interconnected in space, keeping the ownership of its pieces separate clarified the station's legal status in the context of the diffuse liability regime, which required that space objects be launched under the name of a specific country.[106] By keeping ownership of the core part of the station, the US preserved its leadership role, but by keeping component ownership distinct, the US placed some financial responsibility and liability with the station partners.

The ownership solution reduced the overall interdependence of the project. Alternative solutions which might have involved pooling technological efforts and funds to build the station in a more integrated manner would have made both the actual station and its partners more vulnerable to each other. However the regime chosen established that in space the component parts would be atomistic, physically distinct contributions to a larger project.

By keeping components largely separate, the US also ensured that it could avoid technology transfer, thus gaining maximum relative benefits from its partners and no

[106] According to the IGA 1988, launching states were to be liable to compensate for damage caused by its spacecraft on earth (1988 IGA, Article 2), damage caused to objects in space would be the responsibility of the state whose object caused the damage (if the damage was due to the fault of the state responsible) (Article 3), and jointly launched objects that cause damage would be the joint responsibility of the collaborative launching states (Article 5). Article 17 also referred cases of damage caused by station objects back to the Liability Convention. Article 16 dealt more specifically with issues of liability that might arise from activity on the station, and established a cross-waiver of liability. If damage were caused during an activity for the purpose of developing the ISS, all claims for direct damage, indirect damage, or loss of profits rallied against partner states, its contractors, users or customers would be waived. Each state agreed to also extend that cross-waiver to agencies, institutions, or private persons in their domestic setting, unless the claim related to harm or death of a person. That is, if work were being carried out on earth for the ISS and damage occurred, liability would be waved.

relative losses. Prior to launch the station would require technological coordination, but not uncontrolled technology transfer (Sadeh 2004, 174). This reduced the risks of cooperation by putting clear boundaries on exchanges of technology and scientific expertise, allowing the US in particular to profit from other countries' contributions without sacrificing significant intellectual and financial resources of its own (Harland and Catchpole 2002, 89).

While ownership of the core station "module" gave the US a greater physical element of control over the station, the issue of leadership over the station was still a separate issue. As the main financial and components contributor to the station (who also possessed the only means of getting objects into space), NASA clearly had a strong interest in maintaining leadership over the project (Devlin and Schmidt 1997, 251). However part of the purpose of the station, as above, was to project an image of openness and leadership through cooperation. Resolution of the issue again reflected the interests of the dominant power. Article Seven of the IGA 1988 gave the United States overall charge of the program. The Agreement also established procedures for future decision-making by agreeing to multilateral program reviews during design, development, and assembly, joint concurrence in decision-making for utilization rights and transfer of ownership, and multilateral control board operations and utilization of activities. Yet final decisions rested with NASA.[107]

[107] The system of governance established by the MOUs and IGAs can be seen as three tiered (Yakovenko 1999, 82). The top tier was established by the multi-lateral IGA, and established regulations for the cross-waiver of liability, registration and ownership of objects, and issues of decision-making for the station (and thus station-management). The second layer was characterized by the bi-lateral MOUs, which deal with immediate issues of cooperation on technical issues such as the development of physical ISS component parts. The third tier would become the Code of Conduct for ISS Crew (CoCC), and is discussed in the second phase of the ISS regime development, below. The CoCC was largely focused on establishing hierarchy or chain of command within the station, emphasizing the role of ground control, and also strictly specifying that the Flight Captain on each crew would hold supreme command, especially in emergencies.

The Early Space Station Regime

Negotiations to establish the space station regime took three years due to the complexity of issues that had to be resolved in establishing governance over the large, unique project—for establishing a multinational manned laboratory in the outer space. The agreements established a hegemonic regime, nested in diffuse outer space regimes. The regime was hegemonic because it predominantly reflected the interests of the dominant power within the regime. Although agreement was achieved amongst space station partners, the initial regime was relatively unstable and embryonic, given its heavy reliance on the continued support of the hegemonic member, and that member's interests as tied to the geopolitical system. At the outset, the regime could be seen as epiphenomenon, dependent on the interests of the most powerful actor within the project. The regime's vulnerability to the US was indicated by the fact that the station plans were regularly delayed by US Congressional demands for revisions of the technical station plans, and reduction of costs (despite the fact that other partners were prepared to go forward with the project). Weaker member states had a limited capability to use both positive and negative reciprocity to influence the actions and interests of the dominant partner.

However despite being hegemonic, the regime was not imposed, but rather negotiated. The regime was established by conscious efforts to agree on its major provisions, with explicit consent on the part of individual participants, based on bargaining, and with formal expression of results (Young 1983, 99). It was based on a constitutional contract, and those actors who would be its subjects were directly involved in the relevant negotiations (Young 1983, 99).

Thus NASA negotiated a specific international regime with regards to the International Space Station in a way that advanced its interests as best as possible within the context of existing outer space law. However this raises the question of why the US deferred to outer space laws at all to establish the space station regime? By 1988 the three main treaties influencing the space station's governance were widely ratified and regularly deferred to as part of normal space-exploration practice: the OST, the Rescue Agreement, and the Liability Convention. Given that the treaties were widely ratified and adhered to in other areas of outer space politics, these three regimes had the status of diffuse regimes. As diffuse regimes the three treaties served to constitute actors' understandings about activity in outer space. Deferring to the regimes was also convenient and in the US's interests—as above, keeping liability over parts with individual participants reduce America's financial risks with regards to the station.

The European Space Agency had recognized early on that NASA's sense of obligation to the space station project was potentially not great enough to prevent the US defecting from the regime. ESA furthermore felt that NASA had abused them in the past, by reneging on a Spacelab program after Congress failed to come through with adequate funds, and also in the International Solar Polar Mission (Johnson-Freese 2007, 177-179). As such ESA had an interest in raising the profile of NASA's commitment to the regime. ESA believed that if the US was very public about its obligation to the station the project would be more likely to succeed. The GSO regime was more obviously embedded and nested within deeper regimes that pre-established expectations and a sense of obligation (such as to the ITU)—this socialized sense of commitment to the space station regime needed to be intentionally orchestrated in order for the regime to be more stable. Thus

ESA pushed for NASA to raise the profile of their commitment to the space station in order to raise the costs of political defection and institute a stronger sense of obligation (Johnson-Freese 1999, 86). NASA felt that the level of input ESA was giving to the space station project, versus the amount of demands they were making for it, was equivalent to a freeloader situation—that ESA wanted to exploit the station project without contributing its fair share. However ESA used its bargaining capabilities (because the US desired Europe's financial support and desired its political support for the project) and pressured NASA to eventually agree to raise the visibility of the IGA signing in order to demonstrate its commitment to the station (Johnson-Freese 1999, 86). Members of the project would have no power to prevent the US from defecting from the regime—but ESA had established their ability to have a countervailing power over NASA's image and legitimacy should that organization defect from the project.[108]

The International Institutional Context and "Big Science"

The strength of the institutions of sovereignty and territoriality, and the close relationship between the two, pre-established conceptualizations with which actors approached the space station regime. Despite the fact that the station would be in neutral territory and multinational, actors relied on understandings of territorial sovereignty to design the project. International law reinforced the strength of sovereignty and territoriality by providing a legal context that rested on state-centricism. In order to keep issues of liability and ownership clear, actors had to defer to a state-based organization of the station. Individual components would remain the responsibility (and *de facto* "territory") of the launching state, despite the fact that the integrated station was mutually reliant.

[108] For more on countervailing power over legitimacy, see Arts 2000, 528.

Buzan states that "big science" projects are one area wherein the number and depth of shared values may be increased amongst international actors and hence influence a gradual move towards greater solidarism in international society (Buzan 2004, 225). However Freedom (in the early stages at least) reflected complicated aspects of both pluralism and solidarism. Unlike the GSO regime, which was largely based on coordination and hence coexistent pluralist international society, Freedom was a cooperative endeavor, and hence slightly more reflective of solidarism. It was also directed in part towards achieving knowledge for the sake of knowledge—another indicator of a solidarism (Buzan 2004, 151). Yet given that it was largely conceived of as a competitive project in the Cold War context, rooted in the management of a single great power, and that relied on alliances (a derivative of great power management), it also clearly reflected pluralism.

From Space Station Freedom to the International Space Station

By the early 1990s Russian plans were in place to extend the life of Mir, despite the Russian Space Agency's (RSA) serious budget constraints following the disintegration of the Soviet Union. The end of the Cold War had largely removed the competitive and ideological justifications for the increasingly expensive Space Station Freedom, but plans for implementation continued. In 1993 the United States formerly invited Russia to join their efforts into the renamed International Space Station (ISS).[109] Why did the US and its partners choose to invite the ailing Russian space program to join the ISS?[110]

[109] With the end of the Cold War and the inclusion of Russia in the space station, the name Space Station Freedom was dropped, and the name International Space Station Alpha was temporarily used, and by 1994 the station was generally referred to only as the International Space Station (Zimmerman 2003, 330). The name "Alpha" came simply from the fact that, in the early 1990s President Clinton was given three space station plan options: A, B, or C, and Clinton chose A, and as such said that the station should be called Alpha. However the Russians took offense to the implication that the station was the Alpha station, or the first station, due to their pride in the long-lasting and still-existing Mir (Zimmerman 2003, 330). The

For the US and its partners, adding the Russians to the Space Station had some straightforward strategic benefits. Actors within NASA knew the project could benefit from Russian space technology and hardware and also the extensive Russian experience on the Salyut and Mir stations (Sadeh 2004, 177). The Russian Space Agency could potentially provide capable and reliable spacecraft and the Russian Soyuz capsule could serve as a space station lifeboat (Logsdon 1998, 240-242). The decision to cooperate can therefore be explained in part by basic rational calculations: adding the space-capable Russians could benefit the overall project.[111]

Including the Russians would also provide less-obvious political benefits. The decline of the Russian space program after the Cold War left an excess of unfunded Russian space and rocket scientists who could potentially be attracted to work on weapons or missile projects with, for example, Iraq or North Korea. There was also a back stock of rocket hardware which could be sold for or used in military projects if alternative uses were not found for them. The space station project would provide Russian scientists with alternative employment, and create new demand for the surplus Russian hardware (Logsdon 1998, 240-242). It is also noteworthy that the US may have been prompted to include Russia in the ISS because Europe had entered into talks with Russia about jointly creating a Mir-2 project (Johnson-Freese 2007, 182).

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anecdote indicates how the issue of space stations continued to be one of pride and competition regarding leadership and ideology.

[110] On September 3, 1993, US Vice President Al Gore and Russian Prime Minister Viktor Chernomyrdin signed a preliminary agreement in Washington, DC, regarding cooperation on the station. The US acted unilaterally in inviting the Russians, to the frustration of other project partners (Johnson-Freese 2005, 182). However the same year all of the ISS partners also officially extended an invitation to Russia to join the station.

[111] The achievements of the Soviets in long-term space affects should not be underestimated—it is noteworthy that when the ill-fated crew of Salyut 1 was first found dead in their capsule, one consideration was that their deaths were caused from spending just under a month in outer space. In 1995, Russian cosmonaut Valeri Polyakov spent 438 days aboard Mir in outer space—which reflects how far knowledge on the affects of long-duration manned space missions had come.

An additional motivation for inviting Russia to join the ISS was rooted in domestic American politics. Support for the ISS was in sharp decline in the United States, and relations amongst partner-members were strained (Logsdon 1998, 240-242). Bringing the space-capable Soviets into the program would help revive support and morale amongst partners and their respective governments and voting publics. This factor was a direct influence on US motivations in the ISS and demonstrates how the purpose and nature of the space station was evolving based on changes in wider politics. Previously the station had received support and funding from the US government in part because of the Space Race competition (and space stations were also part of the reconstitution of that competition). In the Post Cold War era, support for the project was revitalized based on its potential to inspire Russia-US cooperation.

The reasons for inviting the Russians to join the project can be explained in part based on rational calculations and also basic strategic geopolitical concerns. However, did these benefits outweigh the costs? Adding the Russians to the project would incur the expense, complication, and delay of renegotiating the station regime and redesigning the station—all to add a country that was until recently a rival, and that was also now financially struggling. Practical and political reasons based on basic egotistical calculations fail to explain entirely why Russia was invited, and why the ISS project wasn't simply continued with the partners and arrangements already in place. To better understand why actors decided to pursue Russian partnership requires expanding the scope of the analysis further to consider the influence of the Post Cold War context in which decisions were being made and understandings of space stations reconceived.

In the Post Cold War context the US wanted to shore up Russia's self-esteem and encourage its involvement in the international community (Burrows 1999, 608). The US wanted to ensure that democracy continued in Russia and that the country did not de-stabilize in the Post Cold War era. Part of US President Clinton's foreign policy plans was to engage Russia, and the ISS was an opportunity to counter-balance the isolation and shame of loss of empire, disintegration of the military and the country's low standard of living (Burrows 1999, 608). Given the tradition of outer space activity as a sign of pride and capability, the ISS was an opportunity to continue to engage with Russia on a specific international project.[112]

However a question still remains as to why, if the station had fallen out of favor with the regime hegemon (because the project was in disfavor with the American Congress), and its purpose as a symbol of power in the Cold War context was no longer relevant, the project was not simply abandoned altogether? By 1993 no actual hardware had been constructed for the station, and the spiraling expense of the project caused it to be seen by many as a "white elephant." Why did the partners not simply withdraw? Rational actor models do little to help answer this question. As above, the US in part came to reconceive its interests in the station as a symbol of Post Cold War cooperation. However it is difficult to conceive that such a benefit outweighed the political and actual financial costs of the station. One possibility is that the regime had developed a compliance pull which kept members dedicated to the project. The fact that it took three years of negotiations to conclude the Space Station Freedom agreements shows that actors took their commitment

[112] The creation of the ISS project with Russia was part of a wider "joint agenda in energy, space, and science and technology to the benefit of both countries" as agreed in discussions between Presidents Yeltsin and Clinton (United States Department of State Dispatch, January 3, 1994).

to the regime seriously. America's public commitment to the Station (as demanded by ESA) could have played a role in creating the sense of obligation to continue the project.

While in the earlier stages of the Space Station development the institution of great power management was apparent (and particularly through its derivative of alliances), now the great power institution was manifesting itself differently. The United States was using its hegemony to re-distribute slightly the balance of power, which had shifted dramatically at the end of the Cold War. The US was empowering Russia in a small way by including it in the Space Station project, and working to keep that country engaged in international society in order to maintain international order. International society shifted at the end of the Cold War towards a more cooperative solidarist international society, and the changes to the Space Station project both reflected and reinforced that shift.

Changes to the Regime: What and Why?

Russia's decision to join the space station project was contingent upon the renegotiation of the ISS regime with regards to the original key issues of ownership, liability and management. Russia entered the project with the intent to pay for 30% of the station costs (with NASA paying 45% and the other partners making up the rest) and to provide substantial hardware elements. The module that Russia planned to contribute would combine with the NASA module as part of the "core" of the station that all other elements would depend upon. Several areas of contention arose during renegotiations of the regime.[113] Under the original Agreement any criminal jurisdiction on the station

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[113] Article Seven, which continues, "They shall plan and coordinate activities affecting the design and development of the Space Station and its safe, efficient, and effective operation and utilization, as provided in this agreement." In 1994, delegations representing all partners convened in Paris to begin negotiations. Some delegates were optimistic and expected the new agreement to be formed within the year (Yakovenko 1999, 81—Yakavenko was Head of the Russian Delegation to the Space Station negotiations from 1994-1998). However as negotiations proceeded it became clear that many changes to the regime would need to be made, and that the 1988 IGA would have to be re-written (Yakovenko 1999, 81). Despite attempts at

would have fallen under domestic American jurisdiction. This reflected US dominance over the project and was also practical given that the only individuals on the station would be American astronauts. For other members (at this point at least) the issue of liability for astronauts was a moot point because the only partner with manned space capabilities was the US. However given that cosmonauts would be aboard the ISS, Russia found this liability structure unacceptable. The US agreed to change the regime so that each country would have criminal jurisdiction over their respected nationals on board the station.[114]

NASA's explicit dominance over the station's management was also a point of contention during the renegotiation of the ISS agreement after Russia's joining. Again, the need for Russians to have "extra responsibilities" was partly a practical matter with regards to needing a chain of command once astronauts of two nationalities were on the station in space.[115] However actors within ESA also felt that Europe now deserved a

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nearly monthly meetings, the complex nature of the project meant that the Agreement wasn't complete until 1998. In 1994 a medium-range temporary agreement on cooperation was signed between Russia and NASA so that plans could move forward.

Meanwhile IGA negotiations proceeded over years of aggressive meetings, after which delegations revised the space station program. In 1998 the new IGA was signed (IGA 1998—Technically the "Agreement Among the Government of Canada, Governments of the Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America concerning cooperation on the civil international space station") which incorporated Russia into the space station plans. New Memorandums of Understanding were also signed between each of the partner countries and NASA in early 1998.

[114] If a particular situation involved a threat to the life, health or safety of another crewmember, or caused damage to equipment, the affected partner state could exercise criminal jurisdiction over the person, if the affected state didn't feel that the alleged perpetrator's state was correctly prosecuting within 90 days. On a lesser point, it was also agreed that cross-waiver of liability in the IGA 1998 would be expanded "in the interest of encouraging participation in the exploration, exploitation, and use of the outer space through the space station," but refers back to the Liability Convention when damage is against a third party (1998 IGA, Article 16).

[115] Additionally with regards to chain of command, during the 1990s the Code of Conduct for ISS Crew was negotiated, effective in 2000. Importantly the CoCC established that, especially during emergencies, crews were to rely on a chain of command starting with the captain of the mission. This meant that in certain situations, crewmembers would be taking orders from a crew captain that may be of a separate nationality (specifically the senior Russian or American astronaut). Despite the normal heavy reliance of

greater leadership and management role in the project. The success of the (France-based) Ariane rockets in particular implied that ESA's space program had developed significantly. ESA believed that their space achievements gave them more bargaining power to assert their preferences for expanded leadership in the station, and ESA refused to concur on Russia's joining the station unless its own contribution to the station was re-evaluated (Sadeh 2003, 179).

NASA again accepted adjustments to the regime and the main Agreement was changed to read, "Management of the Space Station will be established on a multilateral basis and the Partners will participate and discharge responsibilities in management." NASA would still technically hold the right to over-ride any decisions that came to an impasse, although a "strong effort would be made to first achieve consensus." Russia was also noted specifically as having extra management responsibilities in terms of executing commands, and senior Russian or American astronauts would have superior authority in orbit.[116] ESA also bargained for use of the Ariane rocket in missions supplying significant on-orbit elements and in other operations for the space station, among other things (Johnson-Freese 1999, 30).

The ISS: What Financial and Political Price Tag?

Shortly after negotiations began for the inclusion of Russia in the ISS project, it was apparent that financial problems in the former Soviet Union could potentially undermine that country's ability to meet its responsibilities in the ISS partnership (Burrows 1999,

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the space station on ground control stations in Russia and the US, in space the crew would have to accept a microcosm of interdependence in certain situations (Peterson 2000, 7).

[116] Article 7.2. The Agreement also specified that NASA would have additional responsibilities in terms of managing overall system engineering and integration, and establishing overall safety requirements, except where MOUs specified differences.

601). The shortfall of funds was rooted in general Russian financial difficulties after the disintegration of the Soviet Union, but also space specific issues. The aging Mir station had repeated problems that required expensive repairs. The Duma was also starting to constrain the Russian Space Agency's funding, in part as a response to a skeptical Russian public that wanted "butter for rockets."

Prior to joining the ISS, the Russian space program was partially commercialized through the creation of the company MirCorp which assumed responsibility for the station in an attempt to turn it into a profit-making endeavor. Russian interest in creating the MirCorp company can be partly understood as a rational decision: if funds were not brought into the Russian space program through commercialization, many of the country's space projects would be at risk, including Mir (which still held sentimental value and also embodied a fading sense of pride for Russians). However expanding the analysis to consider the wider outer space political and international social context also helps explain how the conditions of possibility to privatize MirCorp came about in the first place. During the Space Race the idea of a private company managing an international space station would have been foreign to most governments. However over time outer space increasingly became understood as a commercial as well as state-based realm. The first private satellite was launched in the 1960s, and in the 1980s under Ronald Reagan the US government passed legislation to encourage further space privatization. Thus space commercialization was becoming increasingly normalized. The growth of a global outer space market can be seen as part of the wider rise of the market institution, especially after the end of the Cold War.

Despite the creation of MirCorp, Russia's ability to meet its financial commitment to the International Space Station was still in doubt in the early stages of renegotiations. Russia could have defected from the ISS project, but instead the US took the unprecedented decision to create the Shuttle-Mir program in order to subsidize the RSA financially. In Phase One of the ISS development NASA would pay Russia $400 million for use of Mir as a training facility. The Shuttle-Mir program was a way to launder money into the Russian space program in order to encourage Russia to meet its ISS commitments (Zimmerman 2003, 446).

Why would the US agree to the Shuttle-Mir program, with its $400 million price tag? There was one basic scientific interest in doing so: placing astronauts on the Mir space station would help prepare NASA for its future manned missions to the space station (Logsdon 1998, 240-242). However the Shuttle-Mir program was also contrary to some basic American interests. Placing American astronauts on the aging and increasingly dangerous Mir was seen by some within NASA as a risk not worth taking (Burrows 1999, 607-611). The Shuttle-Mir program also indirectly channeled funds to Russia's space program, hence compromising NASA's core value of "no exchange of funds."

The Influence of Interdependence

Thus rational calculations don't adequately explain the US's position on securing Russia's involvement in the ISS project. As above, the US had serious political interests in keeping Russia and the Russian space sector engaged in international society—but this does not rationally justify the degree to which the US compromised its basic interests with regards to the ISS. Understanding the changes in America's interests requires considering how increased interdependence led to the stabilization of the regime and subsequently its acting as an intervening variable.

As the space station was redesigned it became more financially, politically, and physically interdependent. Partners became more vulnerable to each other as each party secured and invested funds from their respective governments (and as that funding was exchanged through the Shuttle-Mir program). In order for each partner's own investment to be worthwhile, other partners would have to reciprocate and fulfill their own funding obligations.

The introduction of the space-capable Russians combined with the increased space capabilities of ESA redistributed power amongst the project partners and thus increased political interdependence. Although NASA still maintained practical edges in the leadership and management of the station, the reorganization of rules and decision-making procedures eliminated NASA as the obvious hegemon in the regime, and the blurring of the hierarchy of power amongst the actors further increased interdependence.[117]

The redesigned station also increased the physical interdependence of the project. The original station design included some redundant segments, such as multiple resupply cargo units, which would reduce reliance on individual partners fulfilling their obligations. However in the Post Cold War era states were looking to reduce their financial investment in outer space, and so many of the redundancies were eliminated in order to reduce the overall Station-cost. As a result, each partner's hardware contribution was integral to the project and the station itself would be physically interdependent (Zimmerman 2002, 455).

[117] For more on interdependence and blurring of power hierarchies see Young 1983, 103.

The willingness of the US to compromise its basic interests demonstrates how the increased interdependence of the regime gave it a stronger compliance pull.[118] NASA's continued commitment to the Shuttle-Mir program (and thus the ISS regime) suggests that the US was considering longer-term interests in the project, and seeking ways to avoid defecting from the program that it had committed itself to—and furthermore taking actions to ensure that Russia was also able to also fulfill its obligations. This elevated the status of the regime from merely an epiphenomenon to an intervening variable with the ability to influence actor behavior and interests.

The Evolving ISS Regime: Open for Business?

Throughout the 1990s American astronauts visited Mir as part of the Shuttle-Mir phase of ISS development. The funding this gave the RSA helped Russia to meet its ISS obligations and in 1998 the core Russian and American components of the ISS were launched.[119] In October 2000 the first crew arrived, from which point the station was continually inhabited. Despite minor technical incidents on the newly launched station, construction proceeded as expected.[120]

However a major point of contention arose amongst the ISS partners when the Russians announced plans to bring a paying "space tourist" onto the Station. As the Russian space program struggled financially in the 1990s, a wealthy American businessman named Dennis Tito approached the Russians with a request to travel to Mir as a paying tourist. With the aid of the American company Space Adventures, Tito

[118] For more on regime stability as related to vulnerability and interdependence, see Puchala and Hopkins 1983, 66.
[119] After delays, on 20 November 1998 the Russian *Zarya* module was launched, followed weeks later by the American module *Destiny*. In summer of 2000, the Russian module *Zvezda* was launched.
[120] By 2005, additional modules as well as trusses and the Canadian-built robotic arm had been installed, and the station had been visited by manned Russian and American space vehicles, as well as unmanned re-supply vehicles.

arranged his trip and paid $20 million into an account that would become available to the Russians upon his arrival at Mir, and then underwent eight months of pre-flight training (Zimmerman 2003, 447). Given that the RSA was increasingly exploring commercial activities to prop up its finances it is not surprising that Tito's proposition was accepted. As the market presented opportunities, Russian interests shifted towards taking advantage of them.[121]

NASA was also pushing for greater privatization of their space industry in the 1980s. Such efforts extended to the space station, where NASA was considering "renting" 30% of NASA's research space on the station to groups willing to pay for their experiments to be conducted there. However experiments would be conducted by the ISS astronauts on board and the notion of accepting any paying astronauts (such as tourists) was not on NASA's agenda. The decision to rent 30% of the research space was itself reluctantly taken by NASA as a result of Congressional pressure to show that the station was contributing to the American economy.[122] NASA had also written a Commercial Development Plan for the ISS in 1998, which noted that a long-term goal of the station was "to establish the foundation for a market-place and stimulate a national economy for space products and services in low-earth orbit, where both demand and supply are dominated by the private sector."[123]

Tito's training was mostly completed when Mir was intentionally de-orbited in March 2001, and the RSA decided to fly Tito to the ISS instead. [124] Article Nine of the IGA

[121] Mircorp also accepted payment for hosting a Japanese journalist on Mir in 1990. By some accounts, that journalist is the first "space tourist," but he is not widely known as such given that the trip was paid for by the Tokyo Broadcasting System and for the purpose of making a news story.
[122] For more on this see Logsdon 1998 and Johnson-Freese 2002.
[123] quoted in Tito 2002, 183
[124] Mir was de-orbited because of funding shortfalls (partly caused by funds being redirected to the ISS), and because the station was continually plagued by technical problems.

1998 said that, "The Partners shall have the right to barter or sell any portion of their respective allocations" to non-partner states or private entities, as long as "timely" notice is given to other parties. However the other ISS members were concerned that Tito was not sufficiently trained, and that no precedents had been set for safety and training requirements for non-space professionals visiting the Station. The partners feared that an insufficiently trained civilian onboard the under-construction station could threaten the safety of both the station and the crew (Harwood 2001). Russia's intentions and the other members' hesitations were also due to a divergence of expectations, rooted in each actor's previous experience of normal behavior in relation to outer space. Russia had embraced the commercialization of much of its outer space industry. Yet despite discussions of opening the Station up to companies in the future, the other members had expected it to continue as exclusively state-based for the time being.

Although NASA still maintained an edge of leadership in terms of major decisions over the station, negotiations were undertaken to expand the regime to accommodate space tourists. A document was drawn up for Tito to sign which stated that he was flying by Russian invitation and none of the other ISS partners were liable should he be injured or killed during the trip. He also agreed to pay for anything that he broke or damaged while on the ISS. Initially Tito was to be restricted to the Russian Zarya and Zveda modules, and could only visit non-Russian segments if escorted by a crewmember (Harland and Catchpole 2002, 316), but eventually an agreement was reached to allow him the same scope of movement as other crewmembers.[125] On 28 April 2001 Tito joined the Soyuz-TMA 32 crew in liftoff for the mission to the ISS. Since that time the partners

[125] Speech by Chris Faranetta of *Space Adventures,* June 7th, 2006.

have agreed to a strict system of pre-flight training and medical tests for tourists (McCoy 2002, 139). Tito was followed by several other paying space tourists.[126]

Why did the US once again compromise its own interests in order to accommodate another member of the Space Station regime? As before, the US's behavior was influenced by the compliance pull of an increasingly interdependent regime. The disagreement regarding tourists indicated inconsistencies in both the negotiated element of the regime and the norms and principles on which the space station regime rested. The resultant shift within the regime adjusted the underlying norms (to better accept and internalize the commercial role of station) and the rules of the regime. It was internal contradictions that revealed instabilities within the regime and that required adjustments within it to accommodate change.

The ISS regime was able to shift by implementing the rules and decision-making procedures pre-established for it. Russia gave "timely notice" to the other members of its plans and the members consulted with each other to reach a consensus regarding the issue. This demonstrates how the regime was stable—because the members adhered to the rules of the regime itself in order to adjust it (Hopkins and Puchala 1983, 62). The regime itself provided the members with tools through which to resolve differences.

[126] As of 2008, additional ISS space tourists include South African entrepreneur Mark Shuttleworth (April 2002), American businessman Dennis Olsen (October 2005), Iranian American Anousheh Ansari (September 2006), and Hungarian American Charles Simonyi (April 2007). As of 2007 the Russian Space Agency was booked through 2009 to fly additional tourists to the station. In January 2006, the US Federal Aviation Administration announced a draft report on regulating space tourism. The report suggests that tourists will be required to pass security screening to ensure that they are not terrorists, and also that they should be trained in safety and emergency procedures (BBC, 8 January 2006). However health requirements will be left to the discretion of the tourist. These regulations appear to be directed at the developing private space tourism industry, such as that planned by the company Virgin Galactic. However it is likely that the rules will have implications for any future ISS tourists as well.

Reflections of Globalization?

The politics of the ISS after 2000 both reflected and reinforced certain aspects of globalization. While partners still maintained technical ownership over their component parts of the ISS under the new design, the increased physical interdependence inherently undermined the close relationship between sovereignty and territoriality onboard the station. Once constructed, technically each part of the station was distinguished by a "boundary" of state ownership; yet the station relies on all parts for its functioning. Humans onboard come from different countries and move between the various "territories" of the station. As such the conceptualization of hard Westphalian sovereignty is incompatible with the reality of the station. This blurring of boundaries and the disjuncture between sovereignty and territoriality mirrors some processes on earth associated with globalization.

Politics on the ISS also reflected an increased interaction between the three domains—interstate, interhuman, and transnational. While the interstate domain remains the primary influence on the station, the individuals on board (including tourists) share a unique experience as individual human beings (the interhuman domain), and tourists also represent the transnational (as connected to the structures of transnational space commerce and business). The rise of the market in wider world politics was also reflected in the shifting influence of commerce on actors' interests and decisions with relation to the Station.

Thus what type of international/ world society has the ISS come to reflect? I have argued that Freedom originally represented cooperative international society, with obvious power-political foundations—and therefore that Buzan's statements that "big science" projects necessarily reflect solidarism is untrue. However Buzan says specifically that they may *lead* to an increase in the number and depth of shared values amongst international actors, and the evolution of the ISS regime could indicate that this is true. Although originally a hegemonic regime, the Station led eventually to increased interdependence amongst actors. The Station itself could, in turn, also reinforce stronger shared values and interdependence amongst actors in wider world politics. The increased financial and technical dependence of the station gave all of the partner countries more influence over each other, and not just in outer space (UN 1998, II.A.20).

Current Situation and Speculation about the Future

The purpose and significance of space stations has always been defined by wider geopolitics. As such the current cooperative and interdependent space station regime reflects and also reconstitutes cooperative and interdependent international society. However by the same logic changes in geopolitics on earth could once again come to influence changes in the principles and definition of the Station. In particular, as China emerges as a potential space rival, the ISS may again be reconceived along political lines, once again becoming a symbol of cooperation between "free" nations. China has conspicuously not been offered the opportunity to join the ISS project, despite expressed interest. China has also made it clear that if it is not included in the ISS project, it may develop its own international space station (Sheehan 2007, 167).[127] Doing so would balance the power of the US with regards to space stations, particularly if ESA choose to cooperate with China on such a project (which it would potentially choose to do [Johnson-Freese 2007, 227]). The new challenge posed by China as a space rival may deflect attention and funds from the ISS as bolder projects, such as moon bases, or

[127] The American decision to invite Brazil to participate in the Space Station in 1997 made it clear that the decision to *not* invite China to join the ISS was political as opposed to technical (given that Brazil has less space experience than China) (Johnson-Freese 2007, 227).

America's announced mission to Mars are pursued. At present the project reflects a decline in the influence of sovereignty and even war in international society, but the Station could also reflect and reinforce the re-emergence of those institutions in the future—or be eclipsed by other space projects embodying power politics and competition.

However even if the station is redefined and deprioritized, I believe that the project will continue and the regime will remain stable due to the level of investment (financial and political) by actors in the project, the internalization of the sense of obligation and commitment to the project, and increased vulnerability to reciprocity within the regime due to interdependence. The fact that the regime has proven to be dynamic in the face of changes in both wider world politics, and also internal changes in the interests and power differences amongst it members, suggests that the regime is sufficiently institutionalized and internalized by the members. The regime will continue to reflect the specific interests of partners, but also clearly now has the ability to influence those actors' behavior as well. This makes the ISS regime a variable that not only intervenes between actors' interest and their behavior, but also constitutes the social environment in which the members develop those interests.

Conclusion

Interests and motivations in space stations have evolved over time, and as related to changes in wider international politics and international society. Pre-Space Age ideas romanticized space stations as part of exploration, but the Cold War context led to them also playing a role in competition between the US and USSR. In the Post Cold War era the ISS became a symbol of cooperation, and eventually incorporated aspects of outer space commercialization. Wider geopolitics created the international social context in which actors determined their interests in the space station, but once established the ISS regime also served as an intervening variable to influence actors' interests. Now in place the Station serves to represent a microcosm of solidarist international society. As a "big science" project it serves to reconstitute solidarist elements in society, but is still vulnerable to be mutually reconstituted in the future by pluralist institutions such as war and the balance of power.

The next chapter considers global navitational satellite systems (GNSS). As with the two cases already covered, early aspects of GNSS development were rooted in the Cold War and influenced by actors' rational calculations determined in that pluralist international social context. GPS was established as an American military system, but an implicit international regime formed around it after the signals were made publicly available. Europe's plans for the Galileo system posed problems of coordination, but also reflected deeper issues regarding commercialism and the balance of power in the Post Cold War era. The case of GNSS raises questions about what role mediating regimes play regarding specific issue-areas, and also how outer space politics have reflected and reinforced changes in international society.

Chapter 4: Global Navigational Satellites

"A location-finding satellite looks down at Earth and shows us ourselves within that system."

—Ivan White, *The Overview Effect* (1987, 61)

For thousands of years humans have relied on the sun, moon and stars for navigational purposes. By looking at the skies and having an understanding of what was in outer space, people could roughly calculate their own position on earth. The launch of Sputnik opened up new opportunities for refining the use of outer space for global positioning. A team of American scientists listening to Sputnik's radio-signal "beep... beep" concluded that satellites could potentially be used to determine one's position on earth. Based on the Doppler effect, sound waves around Sputnik were distributed in a way that, if calculated correctly, could be used to determine one's relative location.[128] An accurate system would require a fleet of sophisticated satellites, but would reward any beneficiary of the system with a useful navigational tool.

The US launched a Global Navigational Satellite System in the 1960s and another in the 1970s. The US carefully guarded the benefits of the systems so that they could only be used by the US military. However in the 1980s the US opened up parts of the signal from one of its GNS systems for global use. This chapter analyzes why the US made its GNSS signals publicly available and how global positioning signals created global expectations for stable GNSS signals as a public good (and hence led to the formation of

[128] The Doppler effect was discovered in 1842 by Christian Doppler: a stationary object emits sound waves that spread equally around it. However if the object is moving, it will move into the wavefront that it is emitting, causing the circles of sound waves to 'bunch' slightly in front of the object, and widen slightly behind it. Someone in front of the object will hear higher frequency waves, and someone behind it will hear lower frequency waves (as when the tone of a car horn seems to change as it passes by you).

an informal regime to govern GPS). The signals came to be used for a variety of purposes by a wide range of actors. In the 1990s Europe undertook complicated plans to launch a parallel GNSS fleet. Why would Europe invest the huge expense in order to create a separate GNSS system, and how would the US react to the creation of such an altenate system? The analysis below considers these questions in the context of wider international politics and international society.

GPS: An American Project Embedded in International Regimes

The first organization to launch global navigational satellites was the US Navy, which launched the "Transit" system in the 1960s, which was used into the 1970s. A more sophisticated and expanded system was planned and in 1978 the first satellite of the Navstar Global Positioning System (better known as just the Global Position System or GPS) was launched. [129] The initial $10 billion output for the GPS system was high, but considered justified for the unique navigational and global positioning capabilities it would give the US military.[130] The GPS signals were encrypted and only those with access to the heavily guarded code could make use of the signals. Putting the system in place also bolstered America's image of military prowess and prestige associated with space capabilities.

[129] A note on the terms "GPS" and "GNSS": For decades, the US's Global Positioning System was the only reliable GNSS signal available. As the only reliable system, the notion of a satellite array emitting signals that could be used to distinguish time and location was universally referred to as "GPS"; that is, GPS was the specific American system, but became known as the product itself too (i.e., it became in common language the generic descriptor, or proprietary eponym). However with the potential viability of alternative systems such as Glonass and Galileo, "GPS" became only associated with the American system, and the term Global Navigation Satellite System (GNSS) was adopted as an umbrella term to refer to all satellite navigation systems.

[130] GPS funding came from the budgets for the Department of Transportation and Department of Defense. The management of the GPS regime was based on American domestic politics, balanced between the Congressional budget allocations, presidential input, and ultimate implementation by the Department of Defense and Department of Transportation. In 1996 the Interagency GPS Executive Board (IGEB) was created. The IGEB was also subject to the budgeting check of the Office of Management and Budget (OMB), which at times effected GPS policy through "holding the purse strings." Traditionally, presidential input has played a role as well in determining the direction of GPS development.

As with GEOSATs the GPS satellites used radio-frequencies to "communicate" with earth-based receivers. As with GSO the US submitted each of its Telstar and GPS satellite signal uses to the ITU for entry onto the Master Frequency List, and also registered their satellites in the International Satellite Registry.[131] As such, GPS was not itself an international regime, but was developed with regard to diffuse international regimes for two resources: outer space (through the OST) and the radio-frequency spectrum (through the ITU). American deferral to the ITU regime can be understood as similar to the case of GEOSATs: rooted in basic interests of avoiding mutual interference with other satellites. The existence of the ITU and the satellite registration list pre-established norms and expectations which in turn influenced America's interests and behavior with regards to satellite launches.

GPS: A Free Global Public Good

Throughout the 1970s the US military enjoyed the strategic advantages offered by GPS, but in 1983 Ronald Reagan announced that certain GPS signals would be unencrypted and hence freely available to any user around the world with a capable receiver device. This redefined certain portions of GPS as a global free and public good.

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[131] Modern GNSS satellites are equipped with an atomic clock (a clock that is based on the vibrations of an atom or a molecule). The atomic clocks on GNSS satellites are set to "GPS time," which is the number of seconds since 00:00:00 January 6, 1980. Modern GNSS satellites emit radio signals, which announce the exact time on the atomic clock onboard the satellite. Receivers seek out the signals of four or more GNSS satellites, where it is in the intersection of the four spheres (or footprints) of each satellite. The receiver measures with high precision the differences between the times when the four radio waves were received from each satellite, and hence calculate its own latitude, longitude, and altitude. "Leap seconds" are caused by the gradual slowing of the earth's rotation, and clocks must occasionally be adjusted in order to synchronize time with solar time (in this sense, correcting our "positive time" with "natural time"—adjusting our own time as based on consistent quantifications such as seconds, with the underlying reality that it measures—time as based in astronomy, which delineates a day as one cycle of earth, a year as one cycle around the sun, etcetera). Fourteen leap seconds have accumulated since January 6, 1980, and as such, GNSS satellites transmit a time that is 14 seconds fast, but receivers are designed to apply a clock-correction offsets to make the time accurate according to solar time.

The US remained the sole financial backer of the system, so why allow partial access to friends and enemies, states and individuals around the world?

As with GSO, Cold War geopolitics created the context in which the US calculated its interests with regards to GPS. In 1983 Korean Air Liner (KAL) 007 was shot down by Soviet jet interceptors when it allegedly strayed into Soviet airspace. Two hundred sixty nine people were killed, including an American Congressman. The Americans spoke out strongly against the plane's destruction and the event sparked a war of words inevitably embedded in the Cold War bipolar context.[132] As part of the reaction against the plane's destruction, Reagan announced that GPS would be made publicly available so that airliners could use the service to guarantee their location. As such the opening up of GPS was in part altruistic, but also subtly part of complicated politics between the US and USSR during the Cold War. Making portions of GPS freely available helped to advance America's image as the leader of the "free" world in the context of the tragedy. The US might have preferred to open up the signals only to specific users or industries, but no technology existed that would allow for restricting signals to a specific geographical area or use (Peterson 2005, 173-182).

While opening up certain GPS signals gave the US certain benefits, the relative losses of making the signals public were also carefully protected. To control the strategic advantages of GPS, the US kept some signals encrypted for American military use, and also only allowed open signals to disseminate with "selective availability" (SA). SA intentionally varied the quality and consistency of signals, injected intentional errors into GPS civilian signals, and could cause inaccuracies of up to one hundred meters. Discrepancies intentionally shifted unpredictably, causing the signal readings to have

[132] See for example BBC 2008.

errors, and also errors of an inconsistent nature. To protect its relative gains the US also maintained the right to shut down the civilian signal system entirely in times of war or crisis.

GPS: An International Regime?

GPS could originally be defined as an American program and not an international regime, given that it was initially a domestic system reserved for US military usage. However when the US opened certain GPS signals for free use it became a public good and eventually evolved to become an international regime. Opening up the signal established a norm for certain aspects of the service to be available at most times. By opening up the signal for international aviation safety, Reagan unintentionally established a principle within the regime that airplanes should have a right to global positioning technology. Conversely this meant that the airline industry became dependent on GPS, and denying GPS signals could cause plane crashes—the exact thing that making the signal public was intended to avoid. The role of GPS in guiding planes came to be referred to as "safety-of-life applications," since the disruption of the system could have dire consequences.

The public GPS resource was explicitly controlled by the American government, but nonetheless users came to have expectations as to how that good should be disseminated. Over time the pattern of behavior (the GPS signal being freely available) created expectations amongst global actors using the system.[133] As such a nascent unintended regime developed around GPS: there were norms and principles regarding the GPS service, around which actor expectations' converged. As organizations and industries

[133] For more on patterns of behavior creating expectations, see Young 1983; Puchala and Hopkins 1983; Krasner 1983a, 9.

came to feel they had a right (and a need) to receive GPS signals, the behavior of the US towards GPS was infused with normative significance. At this point the governance surrounding GPS spontaneously became an international regime—although not formally negotiated, expectations converged regarding the provision of service.[134]

The US had used the language of benevolence in opening up the GPS signals to global public use, and therefore denying the signals could potentially ignite a backlash from global users. Such a backlash would taint the image that the GPS signals were intended to project: a benign America, great power and leader of the free and open world.[135] Despite the lack of an explicit or formal method of reciprocity between user and provider, and despite the obvious preponderance of power that the US possessed in the regime, users did have a countervailing power: over opinion and legitimacy.[136] The US was vulnerable enough to the political outfall of shutting public GPS signals down that the regime had elements of interdependence and stability, despite being one-sided in terms of power-relations amongst members.

An English School approach helps explain how international society institutions influenced the evolution of the GPS regime and also how GPS served to reconstitute the rise of those institutions. America's behavior can be understood as a reflection of the strength of great power management, which influenced America's perceived identity as a "leader" in the Cold War context. Opening GPS up to public use was an act of fulfilling a perceived leadership responsibility: the responsibility to assist the aviation industry in the context of Soviet threats.

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[134] For more on implicit regimes formulated around areas where expectations are gradually established, see Young 1989, 98.
[135] For more on actors' interests in reputation, see for example Stein 1983, 189.
[136] For more on countervailing power over legitimacy and opinion, see Arts 2000, 528.

GPS also reinforced significantly strengthened America's military power. Through GPS military personnel could know where they were on the ground, sea, and air, which significantly improved their strategic capabilities. Bombs such as the SMART bomb were also developed, which relied on GPS for their deadly precision.[137] As such GPS was also part of the revolution of military affairs and the reinforcement of US military prowess.

Opening up the GPS signal to public use also led to the growth of a major industry based on GNSS signals. GPS also came to be used in the 1990s for individual civilian purposes such as navigation in cars ("satnav").[138] As the price of GPS receivers came down, signals also came to be used in recreational activities such as geocaching.[139] GPS also came to be used to track objects, including recent moves within several countries to equip mobile phones with GPS for safety purposes.[140] GPS also influenced the general rise of the global market by playing a role in financial transactions (BBC 2005). Therefore GPS helped reconstitute the rise of the market institution with regard to outer space politics (which was also being reinforced by the expansion of the telecommunications industry).

GPS originally reflected power political international society during the Cold War, wherein there is the possibility of war, but where there was also some trade. However it

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[137] For more on the role of satellites in the Revolution in Military Affairs (RMA) see for example Friedman 1998; Herman 1999.

[138] Honda produced the first GPS-equipped car in 1990, and the personal navigation industry has grown rapidly since then.

[139] Geocaching refers to the recreational use of GPS to hide and find objects, usually in a natural setting that requires hiking. Specific coordinates are given for an object by a member of the community, and others seek out the object.

[140] GPS is increasingly used to track objects on earth—anything from packages to pets to people. Objects fitted with a GPS device can be followed remotely, and Europe has, for example planned to use the system for tracking cars as part of a new toll-road system (see for example *GPS World* 2002). The practice is also used in police action, particularly in the US (See for example Cameron and Landers 08/2001 and *GPS World* 2000). The ability of GPS to locate people and objects on earth is mainly used for safety purposes, such as the ongoing project to fit all mobile phones with chips that will alert services such as 911 and 999 to a caller's location, and planned projects to use GPS to locate missing children.

also had characteristics of coexistent international society given that the norm of coordinating and registering signal usage remained firm. GPS in turn reinforced power politics but also indirectly contributed to the strengthening of institutions (the market and environmental stewardship) consistent with cooperative and coexistent international society.

GPS was conceived as a US military system and was opened up primarily for civilian transport purposes, but an industry and culture developed around the service in the 1980s and 1990s. The case of GPS demonstrates how actors can create a project for certain purposes (and because of their interests within a given international social context), but that actors in turn can generate consequences that mutually reconstitute aspects of the social context, and change the definition of the original issue area. GPS remained a military-controlled system, but the commercial industry that developed around the signals created expectations that were potentially at odds with the system's principles and norms. Expectations for a consistent GNSS signal, and the commercial industry surrounding global positioning, had generated the demand and opportunity for a new GNSS system.

Galileo

Despite the viability of the American GPS system, in the late 1990s discussions began in Europe (between the European Space Agency and the European Commission) to create a separate GNSS system called Galileo. Given the expense and complexity of creating a second system, the question arises as to why actors in Europe would create an alternate global navigational satellite system? One factor was simply technical: satellite technology had moved on since the creation of GPS, and a new system could offer greater location-accuracy.[141] Galileo satellites promised more accurate signals than that of GPS, and the new system would also warn users of signal failures. The public GPS signal was intentionally manipulated by the US government, but even without SA GPS signals could be inconsistent and occasionally disrupted because of the aging technology that the system relied on. As GNSS signals were increasingly used in navigation and safety-of-life applications, a disruption to the signal could not only be inconvenient, but dangerous (ESA 2005). Throughout the 1990s, relevant agencies within the US discussed modernizing the GPS system, but continual budget cuts and Congressional orders resulted in delays. The range of users dependent on GPS were effected by, but had virtually no influence on, those delays.

The hegemonic management over GPS provided other reasons for actors to be interested in the Galileo project. European actors expressed serious concern that GPS was military-controlled, and the US still insisted on the right to shut down the system if need be (ESA 2005). Although doing so would cause a global outcry and perhaps even loss of life, the GPS regime still had an unsatisfactory feedback mechanism that left users significantly more vulnerable than the provider. European concerns were not only regarding the potential of the US to deny GPS signals, but based on a principled objection to GNSS systems being military. There was a market for a new system, distanced from the military purposes and focused on commercial and civilian uses.

As with the International Space Station, developments in the European space sector (such as the Ariane project) demonstrated the strength of the European space infrastructure, yet the US was reluctant to grant Europe greater leadership roles in joint

[141] GPS satellites were occasionally replaced over time, but the system still relied on several older satellites that operated on dated technology.

projects.[142] Galileo was an opportunity to bypass GPS altogether and create Europe's own GNSS system. Individual European countries also expressed interest in improving safety, improving quality of life, and stimulating economic growth in Europe.[143]

The Galileo project was designed to provide commercial and civilian services. At original discussions in 1999 it was firmly agreed that Galileo would be civilian, although several critics focused on the fact that it would nonetheless have *de facto* implicit military uses (Divis 2002). Like GPS, Galileo would have a free and open civilian signal and a government-only encrypted signal. The free signal would be unencrypted and offer simple timing and positioning accurate to one meter. The government encrypted signal would be called the Public Regulated Signal (PRS) and be used primarily in safety-of-life services such as airplane navigation, and integrity messages would warn users of errors. A second section of PRS would be for government and military purposes, be encrypted, and be designed to continue to broadcast even in times of crisis. The PRS signals would be highly accurate and guaranteed available under all but the most extreme circumstances.

Galileo would also broadcast a commercial fee-for-service signal, accurate down to one centimeter. As such the private sector was expected to contribute an estimated 1.5 billion euros based on future revenues from encrypted, value-added services, taxes on chipsets manufactured and/or sold in Europe, and fees from user-equipment.[144] Galileo was expected to enliven Europe's GNSS industry as the commercial signal would offer

[142] For more on the changing European and American relationship regarding leadership in space projects, see for example Johnson-Freese 2007; Sadeh 2002; Sheehan 2007.
[143] Gallimore 09/2000, 59.
[144] *GPS World* 2005.

an improved-accuracy and guaranteed-stable signal available by subscription.[145] Funding would also come from the 15 ESA member states who agreed to supply 730 million Euros to the project.[146]

Considering the role that international institutions played in the decision to create Galileo contributes to an understanding of why actors developed interests in the Galileo system. In the Post Cold War era, Galileo can be seen as part of Europe's intentional manipulation of the systemic balance of power. European identity was shifting towards greater cohesion and also independence from the US. The focus on commercial aspects for the Galileo project also indicates how the market institution had an influence on outer space and also wider international politics in the 1990s. The market institution pre-constituted the context in which European actors developed their interests. The focus of Galileo was on commercialism and European independence—and on defining the Galileo system as *not* military.

English School terminology is useful in being able to describe and understand the EU as a subglobal society, where there is, "...a substantial enough range of shared values within a set of states to make them adopt similar political, legal and economic forms" (Buzan 2004, 160). Europe in the 1990s had developed a relatively strong sense of shared common identity, culture, values, and the "we-feeling" of community. Galileo was already part of the international social movement within Europe towards convergence and even moving into confederative solidarist international society. The Galileo project

[145] GNSS receiver and equipment manufacturers, application providers and service operators were also expected to benefit from novel business opportunities (ESA 2005).
[146] Initially the Galileo project was run under a joint undertaking (JU), which created an office in Brussels. In the summer of 2003, the European Commission decided to arrange the management of Galileo with a Supervisory Authority to oversee a concessionaire—however plans to have a concessionaire later fell through.

was possible (and desired) because of this convergence, but if launched, also had the potential to reinforce that solidarism (in reinforcing both ideational factors such as a common European identity, and also in practically requiring the intentional move towards greater homogeneity in domestic structures amongst states).[147] Outer space projects such as Galileo had intentionally been conceived as part of a functionalist process, reflecting and also reinforcing European integration.[148]

US Reactions to Galileo: What and Why?

What would the US reaction be to European plans for Galileo? At the outset, it is fair to ask whether and why the US would even care if Europe created a separate system? However the proposals for Galileo did raise serious concerns for the US. On a technical level, a second GNSS system would inherently compete with the US's radio-frequency usage, given that only certain segments of the spectrum were allocated to space uses. If Galileo were to be implemented and given ITU approval, the two systems would either need to coordinate their radio-frequency usage in order to avoid interference or else agree to make the systems interoperable so they complimented each other.[149] After almost three decades of managing GPS the US also did not want to loose exclusive control over GNSS, nor loose the prestige of having the only major GNSS system in place.[150] There were also strategic concerns: the improved Galileo signals would give any user on earth access to high quality free and open GNSS signals (and those who paid a subscription fee

[147] Buzan asserts that such a move towards homogenization of domestic structures and values among a set of states is part of the movement of convergent states towards solidarism (2004, 147).
[148] For more on the role of space projects in reflecting and reinforcing European integration, see for example Sheekah 2007, 72.
[149] Interoperability at the user level is, "a situation whereby a combined system receiver with a mix of multiple GPS or GALILEO satellites in view can achieve position, navigation and timing solutions at the user level that are equivalent to or better than the position, navigation or timing solutions that could be achieved by either system alone" (Article 2.1).
[150] Gibbons 2000b, 10.

would have access to even better Galileo signals) which could include state or non-state actors. The US was also concerned that Europe had indicated that non-European partners might be added to the project, and it wasn't clear whether non-European partners would be given access to Galileo's even more accurate PRS signals (which could be used by non-EU countries for military purposes).

American actors therefore calculated their response to Galileo based on specific interests. At the outset the US's main interest was in discouraging, and by some accounts even preventing Galileo from going ahead (although some American officials have publicly denied such claims[151]). The US used diplomatic and public platforms (such as media interviews) to try and dissuade support for the Galileo project.[152] The US attempted to manipulate public interpretation of the GNSS issue-area in such a way as to delegitimize the Galileo project. Americans argued that GPS was an adequate system and that a Galileo system would be redundant, expensive, and unnecessary.[153] The US also argued as a point of rectitude that charging for a GNSS service was amoral. Such an argument is further evidence of the conflicting principles on which GPS and Galileo were founded: GPS being free but military based, and Galileo being civilian and partly fee-for-service.

The US also undertook efforts to make GPS more attractive (and hence make Galileo seem unnecessary). On 1 May 2000 the US switched off GPS's selective availability. Overnight civilian GPS signals changed from being accurate to within one hundred

[151] For a specific case on denying such intentions, see Ralph Braibanti (USEU transcript 16/01/2004).
[152] For more on persuasion as a bargaining tool, see Peterson 2005, 10.
[153] On American intentions to derail Galileo, see for example Glen Gibbons interview, 03/29/2006; see also *GPS World* 2000, 20. As a specific example, Jeffrey Bialos, head of the U.S. delegation to the GPS/Galileo consultations stressed that Galileo was not necessary, especially as plans for GPS modernization were ongoing, saying, "The European Union has to decide whether to spend significant taxpayer dollars on Galileo, a major project… in light of a very robust and modernized GPS system". Quoted in Divis 11/2000, 12.

meters to being accurate to less than ten meters. In 2001 the American government also finally committed funds to modernizing the GPS satellite fleet. The Gailieo threat caused the US to expedite its plans for improving GPS for non-military users.[154]

Turning off SA was a dramatic move, but the US had several strategic and rational reasons for doing so. The basic purpose of Galileo was to improve signal accuracy and offer a consistent open civilian signal. GPS modernization and removal of SA was intended to undermine those basic motivations for Galileo. Turning off SA was also part of the strategy to generate good will and thus improve America's bargaining power at the upcoming World Radiotelecommunications Conference 2000 (WRC 2000), where Galileo's frequencies would be allocated.[155] Military technology had also been developed that could deny regional signal in times of conflict. Furthermore, during the Gulf War the US military was so short of military GPS receivers that civilian models were used and SA was turned off temporarily in 1990 and 1991. The improved technology of GPS-augmentation systems was also progressively decreasing the strategic advantage provided by GPS. Public pressure had also mounted to turn off SA, including a letter-writing campaign to the White House.[156]

In the early 2000s Russia had also finally begun broadcasting free and open signals on its own incomplete GNSS system called Glonass. The first Glonass satellites were launched in 1983, but due to funding deficits not enough satellites were launched to make

[154] Divis 2000, 17; Glen Gibbons interview 03/29/2006. Although the decision to turn off SA had been discussed in President Clinton's Presidential Directive 1996, the unprecedented move happened much faster than expected.
[155] Charles Trimble, chairman of the U.S. GPS Industry Council said that turning off SA "clearly helps our position" at WRC, and that delegates at the conference would be, "more convinced that this is a useful system for everybody in the world." Quoted in Divis 2000, 18.
[156] Divis 2000, 17.

the system operable.[157] However by 2002 eight satellites were in place—just enough to provide limited signals that undermined a GPS operating with SA.[158]

At the WRC 2000 Galileo was allocated several different signals that were adjacent to or scattered through GPS's allocations.[159] The US and Europe had held diplomatic discussions about these ITU allocations prior to the meeting and the outcome was therefore expected.[160] However the signals that were allocated meant that GPS and Galileo would now require some level of coordination—either simply to avoid interference, or else to make the systems interoperable. The main issue was that GPS's closely controlled military M Code would be overlaid by part of the Galileo spectrum. As such, Galileo could potentially interfere with the GPS M Code, and (worse for the US military) civilian positioning signals could not be shut down in times of crisis without the M Code being shut down as well. Therefore the US finally conceded to work with Galileo's planners on a signal design that would allow for interoperability between the two signals and also mutual operation of the two systems without interference.

Although Galileo had been granted signal allocations, political and bureaucratic wrangling within Europe over the system continued, and the US continued to undermine

[157] Like GPS the system should operate with 24 satellites (21 operational and 3 "spares").
[158] Despite the failures of several satellites in the past decade, by 2004 eleven Glonass satellites were operational, and completion of the system was set for 2010.
[159] GPS satellites broadcast on several different frequencies of the electromagnetic spectrum, and have been divided into five main bands named L1, L2, L3, L4, and L5. L1 provides free and open signals (although initially with SA, and it also has certain sequences encrypted for government use). The L2 band carries a tightly guarded and closely controlled US Military-only signal, called M Code. L3 is the signal that fulfills GPS's role for detecting missile and rocket launches, nuclear detonations, and other high-energy infrared events. They are not the only US satellites that fulfill this role. In 2007 L4 was not yet in use, but will be used for improving the other existing signals. L5 is planned to be used as part of an international safety-of-life band, which will be coded for use by governments for things like aeronautical aviation, and will be guaranteed stable. Galileo was given two wide-spectrum allocations adjacent to two of GPS's L5 and L2, as well as a three narrow slices scattered through the L-Band, and a swatch of the C-Band.
[160] The process leading up to the decision consisted of diplomatic discussions prior to and during the ITY meeting, and did provide some background to the allocations at the WRC2000. Glen Gibbons interview, 2006.

the Galileo project by subtly avoiding coordination: despite high level meetings between the US and the EU the Americans repeatedly focused on minor issues regarding coordination, but avoided discussion of important technical issues (Gibbons 2001, 10). The US was focusing on policy issues, and Europe was focusing on technical issues, and both tended to ignore the more significant issues facing GPS-Galileo coordination.[161] Although discussions on a potential agreement had been held since 2000, the negotiations were extremely difficult and at times it seemed likely that Europe would not pursue the Galileo system or that the system would be created to use a different frequency, which would prevent the two systems from being interoperable. Under such circumstances receivers would be equipped for one signal or the other to the detriment of GNSS users globally. Furthermore, non-cooperation could result in the signals causing interference with each other due to the lack of technical coordination. By avoiding cooperation altogether, the US was delaying the creation of the Galileo project, and also the creation of any regime that would mediate between GPS and Galileo.

Reconciling GPS and Galileo

In December 2005, after six years of planning, the first Galileo satellite was launched from Baikonur, Kazakhstan.[162] In the same year, the US and Europe finally signed an Agreement establishing a regime to mediate between GPS and Galileo.[163] The Agreement established that GPS and Galileo would be radio frequency compatible and interoperable at the non-military user level (Article 4, Points 2 and 3). Parties eventually agreed to

[161] *GPS World* 2001, 10.
[162] The Galileo array of satellites is planned to eventually consist of at least 30 satellites: 27 operational plus three "spares."
[163] On June 26, 2005 then-Secretary of State Colin Powell and EU Energy Transport Commission Loyola de Palacio signed the "Agreement on the Promotion, Provision and Use of Galileo and GPS-Satellite-Based Navigation Systems and Related Applications."

Article 11, Section 1 of the Agreement, which states that the Parties would pursue frequency compatibility, avoid signal interference and [continue to] harmonize spectrum use through the ITU.[164]

Why did the US finally concede and agree to a mediating regime? On a basic level, once Galileo was given signals by the ITU the US had to re-evaluate its interests because refusing to comply would only lead to signal interferences that would injure all users (including the US military). It must be appreciated that the diffuse ITU regime acted as an intervening variable in creating the situation whereby the US had to reconsider its interests. The diffuse regime served to constrain the US through certain principles, rules, and norms of behavior.[165] The case demonstrates how in the increasingly interdependent international system, states are constrained by ever more dense sets of principles, rules, norms and institutions, and even the powerful rely on cooperative arrangements that restrict their power and give influence to others (Hurrell 1995a, 137).

Europe also offered a compromise which led to the signing of the Agreement. The EU agreed that a certain range of frequencies could be blocked by either the US or the EU in the battlefield without disabling the entire system.[166] The European Union also agreed to address the "mutual concerns related to the protection of allied and U.S. national security capabilities."[167] Thus the ability to shut down certain parts of the system was reciprocal. However given that the US previously had sole control over the right to

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[164] The specific wording of the Article is as follows: "The Parties shall work together to promote adequate frequency allocations for satellite-based navigation and timing signals, to ensure radio frequency compatibility in spectrum use between each other's signals, to make all practicable efforts to protect each other's signals from interference by the radio frequency emissions of other signals, and to promote harmonized use of spectrum on a global basis, notably the ITU."

[165] For more on how and why regimes constrain actor behavior see Rittberger 1993; Puchala and Hopkins 1983.

[166] Those signals being known as "Binary Offset Carrier 1.1."

[167] A quote from John Sammis, minister counselor at the U.S. Mission to the EU in Brussels, quoted in Johnson 2004.

shut GPS down, the compromise was only a relative gain for America within the negotiations.

Issues of commercialism remained contentious, as representatives of the US were less committed to codification of commercial involvement in relation to the GNSS systems. With Galileo's fee-for-signal services, the US was concerned that US companies would be isolated from European markets due to standards or certifications for signals. The Agreement established that the signatories would adopt a non-discriminatory approach with respect to trade in goods and services related to the GNSS industry (Article 6 Section 1).[168]

Thus the Agreement resolved some key issues of contention that would allow for the mutual functioning of GPS and Galileo. However the limits of cooperation are also indicated by the conspicuous non-mention of certain issues. The Agreement does not address contentious issues such as whether global navigational satellite systems should be civilian or military, and whether certain bandwidths should be commercial and fee-for-service. This indicates that the mediating regime was established based on notions of technical coordination when necessary, cooperation when moral (as in safety of life applications) and acceptance of differences when inconsequential. The regime established a management system for interaction between the two major GNSS systems, while still acknowledging the separate political nature of their functions.

The mediating regime between GPS and Galileo reflected pluralist international society, with characteristics of coexistent international society. Establishing

[168] The Agreement also lays out the parameters for four working groups (Article 13 Sections 1 and 2), and that furthermore the Parties will meet as necessary and in principle once a year (Article 13 Section 7), thus establishing the decision-making procedures for the mediating regime. Article 17 lays out that dispute resolution is to be through consultation.

interoperability was a cooperative act that wasn't strictly necessary. Yet the nature of the regime was also largely rooted in coexistence—in preventing the two systems from interfering with each other, and also in creating a political cushion between the differing principles of the two projects.

Expanded Galileo Membership

In 2004 and 2005 India, Canada, Ukraine, Morocco, Saudi Arabia and China all signed agreements to participate in Galileo, and in 2006 South Korea joined.[169] Given that a primary impetus for the Galileo project was greater European independence, why invite non-European partners to join? Strategic interests explain how incorporating non-European international partners would provide mutual benefits for all partners and yet preserve relative gains for Europe. Including more partners dispersed the cost of Galileo, and provided the opportunity to gain technological expertise from other countries' scientists (and it is no coincidence that some of the non-European members chosen already possessed good space infrastructures). It is also possible that expanding the membership would help shore up political support for the program. As with adding Russia to the ISS project, adding more actors to Galileo strengthened the regime by adding additional funding, expertise, and by reinvigorated partners' commitment to the program. New partners expected to gain various benefits from their membership in the

[169] Canada is already an associate member of ESA, and in 2003 signed an agreement committing itself to contribute financially US $8.3 million to the development and validation phase of the Galileo project. China also agreed in October 2003 to invest an estimated 200 million Euros, and Europe also welcomed participation by Chinese scientists and companies in the continued planning of Galileo (*GPS World* 2003,14). Israel also signed an agreement of cooperation with the EU in 2004, and India and Ukraine in 2005, establishing cooperation in industrial manufacturing, service and market development, science and technology, as well as leaving open the opportunity for financial contributions to the system.

program, from practical gains such as boosting domestic GNSS industry to less tangible benefits such as the prestige of cooperating in a major space project.[170]

The US in particular had serious concerns about Europe's decision to include China in the project. The improved Galileo signals could be used by the Chinese military for strategic purposes.[171] However China and other partners in bi-lateral Galileo agreements with Europe would not have access to the PRS signal (or at least, only subject to another agreement). Europe was enthusiastic about including China because of the funds that country would contribute and also because European GNSS industry wanted more opportunities to collaborate with China's GNSS industry.[172]

Including China in the program was a controversial decision, but shows how the institution of the market was increasingly influencing the context in which actors were generating interests. Despite concerns over power politics, Europe decided that China should be made a partner in the Galileo project because of economic interests. The behavior of the US continued to reflect great power management, but that institution was in a state of tension with the market; that is, actors' interests were influenced by both the market and also great power management.

[170] Additional benefits that partners expected include: the opportunity to invest funds; being allowed to input on Galileo's future plans; securing invitations for foreign scientists and companies to become involved in the system; to develop domestic space technology; to gain better access to the higher quality fee-for-use Galileo signal; to forge greater international economic contacts in the GNSS industry (EC 7/09/2005).
[171] Bordonaro 09/02/2006.
[172] EC 18/09/2003.

Current Situation and Speculation about the Future

The Galileo project still faces the basic challenge of reaching completion. The first Galileo satellite was launched in 2005, which "validated" the system with the ITU.[173] In 2007 the Galileo project was at serious risk of being abandoned, although on 30 November 2007 the EU's transport ministers unanimously agreed to press on with the project under a revised plan (BBC 2007). While there is still a possibility that the project could be abandoned, I find this unlikely and expect the system to be completed (although perhaps after its intended 2013 completion date).

The contested issue of China's involvement in Galileo may still result in conflict between Europe and the US. There would be political ramifications if it were determined that China was using Galileo signals for military purposes (or that China had been given rights to better-accuracy signals because of its membership in the Galileo project). It is not clear what action the US could take against Europe and Galileo within the constraints of the GNSS regime, although at the most extreme the US could attempt to interfere with Galileo operations at the radiobandwidth level. However it is far more likely that such a dispute would be addressed at the diplomatic level, as established through the GNSS decision-making procedures. The fact that GPS was never denied after being made publicly available in 1983 indicates that there is a strong norm against interfering with signal provision—and also if Galileo becomes operational GPS will also be vulnerable to reciprocal manipulation of its own signals.

Another key test of the stability of the GNSS regime could come when or if it is determined that certain GNSS signals should be shut down due to security concerns. The

[173] If in-space signal-allocations are pre-requested from the ITU, the requesting actor must launch a functioning satellite to broadcast on that frequency in order to "validate" the actor's intention to use the signals.

US has the capability to shut down signals regionally, but a political split could incur if a significant threat occurred wherein the US demanded that Galileo shut down certain signals. The GNSS regime accounts for decision-making procedures with regards to security issues, and nominally emphasizes the joint understanding that GNSS must be considered in the security context—but putting those decision-making mechanisms to the test could challenge the success of those decision-making procedures.

The recent use of anti-satellite (ASAT) weapons by China (in January 2007) and the US (in February 2008) also suggests that global navigational satellite systems may be vulnerable to attack. However at present I feel that a major disruption to GNSS is unikely to occur. The main emerging rivalry in space is between China and the US, and both those states are already invested in GNSS satellites, so would not likely attack the main GNSS fleet. Other rogue states such as North Korea could develop ASAT technology, but also probably rely on GPS signals for their own civilian and military purposes so would be disinclined to target GNSS satellites. Any other rogue actors that may desire to attack the system (for example Al Qaeda) would not have the technical capability to deploy ASATs. However that is not to say that China, the US, or another space capable state would not attack a different type of satellite (for example, a rival's spy satellite) and create a knock-on effect by creating debris that could destroy further satellites, whose debris could destroy further satellites, and so on—thus eventually affecting enough GPS or Galileo satellites to disrupt the entire system. This chain reaction could also be caused by the unintentional collision between a satellite and pre-existing debris. The level of risk is difficult to calculate, but given that only one satellite has to date been destroyed by debris I feel that it is an unlikely scenario.[174]

It is also possible to speculate as to what effect GNSS systems may have in the future on wider world politics and international society. Buzan writes that social developments, like the growth of common identities and internalized values may be more easily nurtured sub-systemically and eventually spread to the global level (Buzan 2004, 214). If this is true, Galileo could serve to gradually reinforce solidarism amongst European actors, and perhaps eventually the expanded Galileo membership—in the form of stronger economic ties, or the decision to collaborate on another major project (thus acting as a "vanguard" project). Given that Europe has approached space projects functionally (Sheehan 2007, 72), it seems likely that Galileo could indeed reinforce European integration and common identity, and lead to further projects within Europe and possibly beyond. However it is also possible that the military advantage that Galileo will give Europe could instead reinforce power political dynamics in global politics, such as the balance of power between Europe and the US—and thus reinforce pluralism.

Conclusion

While previous chapters have focused on one regime that changed over time, GNSS provides the opportunity to consider complex relations between two separate regimes, and the mediating regime developed to reconcile them. The conflict between GPS and Galileo raised practical questions of coordination, but also reflected deeper changes in the balance of power and the role of the market in the Post Cold War international society. European unity was reflected as a subglobal society in the Galileo project, while the strong commercial component of the system indicates how the influence of private space

[174] In 1995 a French surveillance satellite was damaged by a free-floating screw.

interests had increased significantly by the 1990s. The US's reluctant decision to establish interoperatiability with Galileo indicates the influence of the diffuse ITU regime.

The next chapter considers Sea Launch, a company developed in the Post Cold War era. The company was established from a conglomeration of four companies with close ties to their respective governments—but in the 1990s those companies pursued an opportunity to cooperate on a commercial endeavor. The company established itself within the boundaries of state-centric international law, but in a way that subtly undermined it. The case of Sea Launch in itself provides interesting material for understanding international cooperation, but is also important for raising questions as to how transnational actors are conceptualized and governed in the Post Cold War era.

Chapter 5: Sea Launch

"If Isaac Asimov, Jules Verne, and Tom Clancy got together to write a novel, it might read something like this: Cold-War-era military industrial rivals get together, put commercial satellites atop ballistic missiles, and launch them into space from a gigantic floating oil platform."

—Colin Woodard of the *Christian Science Monitor* on Sea Launch (1999)

Throughout the 1970s and 1980s the commercial satellite industry grew, driven by consumer demand for satellite-reliant products and by various governments' support for space-sector privatization. Commercial satellites had been put into orbit since the 1960s, but in the 1980s the rockets that launched such satellites also became commercially available. By the end of the Cold War even government satellites were sometimes out-sourced to pay-for-launch organizations—to either a company or a foreign government (most often China or Russia).

In the 1990s a group of actors came together to take advantage of opportunities made available by the end of the Cold War and the commercialization of outer space. They created Sea Launch, a multi-national corporation owned by parent companies located in the US, Russia, Norway and the Ukraine. The company owned two ships which were to travel onto the neutral high seas where a multi-national crew would launch private satellites into neutral outer space. Sea Launch would use rockets—the component parts of which were mainly leftover Cold War ballistic missile materials—to launch privately commissioned satellites.

Although Sea Launch was subject to both domestic and international laws, the company was developed to subtly manipulate loopholes in those laws. However controversy in the first few years of its operation led to a complex set of rules and agreements between both state, non-governmental, and the corporate SL actors to establish close monitoring of the company's activities. This chapter addresses why Sea Launch was created and what the controversies indicate about international society and international regimes in the era of globalization and outer space commercialization.

The Market and Outer Space Commercialization

In the 1970s and 1980s the commercial satellite industry was expanding. This was in part the result of businesses realizing the profitability of the space industry and a decline in the price of rocket launches made private sector entry into the industry feasible. Products such as satellite TV and mobile phones, which started to become popular in the 1980s, helped to drive the growth of space commerce. The profit-making potential of satellite launches helped to drive the industry so that it had a momentum independent of government intervention. However as the industry grew and produced jobs it became an important part of domestic economies, and particularly in the US. The significance of this industry can be seen in how non-space faring states regularly cited the development of a space industry as a reason for undertaking joint projects such as the ISS and Galileo.

The American government also pushed through legislation to encourage the privatization of domestic space industry. This move can be understood as part of the wider rhetoric of privatization under the Reagan Republican administration—particularly as the ideological battle between capitalism and communism continued between the two Cold War superpowers (Handburg 2002, 38). There was also a financial dynamic in that after the moon landing NASA's budget was under scrutiny by Congress, and privatizing the satellite industry was one way of dispersing the costs of outer space activity (Macauley 2002, 190). The Chinese space program was also redirected towards profit-making after the successor of Mao, Deng Xiao-Ping called on the program to help achieve China's wider social and economic goals (Sheehan 2007, 162).

Therefore governments in part drove privatization of the satellite industry, and privatization developed a momentum that led to continued growth of the industry. As such, while governments had basic causal interests in privatization, the global economy, trade liberalization and private interest in outer space created the context in which actors formulated their initial interests in outer space commerce. The market institution was constitutive of the circumstances that actors found themselves in. The growth of the private market in space reflected a slight erosion of sovereignty in outer space as governments accepted the legitimacy of privately funded objects in space, and also symbolically as the hard state-focused outer space politics of the Space Race shifted to embracing a new kind of actor altogether in the form of profit-driven commercial satellite companies.

However, commercial space actors were still highly dependent on states in several ways. The manufacture of highly technical instruments such as satellites and rockets remained in the hands of the same companies and manufacturers whether they be commissioned by a government or a private actor. For example, in the US the company Boeing was the main space contractor for the US government and became a producer for commercial satellites as well. That is, the contracts that had come from governments were now occasionally coming from the private sector, but the physical product was still produced by the same manufacturers, and those manufacturers were still also accepting many government contracts for aeronautical and military products. Therefore the companies manufacturing satellites still had very close government ties.

Until the 1980s it was also only the satellite payloads that were privately funded; that is, the rockets that carried the objects into space were still government-built (or in the US commercial loads were sometimes carried on the NASA-owned space shuttle). Throughout the 1960s and 1970s satellites were usually launched from the territory in which the company was embedded (or else by an ally country). For example, a private communications satellite for an American company such as AT&T would still be launched on an American rocket and from American territory. In Europe, the Ariane rocket had successfully been developed by France and was used primarily to launch European satellite payloads.

International legislation also reinforced the role of states in the commercial space sector because it was written in and interpreted through a state-centric framework. Specifically, satellite payloads could be privately owned but the launch had to be registered (according to the Registration Convention of 1974) as the responsibility of a particular state. Once in space liability over private satellites technically fell under the responsibility of the launching state. The institution of sovereignty pre-establsihed that states were the main actors in international politics, and international law reinforced them being defined as such.

In the 1980s the rocket industry went the way of the satellite industry and in many countries became semi-privatized. Several factors drove this move. In 1980 France partially privatized its Ariane rockets—Europe's main rocket-launching entity. After the American shuttle *Challenger* disintegrated during launch in 1986, Ronald Reagan banned commercial payloads aboard the shuttle and appealed to industry to compete against NASA, thus breaking NASA and the US military's monopoly on placing payloads into space (Easterbrook 2003, 70). As discussed in Chapter Four on the ISS, at the end of the Cold War the Soviet Union embraced the commercialization of the space industry and even of the Russian Space Program for various reasons, but mainly to generate much needed funds and as part of the general ideological embrace of capitalism. By 1985 China's commercial launch company, The Great Wall Industry Corporation launched its first privately commissioned satellite.[175] Both rockets and satellites could be privately purchased, although building and also launching the objects still required expertise, and hence relied on the same infrastructure used for state-ordered launches. For example, a rocket and satellite could be privately commissioned in the US, but it would be built by Boeing, and launched from one of NASA's or the US Air Force's launch pads.

This development further challenged the atomistic state-centric conceptualization of activity in outer space, although the requirement of registering satellites with a state remained the same, even if both satellite and payload were private. In the 1980s Russian companies in particular began to sell rockets and launches to non-Russian companies and other countries. This had two rather confusing implications for state-centric conceptualizations of international politics and international legislation. If a country commissioned a rocket launch and satellite from (for example) Russia, under which country would the object be registered? The Registration Convention stated that responsibility lay with the "launching state," but did this mean the state that commissioned the launch, or that actually hosted the launch? And what if the commissioning actor was not a state but a company? As more countries developed nascent satellite-building capabilities, another challenge was that sometimes the rocket and satellite could come from different countries. What if a Canadian-built satellite were

[175] China Great Wall Industry Corporation 2007.

launched from Russia on a Russian rocket, and again, what if the satellite was privately commissioned?

In expanding their private launch industry, Russia and China also inspired a truly competitive international launch industry in that they began competing for business by undercutting the prices of other launchers. In the 1980s even American companies were shipping satellites abroad for more reliable and less expensive rocket launches, and by the 1990s the majority of global satellite launches were being conducted by the private sector (Bosso and Kay 2002, 54). (By the 1990s, the US had continued to focus on the development of outer space projects such as the Space Station, while Russia focused on perfecting cheaper and consistent launches.) In the 1990s China was also a popular producer of inexpensive rocket launches.[176]

By the 1990s it was clear that while the definition of "launching state" needed to be clarified, in practice it was normalized that satellites were registered under the state within which the company that commissioned the launch was based. If the satellite and rocket were from different countries, registration would defer to the country that commissioned the satellite. The definitional issues were not clarified, but normal practice had not proved problematic enough to force the undertaking of complicated and potentially controversial discussions within the UN on the subject. This indicates how the transnational domain was increasingly significant in the Post Cold War era, but that the

[176] By the 1980s, there were also build-operators in Australia, Brazil, Canada, Germany, and Italy, as well as operators in Argentina, Indonesia, and the Philippines (Peterson 2005, 17), although Russia, China, Europe (through Arianespace) and the US remained the primary providers of privately commissioned launches.

interstate domain was still dominant. The institution of sovereignty was still robust, though related to the rising institution of the market.[177]

Smooth Sailing: Sea Launch Prepares for Business

In the 1990s a group of actors came together to form an unusual company. The company of Sea Launch (SL) was incorporated in 1995 as a joint venture between four companies located in four different countries. The American aerospace company Boeing owned 40% of the company. Boeing was created in 1916 and became heavily involved in building bombers for the US during World War II. It was also involved in the Apollo program and the 1969 moon landing. Following the moon landing the company suffered major financial losses as the NASA budget was dramatically cut, although Boeing continued to receive some government space contracts, for example from NASA to develop components of the International Space Station and the space shuttle. The company also came to rely more heavily on commercial endeavors (such as commercial airliners). In the 1990s and 2000s when Sea Launch was being developed, Boeing continued to compete for government military contracts, produce commercial aircraft and to be subcontracted by the government for International Space Station parts.[178]

RSC-Energia (hereafter "Energia"), based in Moscow, owned 25% of SL. Energia was also established in the early 1900s and was also heavily involved in creating military hardware during World War II (rockets). It also had received contracts to build components of the International Space Station.[179] SDO Yuzhnoye/PO Yuzhmash (hereafter Yuzhnoye) of Dnepropetrovsk, Ukraine, would own 15% of the company. Yuzhnoye was created when the Soviet Union converted a car manufacturing plant in

[177] For more on the UN's review of the concept of "launching state," see United Nations document 2002.
[178] For more on the history of Boeing see http://www.boeing.com/history/.
[179] For more on Energia see http://www.energia.ru/english/energia.

Ukraine into a missile weapons manufacturer in 1951. The company was intimately involved in nuclear weapons development during the Cold War. In the 1990s the company also developed the Zenit rocket, a reliable and relatively cheap rocket system that was popular with international customers launching government and commercial payloads. Boeing and Yuzhnoye continued in the Post Cold War era to be involved in many defense contracts, including for building missiles. As such the American, Russian and Ukrainian parent-companies had similar histories. All had been integral to their respective governments in designing and producing Cold War weaponry and still had close ties to their respective governments.

Kvaerner ASA (now Aker Kvaerner ASA) of Oslo, Norway, would own 20% of the company and was the only partner not involved in satellites and rockets (and the only company that would not play a role during the execution of satellite launches). The company's areas of expertise was explicitly not outer- or even aero-space related, but rather oil and gas, refining and chemicals, mining and metals and power generation.[180] As such, Kvaerner was invested in various areas of resource industry and industry sometimes at the interface of government and private business. Kvaerner in Norway had world-renowned expertise in the niche business of dealing with both very large ships and also oil platforms. Such expertise was needed given that SL planned to launch rockets from large ships on the ocean.

There are physical benefits to launching satellites from the equator. The earth spins fastest at the equator, and hence a rocket launched from that location can exploit the

[180] For more on Aker Kvaerner ASA see http://www.akerkvaerner.com/internet/default.htm.

momentum of the planet in its escape into outer space.[181] In addition, an equatorial launch provides the shortest distance for a satellite to travel to geosynchronous orbit. These two elements mean that 10-15% less fuel is needed to launch a rocket from the equator, which reduces launch costs and allows for heavier payloads. Launching from the high seas also means that any failed launches will crash a relatively long distance from land, thus improving safety and decreasing the risk of expensive damage liability.[182]

If launching from the equator was part of SL's intention for running sea launches, why not simply find an equatorial country to launch rockets from? Launches from equatorial land offer the same physical benefits of oceanic equatorial launches, and some companies and countries have taken advantage of launch pads located near the equator—for example Ariane has regularly launched rockets from French Guiana, and equatorial countries such as Brazil have pushed to develop their rocket launching industries because of their geographical advantages.[183] However using equatorial states as launch sites requires adhering to that country's regulations, which can be costly and cumbersome. In addition many equatorial states have not been stable enough to attract investment in their launch programs. Launching from the high seas was thus practical with regards to physics, and also rooted in the desire to avoid government regulation. Launches would still be subject to both high seas and also outer space law, but not the domestic laws of countries as with traditional launches.

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[181] A rocket launched east at the equator is already moving eastward with the earth's spin at approximately 1,000 miles per hour (Kempton and Balc 2003, 2).

[182] While the vast majority of rocket-launching facilities remain on land, the notion of launching from the seas is not a new concept. During the Cold War the Soviet Union considered using rocket launches from submarines, and Italy launched rockets from a stabilized platform off the coast of Kenya from 1967-1988 (Clark 1999, 11).

[183] Other countries simply place their rocket launch sites as close to the equator as possible; and hence the location of the former Soviet Union's launch pads in Baikonur, Kazakhstan, and the US's launch pad in Florida.

Sea Launch was to operate as such: once a contract was signed between a company wishing to launch a satellite and Sea Launch, the satellite would be sent to SL's homeport in Long Beach, California. The satellite may have been produced by any number of manufacturers, as contracted by the company that commissioned the launch. While at port in California, the satellite would be fueled and encapsulated, and then transferred to the Assembly and Command Ship (ACS). The Assembly and Command Ship was essentially the "launch headquarters"—a traditional ship with housing facilities for 240 team members plus customers, modified for SL's purposes by Kvaerner. [184] While in port the ship would also operate as a floating rocket assembly factory. While the satellite could have been produced by a number of different manufacturers, the rockets used would be a pre-established aspect of the SL service. The first two stages of the rocket would be manufactured in Dnepropetrovsk, Ukraine, the third stage would be added in Moscow, and the payload fairing and interstage structure added in Seattle, Washington.[185]

The integrated satellite and rocket would then be transferred to the Odyssey, before the ships set sail for the high seas.[186] The Odyssey was an oil-platform that was converted by Kvaerner into a rocket launch platform. The platform was built to house sixty-eight crew and team members. Once in place the platform would intake seawater in order to stabilize it, after which the satellite and rocket on board would be fueled, erected, and launched.[187]

[184] The ACS was modified at the Govan Shipyard in Glasgow, then sent to Russia where rocket-handling components were added. The ship then sailed to SL's homeport at Long Beach, California, in 1998. When passing through the Panama Canal, the ship was so large that it scraped the sides (Easterbrook 2003, 65).
[185] Sea Launch 2006c.
[186] Sea Launch 2006a.
[187] The platform was designed to have a mobile displacement of 30,000 tons of water, and a stabilized platform displacement of 50,600 tons of water. Being semi-submerged would stabilize the platform, as aided by propellers to further control movement. The platform would be able to remain stable enough for a rocket launch unless winds reach more than 45 mph (72 km/h) and waves reach more than 10 feet (3

Ukraine and Russia possessed rockets that were significantly cheaper than American-made rockets (namely the Zenit rocket) and hence it was rational for Boeing to decide to partner with companies located in those countries. Russian and Ukrainian workers could also be employed on a lower wage than that demanded by workers in Western Europe (Shapiro 2000, 14). In launching from the high seas the company would also avoid the expensive and cumbersome bureaucracy required of US-based launches. Other more specific technical factors also lent themselves to cooperation. For example Russians had always built their rockets lying down (horizontally) as they would need to be for transport on ships, whereas Americans had traditionally built them upright (Shapiro 2000, 14).

Russia and Ukraine (through Energia and Yuzhnoye) expected financial and social benefits from the SL project. The company would use the pre-existing missile manufacturing hardware, technology and infrastructure that had been established during the Cold War. Socially, the project would also provide jobs for the technical specialists whose expertise was not widely demanded in the Post Cold War era.[188] The project was expected to yield financial benefits for the company and also the Ukrainian and Russian economies. In 1997 it was estimated by the World Bank that the SL project would bring $2 billion into the Ukrainian economy (and in 1995 the World Bank issued two identical

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meters) (BBC News 1999). The Odyssey was so large that, when passing through the Suez Canal in 1998, SL had to rent both lanes (Easterbrook 2003, 65). After completion the Odyssey was 436-feet long, 220-feet wide.

Once the chosen launch position was achieved out in the ocean, a gangway would connect the two ships, and crew would prepare the rocket. Once the Odyssey became semi-submerged and stabilized, and the rocket made vertical, the ACS would move back to a distance of 3 miles from the launch platform, and an automated system would fuel the rocket (Easterbrook 2003, 70). Five hours after the two ships disconnected from each other, the rocket with its satellite payload would be launched.

[188] The SL project was expected to help maintain 20,000- 30,000 high-wage, high-skilled jobs throughout Russia and Ukraine.

but legally separate partial risk Guarantees in relation to the SL project).[189] Russia and Ukraine anticipated other benefits such as the enhanced development of the high-tech sector, the introduction of local high-tech firms to the international market place, the teaching of local firms on how to structure international join-ventures by exposing them to international business and finances practices and the promotion of additional guarantee operations for other high priority investment projects in both countries.[190] These benefits mirror those gained by Russia in joining the ISS. International business opportunities were serving to constitute actors' interests in transnational cooperation. The financial implications of such companies also served to encourage states (and particularly Ukraine) to support the SL project.

Any attempt to root SL within a state-centric legal system was further complicated by the fact that the company was incorporated in the Cayman Islands. The strategic reason for doing so is that the Cayman Islands are overseas UK territory and well known as an offshore financial center (OFC) (which the International Monetary Fund [IMF] defines in part as jurisdictions with "low or zero taxation; moderate or light financial regulation; banking secrecy and anonymity"[191]). Sea Launch would not have any actual personnel or

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[189] The estimation comes from World Bank 1998, 2. However it is noteworthy that analysts were overly optimistic about the demand for satellite launchers in the late 1990s, and the early 2000s saw a decline in demand with the resultant folding of several companies.

Guarantees of $100 million each were given to help mobilize commercial bank financing for the SL project, at the request of Russia and Ukraine. Russia and Ukraine (backed by the World Bank Guarantee) would pay damages to Sea Launch if certain events occurred in Russia or Ukraine that prevented SL from making payments on their bank loans. The events covered included (among others) war and civil disturbance, or revocation or suspension of, or failure to re-new licenses or permits. The Agreements also established that Sea Launch could borrow up to $200 million for 10 years from a consortium of 14 multi-national banks to help the Ukrainian and Russian companies design launch vehicles, make equipment and systems, and test the launch vehicles (Agence France Presse 30/05/97). For a summary of the World Bank document, see the World Bank document 1998.

[190] World Bank 30 May1997.

[191] According to the IMF, OFCs are usually, "Jurisdictions that have relatively large numbers of financial institutions engaged primarily in business with non-residents; Financial systems with external assets and liabilities out of proportion to domestic financial intermediation designed to finance domestic economies;

offices on location, but would operate through the business, banking, and taxation structure of the Cayman Islands.

According to the Law of the Seas, international waters are neutral territory, but ships must be registered with a specific country—analogous to the requirement that satellites be registered with a country.[192] That country has responsibility for ensuring that conditions their respective ships are conducive to crew well-being and also that that activities on the ship are legal.[193] However SL again subtly undermined state-jurisdiction by registering their ships with Liberia. Liberian ship registrations are what has been deemed a Flag of Convenience (FOC), "Where beneficial ownership and control of a vessel is found to lie elsewhere than in the country of the flag the vessel is flying."[194] Flying Liberian flags was a way of reducing government jurisdiction over the SL project.

The Regulatory and Institutional Context

How would Sea Launch fit into the state-centric international and domestic legal frameworks within which other satellite launches occurred? While the very nature of SL challenged the definition of state versus non-state actors, normalized patterns of behavior led the company to pursue certain actions that made their activity less controversial and challenging. Given its 40% ownership in the company, Boeing accepted primary responsibility for objects launched into space by the company. Satellites launched by SL would be registered with the international satellite registry under the US. Although

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and more popularly, centers which provide some or all of the following services: low or zero taxation; moderate or light financial regulation; banking secrecy and anonymity" (IMF Background Paper, Section IIB, 2000).

[192] According to the United Nations Convention on the Law of the Seas 1958 Section VII, Article 91 ("Nationality of Ships").

[193] According to the United Nations Convention on the Law of the Seas 1958 Section VII, Article 94 ("Duties of the Flag State").

[194] ITF Handbook (2004) 13:1. Around 30 countries "effectively rent" their flags to ship owners worldwide, with a guarantee of minimal rules, regulations, taxes, and interference ("More Troubled Waters" 1992, 8).

incorporating the company in the Cayman Islands and flying Liberian flags was a subtle way of avoiding certain regulations, the very act of incorporating the company and registering the ships was in itself a deferral to the state-based system of regulation.

In exploiting loopholes in international law (by flying FOCs and registering the company within a tax-haven) Sea Launch undermined the institution of sovereignty. SL embodied challenges to the institution of sovereignty in the Post Cold War era posed by the rise of the market.[195] Yet despite their strategic niggling the company chose to choreograph its undermining of the state in the context of international law and norms. The company had a basic interest in avoiding regulation, but still chose to avoid those regulations by manipulating, instead of ignoring, international law.

Basic rational actor models help to explain why actors had the interests that they did with regards to Sea Launch. However a key question remains: it was logical for the relevant companies to see business opportunities in collaboration, but how did that very collaboration even become a possibility in the first place? Understanding how Sea Launch became a possibility requires considering how the broader social context created the conditions of possibility for a company such as Sea Launch. The Post Cold War era created new opportunities for international business partnerships. The International Space Station project helped uphold the diffuse norm in space exploration and exploitation of cooperation, and to establish a precedent for technical coordination between Russian and American technology and technicians. The rise of the market as an international society institution normalized what twenty years before would have been beyond imagination: not only a joint project, but a joint commercial project, tolerated and even encouraged by

[195] Buzan notes that the rise of the market has the potential to undermine the institution of sovereignty (2004, 261).

respective governments and furthermore backed by an inter-governmental organization (the WTO). The myriad ways in which SL manipulated government regulations suggests a decline in the institution of sovereignty, in that non-state actors had the ability to exploit loopholes in state-based international legislation in a way that allowed companies to reduce state monitoring of their affairs. Actors calculated their interests based on the Post Cold War globalizing context that they found themselves in.

Regime Characteristics?

Governance of SL incorporated norms, principles and decision-making procedures around which actors' expectations convered— but was it an international regime? According to some regime theory authors, international regimes are "always" formed by sovereign states, though the subjects of the regimes may be non-state.[196] However some authors such as Haufler argue that the influence of hegemonic stability theory on regime theory's origins has led to it having an unnecessary state-centric bias, and that there is nothing in the definition of international regimes that means they can't be private (1995, 95 and 96-97). Private actors such as corporations and private voluntary organizations may be involved in regimes in three ways: by laying down practices and norms which states later codify, by constructing an independent international regime, or by playing a relatively equal role with states within a regime (Haufler 1995, 95). In the case of SL it is apparent that the SL partners had established an international regime amongst themselves, despite being non-state actors—and the company was also influenced by (and the subject of) other state-based diffuse regimes.

English School language and ideas contribute to an understanding of how SL fit into global politics. As a non-state actor part of the social structure of transnational society

[196] See for example Young 1983, 93.

SL was part of the transnational domain, although it was closely tied to the inter-state domain by nature of the fact that its constituent companies had close government ties. As a transnational actor it was a participant in international society, but not a member (Buzan 2004, 202). SL represented the increase of transnational and commercial actors in the Post Cold War era and an age of globalization.

Rough Waters: Controversy Regarding Sea Launch

By 1998 the Sea Launch infrastructure was mostly in place and the company hoped to launch its first test rocket by the end of that year. However SL became mired in several controversies which threatened to damage its reputation and to delay (perhaps indefinitely) the company's operation.

In the late 1990s the International Transport Workers' Federation (ITF) challenged SL's use of Liberian flags on its two ships. The ITF is a network of 681 unions based in 148 countries. It formed in 1986 in part to ensure that seafaring transport workers were protected by a universal code of basic workers' rights (despite working on the neutral high seas and on ships registered with various countries). Given that FOCs allowed for the potential abuse of seafaring workers, the ITF had been formally challenging their use since 1948. Various media outlets picked up the story of SL's use of FOCs and the ITF's campaign against the company.[197]

A second controversy arose when the Pacific Ocean island country of Kiribatis expressed concerns regarding the SL project. The Republic of Kiribatis consists of around thirty-two atolls and one island, and is inhabited by around 100,000 people.[198] The Eastern-most island of Kiribatis was 500 miles (800 kilometers) from SL's ocean-

[197] See for example The Economist 1997.
[198] The main island is named Banaba (formerly Easter Island).

launch location. Kiritbatis acted against SL through the intergovernmental organization of the South Pacific Regional Environment Programme (SPREP) to raise concerns about the potential environmental and safety impact of the SL launches. In particular, Kiribatis expressed concerns over water pollution due to its economic and basic sustenance dependence on fishing (Woodard 1999, 2). Kiribatis also expressed deeper concerns relating to global warming. As a country made up of small islands, Kiribatis was immediately vulnerable to rising seas, and by the late 1990s had seen some of its very small and uninhabited atolls engulfed by rising seas.

Kiribatis couched its complaints in the discourse of environmental stewardship, but more basic causal interests also motivated their protest against SL. Kiribatis, which has few natural resources, could itself have been interested in developing a satellite launch system, given its strategic location near the equator. In September 1998 Japan announced that it was building a runway on the Kiribatis island of Kiritimati for its Hope-X Space Shuttle, lending weight to the argument that Kiribatis had strategic commercial as well as environmental concerns.[199]

The ITF and Kiribatis had serious concerns about SL, but both had relatively limited power in realist terms: The ITF was a large international workers union, but had limited power of enforcement, and Kiribatis was a small island company with limited economic or military capabilities. Why then would SL take their complaints into consideration? Both the ITF and Kiribatis had the power to undermine the legitimacy of Sea Launch, particularly given that the international media was reporting on the controversies surround the company. Both actors managed to bring coverage of SL to public attention, and to manipulate the interpretation of certain aspect's of SL's character (its treatment of

[199] Agence France Presse 1998.

its workers and environmental credentials).[200] Sea Launch was particularly vulnerable to issues of legitimacy given that it relied on attracting customers for its success. As such the ITF and Kiribatis had a countervailing power, despite lacking traditional forms of power such as over enforcement.

A Reflection of World Society?

What do the challenges by the ITF and Kiribatis tell us about changes in wider international/ world society? Objects on the high seas (and in outer space, as previously explored with regard to GSO and the ISS) inherently challenged the link between sovereignty and territoriality. State-centric international law has required objects such as ships (and satellites) to be registered with a particular state, although they are detached from that state's territory. Flags of Convenience undermine that state-centered international law by opening up a vacuum where the state is supposed to have jurisdiction but *de facto* does not. The ITF has stepped into that vacuum to try and reassert individual workers' rights that international law should guarantee. In the case, the institution of sovereignty was in decline (because of actors like SL undermining it), but a non-state entity was seeking to pressure actors into adhering to international law. This shows again how non-state actors may at times be the subjects of, and also play a role in enforcing, international regimes. It also brings to light the bigger question of whether international law is necessarily a derivative of sovereignty (as Buzan believes it to be [2004, 182]).

The ITF can also be seen as constituted by, and also reconstitutive of, the international society institution of equality of peoples. The ITF's goals were indirectly related to the human rights agenda, in wanting to guarantee basic universal rights for seaworkers. However it must also be considered why the issue of workers' rights on sea-

[200] For more on power over legitimacy and issue area interpretation, see Arts 2000, 528 and 531.

faring vessels became an issue at all, and why the ITF came to have enough leverage to influence companies as part of their campaign? Why didn't SL simply disregard the ITF's allegations? The movement was based on domestic analogies—domestic unions influenced industry within countries, but international sea trade meant there was a class of workers not covered by specific domestic laws.

Hence the rise in global trade itself provided the context in which there was a space for the ITF to have influence. The fact that the company was focused on individual people (sea-faring workers) but rooted in transnational civil society indicates how the interhuman and transnational domains were interacting. However despite the fact that the ITF worked to fill in the exploitable gaps left by globalizing industry, its own language suggests that it intended to reinforce normative international law, as opposed to establish a second layer to it: that is, the ITF and other NGOs have dubbed FOCs as, "an institutionalized system for the negation of international law."[201] The ITF fought for a return to the principles of high seas international law in which the state in which a ship is registered accepts responsibility for the seafaring workers' safety. As such the ITF was a non-governmental actor focused on individuals' equality, but also working within the state-centric system of pre-established international law. Through the English School it is possible to incorporate into the analysis state and non-state systems operating alongside each other (Buzan 2004, 4), and to appreciate forms of regulation and government that have little to do with states (Paterson 2004).

[201] FOCs have been exploited for centuries; for example the English used them in the 16th century to bypass Spanish blockages along the coasts of South America (The Economist 1997, 75). During American prohibition, US ships flew Panamanian flags in order to carry passengers just outside territorial waters for alcohol-fueled parties (The Economist 1997). In 1999 it was estimated that half the world's shipping tonnage was "flagged out" in countries other than the real country of ownership (PA News 1999). Sea Launch chose to register its two ships under Liberian flags, Liberia being one of the countries that commonly "rent" out their flag to ship owners. The ITW thus targeted SL as part of its campaign against FOCs ("More Troubled Waters" 1992, 5).

The English School provides useful language in considering the three domains with regards to SL and the ITF. To reiterate, SL was a multinational corporation (albeit based on companies with close government ties) being called to account with regards to international law by a transnational organization that champions individuals' rights. For the first time in the cases considered in this thesis, the three domains shared relatively equal balance in their influence and interactions. Although it is only through this relatively minor point in the development of one company, this balance between the domains indicates how world society could be reflected in international politics. This in turn suggests that Sea Launch reflected globalization in the Post Cold War era.

Kiribatis's environmental concerns were in part simply discursive, while underlying strategic interests in space commerce were conspicuously also powerful influences on that country's interests. However environmental stewardship can nonetheless be seen as partly constitutive in this case. It is unlikely that in a different era environmental concerns would be considered legitimate—or even raised at all. Although there were underlying strategic motivations, the fact that Kiribatis considered environmental stewardship a useful tool for launching their complaint against SL suggests that the institution had at least some influence on international society. However environmental stewardship was relational to the market institution, which also served to constitute the context in which Kiribatis calculated its interests. The gradual commercialization of outer space had created an outer space industry which in turn created opportunities for actors such as Kiribatis and also SL to have commercial aspirations and interests.

The Interstate Domain Reasserted

The third and most significant controversy with regards to SL was when the US government accused the company of export violations. The US government was extremely concerned (and by some accounts excessively so) that American space technology could be transferred to other countries (as was also seen in the case of the ISS).[202] As outsourcing satellite launches became more common, satellites were often shipped outside of the US for integration with foreign rockets and launch into outer space. Any actor doing so was supposed to ensure that satellite technology was protected. Such concerns over technology transfer were heightened as government subcontractors began to launch US government satellites on, for example, Russian and Chinese rockets.

American concerns about technology transfer were intensified in 1996 due to a situation involving the American space industry company Loral and Hughes. Loral and Hughes had subcontracted China to launch an American satellite. The rocket failed and Loral and Hughes shared information with China about how to improve the relevant rocket design. According to a US Air Force intelligence assessment, the information given to China could be used to improve their rocket (and hence missile) technology. The US thereafter pushed through several bilateral agreements with countries regularly used for rocket launches (including Ukraine), which reiterated regulations for preventing technology transfer and in some cases limited the number of launches that could be subcontracted to particular countries each year.[203] Outsourcing satellite launches was a

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[202] For a critique of America's concerns about technology transfer, see Johnson-Freese 2007.

[203] US-Ukraine Agreement on Commercial Space Launch Services, signed on 21 February 1996, by Vice President Al Gore and Ukrainian President Leonid Kuchma. Russia and the US also signed a similar agreement. In the Agreement, five launches to geostationary orbit commissioned by US companies would be allowed per year for Ukraine, and the SL project was specifically mentioned and granted up to 11 further launches each year (Section V).

The issue of whether satellites should be allowed for export and launch on foreign rockets was also tied in to domestic politics between Democrats and Republicans, which are beyond the scope of this thesis.

fairly normal practice (especially in the Post Cold War era and as the market institution became more influential), yet that norm was in conflict with basic American power-political concerns about military technology.

Sea Launch was therefore created in the context of elevated American sensitivity about technology transfer, but also rapidly expanding business opportunities for international launches. In 1998 Boeing disclosed to the US State Department that an internal investigation had uncovered violations of its export license (Mintz 1998, A4). The lapses were thought to have occurred between Boeing and SL's Russian and Ukranian partner companies from the time of SL's inception in 1995 until 1997.[204] It was further suggested that Boeing was unaware that some export procedures even existed and would have otherwise applied for permissions to exchange data where necessary. The State Department responded by suspending Boeing's export license in July 1998, given that Boeing had not adequately monitored the transfer of data to its foreign partners (Mintz 1998, A4). There was no time-line in place for the reinstatement of Boeing's license, but it was clear that SL's maiden launch of October 1998 would be postponed and Ukrainian SL workers were returned home pending further developments (Easterbrook 2003, 71).

The US State Department's concerns over SL reiterated the significance of state sovereignty. While the ITF and Kiribatis had some control over SL's reputation (mainly through the international media), the US exerted definitive power over SL by denying its

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In summary, however, the China case sparked a temporary stay of satellite exports by President Clinton, and widespread discussion of the impact of regulations on both American industry and also American security. For a conservative view on the dangers of satellite exports, see for example Farah 2006; Fisher 1998. For a pro-liberalization view, see for example Space News 2005; Johnson-Freese 2007.

[204] In 1998 Boeing spokesman Dick Dalton stated that, "Boeing underestimated the technical complexities of the licensing issues, and didn't have adequate procedures in place to deal with these issues." Quoted in Mintz 1998, A4. It was further suggested that Boeing was unaware that some export procedures even existed, and would have otherwise applied for permissions to exchange data where necessary.

export license. SL was made possible in part because of commercialism and the end of Cold War conflicts between technically space capable actors in the former USSR and the US, yet the American reaction to SL re-emphasized the influence of powerful states in the globalizing world. The US specifically had concerns (as during the Cold War) that technical information exchanged could be used to the strategic military advantage of Russia and Ukraine—the difference now was that such exchange might occur between commercial, and not government-cooperative partners (such as with the ISS). Contributing to the intensity of concerns over potential information transfer to Energia and Yuzhnoye were claims that Ukraine was not a member of, nor in compliance with, the Missile Technology Control Regime (MTCR), "an informal and voluntary association of countries which share the goals of non-proliferation of unmanned delivery systems capable of delivering weapons of mass destruction, and which seek to coordinate national export licensing efforts aimed at preventing their proliferation."[205]

Boeing also had a long history of export violations, which could suggest slippery morality when it comes to that company's practices.[206] Boeing's violations in the SL case amounted to 207 separate breaches of its export license. It is ironic that Boeing, whose space manufacturing infrastructure had been established through government contracts, and who still had close ties to the government, also had a history of challenging the boundaries of US regulation with regards to international trade. The institutions of sovereignty and the market created a complicated context in which the US and Boeing

[205] The MTCR began in 1987 by Canada, France, Germany, Italy, Japan, the United Kingdom and the United States (www.mtcr.info). Russia had joined the MTCR in 1995.

[206] For example Boeing also recently received a $15 million fine for exporting commercial airplanes with a gyropchip that has military applications (Gates 2006), and in 2001 was fined $3.8 million for illegally offering protected military technology to Australia and five other countries (Anderson 2001). However the extensive violations could also reflect that American export laws in this area are overly confusing and strict—an argument made by Johnson-Freese (2007).

were both mutually constitutive, where their interests were both shaped by international social dynamics as well as rational calculations.

The SL case demonstrates how in the era of globalization the inter-state and transnational domains were at times intertwined. Sea Launch was designed to adhere to state-centric international laws, yet also subtly undermined those laws. However the inter-state domain eventually re-asserted its influence over the company when the US suspended Boeing's export license.

After the storm: Sea Launch Becomes Operational

By 1998 the Sea Launch partners had invested significant time and money into preparing the company but had not launched a single object into space, and had attracted significant controversy from various actors. However by 1999, through engaging with various actors, the matters of controversy were resolved. In the summer of 1999, Sea Launch and the ITF agreed that ITF inspectors and lawyers would be used to resolve labor disputes, in order to give the crew recourse and oversight from an independent body (Associated Press 1999). Liberia would not exclusively hold jurisdiction over the conditions and practices on the ship, thus resolving the ITF's concerns over crew safety and exploitation. SL's spokesman stated that the SL ships had excellent quarters, equipment and galleys, and have always complied with the federation's standards (Associated Press 1999). As such, the agreement codified expectations that were already in place, but in need of formalization.

The agreement represented a compromise for both the ITF and SL, but also the fulfillment of their respective interests. The ITF did not get SL to abandon their Liberian flags, but did ensure good conditions for SL's seafaring workers. By making SL express direct responsibility for worker-safety despite the Liberian flag, SL and the ITF undermined the system of FOCs that gave governance to the sponsoring country of SL's ships. Sovereignty within international law was undermined in that legal responsibility remained with Liberia, but *de facto* enforcement and compliance rested within an agreement between the ITF and SL. With regards to FOCs, a corporate actor and a non-governmental actor reached agreement regarding an issue that essentially acknowledged the irrelevance of states in a particular area of high seas law.

The issue of potential environmental damage based on SL launches was resolved by pursuing an additional study of SL's environmental impact. In an independent study the SPREP found ambiguities in safety and accident planning for SL, and expressed concerns about unused fuel from SL rockets ending up in the ocean water (4.5 tons per launch, the report claimed [Woodard 1999, 2]). However an earlier report produced by Boeing had concluded that SL would cause no major environmental impact (Woodard 1999, 2). An American consultancy was commissioned to prepare a thorough environmental assessment on SL for the US Department of Transportation and the Federal Aviation Administrator for Commercial Space Transportation. The document addressed debris, noise, atmospheric effects, and emissions in pre-launch and post-launch phases. The report compared SL to alternative launching options and locations, and established an Environmental Monitoring and Protection Plan for SL to follow at each launch, and the return of its FAA license was contingent upon SL accepting the Plan.[207]

The SPREP report therefore came to different conclusions than that of Boeing and the American consultancy. This indicates that although environmental stewardship was at

[207] The four main points established in the Plan are that SL would: conduct visual observation for species of concern; conduct remote detection of atmospheric effects during launch; take surface water samples to detect possible launch effects; and provide notices to local mariners. ICF Kaiser Consulting Group 1999.

least part of the discourse of politics surrounding this case, that institution remained subordinate to others such as great power management. It also shows how, despite Kiribatis' having power over image and legitimacy for SL, the US was the more powerful actor and could assert its own interpretation of SL's risks over that of the SPREP.

However there remains the question of why the US would, in essence, defend SL if it had its own serious concerns about the company? One reason is that the US economy relied on actors such as SL for the country's own financial success. The rise of the transnational domain was a crucial element in the global economy, which the US's own capitalist political economy was tied to for wealth and power (Buzan 2004, 261). As such the US had a strange relationship with SL, wherein the company raised concerns for state security, but where the state also wanted to encourage its success because of economic interests. In the globalized era, the US's interests were influenced by the rise of both the market institution and the continually constitutive institution of great power management—which at times contradicted but also reinforced each other.

Concerns regarding export violations and transfer of sensitive information were resolved in the establishment of strict but clear regulations that constitute the core of the new export regime under which SL fits. Boeing paid a $10 million fine, $2.5 million of which was re-invested into a computer system at the homeport in California, which allowed the State Department to monitor SL's activities. SL also invested significant funds into training its staff in order to avoid future violations. It was agreed that SL launches would be rigidly structured and strictly monitored. Onboard the ACS, Russians, Ukrainians, and Americans would be kept separate to work on the distinct elements of the rocket, and only Americans would be given access to or even allowed to see the satellites, where sensitive technology could be found (Easterbrook 2003, 69). Satellites would be sealed and made inaccessible prior to transfer to Russian technicians for integration with the rocket. At SL's homeport in California, the American offices would be kept separate from the so-called "Russian embassy" where Russians and Ukrainians would have their offices (Easterbrook 2003, 69). On board, work areas would also be kept separate. Any exchange of technical information between the Western and Eastern partners would have to be pre-approved; for example when an SL rocket blew up shortly after launch in 2001 permission had to be given by the State Department for the technicians to collaborate on what went wrong (Easterbrook 2003, 69). An US State Department official would also accompany the ships on every launch (Easterbrook 2003, 69). In addition, Ukraine joined the MTCR in 1998, and hence committed itself to the mission of that regime. Despite its complicated status as a multinational corporation, incorporated abroad, launching from the high seas, and with ships regulated by an agreement with the ITF (nominally through Liberian flags), SL was placed firmly back within the state-centric system of governance, and specifically within the regulations of the US.

The SL case shows how the state and non-state domains are both interdependent, at times antagonistic and have a complicated relationship in the globalized world. Sea Launch shows how the complication is not only in the relationship between state and non-state actors, but also in how some trasnational actors challenge the very definition *of* state and non-state. This results in further challenges for concepts and the language used in the study of international relations.

Current Situation and Speculation about the Future

In March of 1999 SL finally placed its first satellite in orbit. As of January 2008, SL had launched 25 rockets (including two that failed). The industry-wide dip in demand for satellites in the early 2000s reduced the projected earnings and launches for SL, but the company continued to receive contracts for launches. Since the main controversies regarding SL were resolved, the company has received accolades for its international cooperative business model.[208]

Unless there is a major reduction in the demand for satellite launches the company will likely continue to operate successfully. The regime governing it has created the necessary regulatory framework to ensure its continued operation and the resolution of future conflicts through established decision-making procedures. Evidence of satisfaction with the regime is apparent in the fact that no major controversies have arisen since 1999. Furthermore the quota on the number of US satellites that could be launched by Ukraine was lifted. President Clinton announced in 2001 that the bilateral agreement establishing the quota would not be renewed due to Ukraine's clear commitment to missile control (Johnson-Freese 2007).

In the future the SL regime will likely influence the governance of similarly-structured companies. Cooperative endeavors in the global launching market are not limited to Sea Launch, and future companies could benefit from the recognized regulatory infrastructure inspired by that company. For example, the same group of SL partners have created the company Land Launch, which has its first launch scheduled for

[208] In a 2000 article titled "Skyrocketing Global Relations," Haim Shapiro of *The Jerusalem Post* noted that, "Launching satellites from the sea may be a small step for the aerospace industry, but the multinational company behind the project is taking a giant step toward world cooperation." Furthermore in December 2006, Sea Launch was awarded the 2005 California Space Authority SpotBeam Award for International Space. Boeing 2005.

March 2008. Although the company launches from terra firma, it has the same multinational infrastructure, and the SL regime has acted as a guide for regulating it.

The use of flags of convenience on the high seas raises the question of whether there may eventually be a market for "launching states of convenience" for satellites. Some authors such as Peterson argue that the way outer space is thought about and regulated is rooted in analogous reasoning, largely based on the high seas and Antarctica. There is reason to speculate that there may be countries in the future that profit on the regimes which establish liability and registration based on the "launching state" of a satellite, and hence "rent out" their registration to rockets in a similar manner to FOCs. However satellites have significant strategic significance and the dispute over technology transfer suggests that states will continue to closely monitor satellite launches in the near future. Yet ships also have strategic significance—for example, the ITF has noted that groups such as Al Qaeda benefit from the tolerance of FOCs (2002, 5-6).[209] While the notion of "launching states of convenience" is therefore a possibility it does seem unlikely that this will be a serious problem until the price of satellites becomes low enough that there is a market for satellites with dubious purposes in need of "discreet" launching services, and until the raw number of satellites launch per year increases.

The individual case of Sea Launch also has wider implications for the existence of international society institutions such as the market and sovereignty, as well as the evolving relationship between the three domains (interhuman, interstate, and transnational). The creation of the SL regime reflected wider international society, but the significance of SL also reflects on the status (and projected future status) of international

[209] Noted in the group-authored document "More troubled waters" 1992. The document suggests that Al Queda owns between 20 and 80 ships, which are nearly impossible to trace because of the FOC system.

and world society. SL challenged traditional conceptions and regulations in a way that is indicative of changes in the influence of the market, in that in the globalized era non-state and specifically commercial activities challenge state-centric regulation.

Conclusion

The case study of Sea Launch reflects changes in international society in the Post Cold War era. The rise of the market and transnational domains created the opportunity for SL's parent-companies to establish the complicated transnational corporation. Although the company was designed to comply with international law it also exploited loopholes in those laws. The variety of actors that came to have concerns about Sea Launch indicates the complicated makeup of international/ world society in the Post Cold War era. Ultimately SL was subordinated to the US, but non-state actors and smaller states also exerted influence over SL. This indicates how actors can exert influence over each other not only through raw power but also by using social dynamics such as power over legitimacy.

The next chapter considers how a regime has developed to study the potential threat from comets and asteroids and how interests have also developed in mining celestial bodies. The case of comets and asteroids raises questions about how cooperation may come to occur on outer space issue-areas, but also why that cooperation has been limited. International society institutions have played a role in creating the context in which the near-earth object issue-area is understood, and comets and asteroids have the potential to conversely influence international society in the future.

Chapter 6: Asteroids and Comets

"It is a law of nature that earth and all other bodies should remain in their proper places and be moved from them only by violence..."

—Aristotle in *Physics* (350 BCE)

Asteroids and comets potentially represent either a major threat or a significant opportunity for life on earth. Humans have long studied, speculated about, and pondered the significance of comets and asteroids, but the last thirty years have been particularly active for those seeking to understand, interpret, coordinate and disseminate information about them. Comets and asteroids raise two issues of primary importance: firstly, concern over the possibility of a disastrous collision between earth and a comet or asteroid that passes near to earth (near-earth objects, or NEOs), and secondly, the possibility of mining such objects for resources.[210]

This Chapter examines the politics surrounding these issue-areas and asks how and why actors decided to cooperate to study near-earth objects, but also why actors limited that cooperation. The Chapter looks at when and why a regime was created for NEOs, what type of regime it was, and questions whether it was effective. The Chapter also explores a range of possible future developments in the area of both NEO threats and mining opportunities. How would exogenous developments, such as the actual discovery of a life-threatening NEO influence actors and the NEO regime (and indeed wider world politics)? Without such a major development, how might internal mechanisms of the

[210] A "near-earth object" has an orbit that intersects that of earth within 0.3 Astronomical Units (AU), an AU being the distance between the earth and the sun (Task Force 2000, 11). If an object's orbit brings it within .05 AU to earth, it is considered a "potentially hazardous Asteroid (PHA)" (NASA 2006c). Potentially hazardous NEOs are mostly comets and small asteroids. Other objects that may come near earth orbit are small meteors and human made objects.

regime and wider social institutions influence the regime and actor interests relating to the issue-area?

Interpreting the Threats and Opportunities Posed by Comets and Asteroids

Comets are made up of boulders and volatile gases. When passing the sun those gases melt and emit a long tail that makes them visible in space via telescopes and sometimes to the naked eye.[211] Some, like Halley's Comet, have consistent and predictable orbits, while others may come at earth "cold" with an unpredictable orbit. Asteroids are either piles of boulders held together by their own weak gravitational pull or solid non-spherical slabs that tumble or spin through space (Task Force 2000, 12).[212] Asteroids do not emit any light of their own, and thus are only visible by the light they reflect from the sun (Task Force 2000, 11).

Ancient mythology shows that comets have long fascinated humans, who sometimes associated them with the gods, disaster or as harbingers of change.[213] Advances in

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[211] Comets and small asteroids are debris left over from the formation of the solar system 4.5 billion years ago, and are located mainly in a region beyond Neptune (Sagan 1980, 82; Task Force 2000, 11). Comets are primarily located in a region beyond Neptune (called the Edgeworth-Kuiper Belt), or around the outer reaches of the Solar System (in a region called the Oort Cloud) (Task Force 2000, 11). Many remain remote frozen "dirty snowballs," but those that are moved out of their normal region (often because of the gravitational pull of large planets) may develop orbits that take them close to the sun. As they repeatedly pass the sun, they may heat enough to melt and begin to break apart, after which the solar wind and the pressure of sunlight causes the vapors to create a tail (Sagan 1994, 296). Comets whose volatile gases have disintegrated become "dead" and are visible only by the light they reflect from the sun (Task Force 2000, 13).

[212] Asteroids are made up of carbon-containing (carbonaceous) materials, rocks (silicates) or metal (Task Force 2000, 11). Asteroids are primarily located between Mars and Jupiter (Sagan 1994, 296). This "main-belt" contains approximately 1 million objects that are over 1 kilometre in diameter (Task Force Report 2000, 11). Their origin is debatable, but it is likely that when the solar system was being formed, some asteroids combined to become the planets, but the incredible mass of Jupiter (318 times the size of earth) resulted in a gravitational tide that prevented asteroids near it from coalescing into further planets (Sagan 1994, 296). Asteroids generally maintain their position in their orbital belt near Jupiter (Sagan 1994, 296).

[213] Comets in particular, with their impressive flaming tails, have often been attributed with mystical qualities. Cosmologist Carl Sagan speculated that, for many cultures throughout history, the presence of comets disturbed the notion of a divinely ordered and unalterable universe (1980, 78). Comets were most often thought of as harbingers of disaster (Sagan 1980, 78). Greek astronomer Ptolemy (90-168 CE) thought that comets brought wars, hot weather and disturbed conditions (Sagan 1980, 78). In 1066 the

physics and astronomy in the 17th and 18th century improved scientific knowledge about the nature of comets and asteroids, although that knowledge was still imbued with strong superstitious, philosophic and religious influences. In 1910 advances in science meant that astronomers were able to predict the passage of Halley's Comet by earth, although the forewarning also increased public panic about the perceived threat of an impact (inspiring the growth of a market for anti-comet pills, and sparking "end of the world" parties) (Sagan 1980, 80). It is therefore apparent that the threat posed by comets and asteroids has always been influenced by scientific information and also public interpretation (and misinterpretation) of that information.

In the 1950s scientists began studying what would come to be known as the Tunguska Event, when a comet (now estimated to have been five meters in diameter) exploded over Central Sibera.[214] The Event occurred on 20 January 1908, but lack of interest by the Russian government meant that it wasn't thoroughly investigated until decades later. It was concluded that the explosion leveled 2,000 square kilometers of forest and burned thousands trees near the impact site (Sagan 1980, 73).[215] The atmospheric shock circled the earth twice, and scattered dust affected the atmosphere as far away as London for two

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Normans witnessed Halley's Comet, and presupposed it meant the downfall of a kingdom, and this in part inspired William the Conqueror to invade England shortly thereafter (Sagan 1980, 79). In 1578 Bishop of Magdeburg Andreas Celichius wrote that a comet is, "the thick smoke of human sins, rising every day, every hour, every moment, full of stench and horror before the face of God..." (quoted in Sagan 1980, 78). Historically comets were seen as somehow related to the god/s, whether as their beards (as the Babylonians believed) or as reflections of divine wrath, and in recent times, cults such as Heaven's Gate indicate that some religious groups still see comets as divinely ordained (even if the "divine" is a superior alien race), and emancipatory. For more on human perceptions of comets over time, I recommend Sagan 1980, 74-79.

214 Although explanations for the blast have ranged from earth's intercepting a black hole, to it being the result of an extraterrestrial encounter (Sagan 1980, 75), it is widely accepted today that on the morning in question, a comet exploded before impact (Task Force Report 2000).

215 One witness to the event recalled: "...the sky split in two, and high above the forest the whole northern part of the sky appeared to be covered with fire. At that moment I felt a great heat as if my shirt had caught fire... I wanted to pull my shift off and throw it away, but at that moment there was a bang in the sky, and a mighty crash was heard. I was thrown on the ground about two sangenes away from the porch and for a moment I lost consciousness" (Quoted in Sagan 1980, 74). For more on the Tunguska event, including eyewitness accounts, see Sagan 1980.

days (Sagan 1980, 73). This changed scientific perceptions of comets and asteroids as distant objects, to a more thorough understanding of how they could have directly influenced earth in the past, and could do so again the future.[216]

In the late 20th Century and the early 21st Century scientific developments, public concerns and political reactions mutually re-constituted collective understandings of, interests in and reactions to the NEO issue-area. In the 1980s a centuries old mystery was solved: that a comet caused the mass extinction of the dinosaurs. This influenced how scientists as well as with the wider public perception of NEO threats (Deudney 2002, 148-149).[217] Four additional events in the last three decades reinforced concerns regarding the NEO threat. In 1994 amateur astronomers and professional scientists around the world observed the aftermath of the collision of the Shoemaker-Levy-9 Comet with Jupiter, which caused fireballs the size of earth itself.[218] Two blockbuster Hollywood films then came out in 1998 (*Armageddon* and *Deep Impact*) which depicted the discovery of NEOs and the subsequent crisis on earth prior to their impact.[219] In 2002

[216] The potential effect of an NEO impact on earth varies depending on the object's size, velocity, and content. Objects may be traveling at different speeds (and comets travel on average twice as fast as asteroids), and may range from the size of sand to over 100 kilometers wide. An asteroid meets the earth's atmosphere traveling between 15 and 30 kilometers per second, an asteroid at 75 kilometers per second. By comparison, the Concorde traveled at 0.6 kilometers per second (Task Force Report 2000, 15). Asteroids are more likely to reach earth and impact the surface, whereas a comet's ice will often melt as it passes through earth's atmosphere, and eventually explode above the earth's surface (Sagan 1980, 76). Both objects would release their energy in an explosion, causing a blast wave—but not all will reach the surface before this explosion occurs (Task Force 2000, 15-17). Dead comets and asteroids are potentially more dangerous as they are harder to see and thus less likely to be detected (Task Force 2000, 13).

[217] The dinosaur extinction was first hypothetically linked to an asteroid in 1980 in a study at the University of California, Berkeley (Ward 2006, 64). The thesis was debated throughout the 1980s, and additional studies of the Chicxulub Crater in the Mexican Yucatan (where the asteroid likely landed) led to increasing consensus that an asteroid did cause their extinction (Ward 2006, 64).

[218] The pieces collided with Jupiter's night-side and were thus not visible from earth—but as Jupiter rotated the aftermath of the impact was readily visible. The comet consisted of at least 21 discernable fragments with diameters estimated at up to 2 kilometers (NASA 2000b).

[219] In *Armageddon* a team of Americans is assembled to plant a nuclear weapon into an asteroid that is on target to impact earth in 18 days. The task is complicated by politics and spreading global hysteria. In *Deep Impact* an amateur astronomer discovers a comet on course to intercept earth. NASA's mission "Messiah" attempts to destroy the comet, but instead breaks it up into smaller pieces. At that point, 80,000 Americans

scientists announced two separate instances of near-earth objects passing relatively close to earth, and only detected days after they had passed.[220] In the 2000s some scientists also speculated that asteroids or comets caused four out of five of earth's past major extinctions. Scientists have recently found evidence that 250 million years ago an asteroid may have caused the "great dying" wherein 90% of marine life and 80% of land life became extinct (NASA, 2004; Rees 2003, 91).[221]

An increase in commercial interests in comets and asteroids accompanied the raised profile of NEO threat issues. Elaborate ideas for NEO resource exploitation were raised in the 1970s and 1980s, but became more practical in the latter of part of the 1980s and into the 1990s (Deudney 2002, 152). The potential cost of mining would inevitably be huge, but some believe that the payoffs would be worth it. In 1983 it was estimated that precious and strategic metals in a single asteroid could have a market value of $5 billion (although, significantly, this did not account for extraction costs) (NASA 2006b). It has been estimated that the asteroids in the orbit of Mars and Jupiter would collectively be worth $100 billion for every person on earth (NASA 2006b). While governments have invested some funds in researching mining potential, it has often been entrepreneurs and space activists who advocate mining as part of the wider movement for greater commercialization and deregulation of space, and the implementation of private property rights in space.[222]

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are selected in a lottery system to accompany 200,000 scientists, artists, doctors and officials into underground caves, in hopes of surviving the impact and re-establishing humanity after the disaster.

[220] In March an asteroid passed 463,000 kilometers from earth and in June 2002 an asteroid the size of a football field passed within 120,000 kilometers of earth, traveling at 36,800 kilometers per hour (Komisar 2002).

[221] Suspicions of an asteroidal link to the "Great Dying" were reinforced when evidence of an Impact Crater off the Australian Coast was discovered, with characteristics that link it to the period of the mass extinctions (NASA 2004).

[222] See for example the authors in the edited text *Space, the Free Market Frontier* 2002.

Cooperation

Research into NEOs has been conducted by scientists around the world, who work as individuals or in collectives (such as in universities or through organizations such as the Committee on Space Research [COSPAR]). In the 1980s and 1990s scientific and public opinion was shifting towards securitization (of NEOs as a threat), commercialization (in terms of thoughts on how NEOs could be mined), and politicization (in terms of how the threats or mining should be managed). As such NASA's focus shifted towards NEO detection and to studies (such as of NEO make-up) that could one day prove useful in case of the need for NEO deflection.

The United States has always been the global leader of NEO studies because of NASA's detection efforts, their robotic space-based missions to study NEOs, and the strong academic network of planetary scientists at American universities and research centers.[223] In 1992 NASA drafted the "NASA Spaceguard Report" which suggested that NASA (in conjunction with the US Air Force Space Command and the US National Reconnaissance Office) have a goal to discover 90% of the estimated 1,000 NEOs greater than 1 kilometer in diameter (NASA 1999). Despite American dominance over NEO research, the document suggested that NASA rely on the assistance of a variety of actors including proactive international and non-governmental organizations and even amateur astronomers, with NASA as the center of coordination.[224] As such the report laid the

[223] Task Force Report 2000, 24.
[224] The NASA Spaceguard program would also draw on the vast range of American NEO study and detection resources, such as an array of detection operations spread across the country and supported by universities, and also several robotic in-space NASA projects. The detection operations include: Spacewatch (a detection facility based at the University of Arizona); Near-Earth Asteroid Tracking (NEAT—based at the Jet Propulsion Laboratory in California, and reliant on the USAFSC telescope on Haleakala, Maui, Hawaii); Lincoln Near-Earth Asteroid Research (LINEAR—in cooperation with the Air Force and the Massachusetts Institute of Technology); Lowell Observatory Near-Earth Object Search (LONEOS, based in Flagstaff Arizona). In 2006, NASA had also launched seven robotic missions into space to study asteroids and comets. Rendezvous missions include: Near (launched in 1997 to study

foundation for a nascent international regime to coordinate procedures for NEO detection and management, incorporating a range of actors, but dominated by the US. Such a regime would also encourage the development of further studies on NEOs outside of the US and by non-state organizations.

The question arises as to why, given its dominance over NEO research, the US would seek to establish such a cooperative regime. One strategic calculation is apparent to explain the behavior: the detection and tracking of NEOs has inherent constraints that could only be overcome through transnational cooperation. Due to the spherical nature of earth, only certain segments of the sky can be monitored from a particular location on the planet at any given time during the day. Thus monitoring and tracking efforts would require coordination between telescopes spread across the globe to maximize research efficiency. NEO research was therefore inherently a conducive issue-area for a regime to form around. As the most advanced actor in NEO research, the US would only achieve relative benefits from the relationship (as the US had less to gain from its partners than vice-versa), but should an NEO go undetected then the mutual losses could be catastrophic. However acting as the leader of the program allowed the US to maintain control over the exchange of information amongst actors.

The regime was primarily intended to assist in obtaining and interpreting highly technical information (an informational regime), and relied heavily on global epistemic communities that possessed the expertise to acquire and interpret this information.[225]

Asteroid Eros); Deep Space 1 (launched in 1998 to studey Comet Borrelly); Stardust (launched in 1999 to study Comet Wild-2); Muses-C (launched in 2002 to study Asteroid Itokawa—a joint project with Japan); Rosetta (launched in 2004, to study Comet Churyumov-Gerasimenko); Deep Impact (launched at the end of 2004, to study and impact Comet Tempel 1); Dawn (launched in 2006 to studey Asteroids Vestas and Ceres).

[225] For more on informational regimes, see for example Ruggie 1975, 572-573. For more on epistemic communities and international regimes see for example Haas 1997.

According to modified structuralist approaches, regimes often develop around such technical and inherently transnational issue-areas, and in this case would serve the purpose of managing the complexity of consolidating the highly technical NEO research, and also reduce the transaction costs of cooperation amongst scientists globally.

The regime also embodied the pre-existing norm of cooperation amongst scientists in outer space studies (as was also true for the cases of the International Space Station, the Global Navigational Satellite System and Sea Launch regimes).[226] Actors already had understandings and expectations about appropriate behavior with regards to cooperation for outer space, and those expectations were likely to conversely encourage further cooperation in the future. Therefore Grotian approaches also help explain how such cooperation for outer space was already one of many pervasive informal regimes that exist in international society, while the specific NEO issue-area was conducive to codification of that cooperation into a formal regime. Given that some degree of cooperation was already occurring amongst scientists with regards to NEOs (through NGOs such as COSPAR) the regime was intended to formalize and encourage that cooperation, and also bring it under the coordination of the US.

Diffuse Regimes

While the NEO regime formalized broader patterns of coordination it did not, in its early stages, have obvious implications for other diffuse outer space regimes established by outer space law. In previous cases analyzed in this thesis, diffuse regimes establishing liability, ownership, and registration of outer space objects effected the development of

[226] The ISS had scientific cooperative implications, but the roots of scientific cooperation on outer space across international boundaries go further back. For example, with scientists cooperating on rockets transnationally prior to WWII, and in the fact that co-authored academic papers are most likely to be about space science (Sagan 1994, 228).

specific regimes. Although NEO studies did involve some projects for putting objects in outer space, they were undertaken by individual organizations such as ESA and NASA. Therefore diffuse outer space regimes were not immediately relevant to an NEO threat regime.

Comet and asteroid mining, on the other hand, would have extensive implications for diffuse outer space regimes. As previously introduced in this thesis, the Outer Space Treaty established that no nation-state may lay sovereign claim to a celestial body (Article II; Appendix X). Having been ratified in 1967 (when outer space was the domain almost exclusively of states), the Treaty only specified property rights for nation-states. Some groups (such as those selling plots of land on celestial bodies on the internet) claim this is a loophole allowing for non-state actors to claim outer space territory.[227] However mineral extraction would be hugely expensive and complicated and it is far more likely that only a state and commercial cooperative would be able to actually undertake a mining project. The Moon Treaty of 1979 (Appendix E) attempted to control mining on the moon by outlining an international bureaucracy that would manage, "An equitable sharing by all States Parties in the benefits derived from those resources," including with non-space-faring nations (Article 11). This Treaty was focused on the moon, but would have had implications for future negotiations on other celestial bodies such as comets and asteroids. However the Treaty was only ratified by a limited number of (mostly developing) states and the main spacepowers did not sign, rendering it essentially defunct. As such in 2008 it is still not clear how mining efforts would nest within, and

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[227] As an example of a company selling plots of land on celestial bodies, see the Lunar Registry website ("Earth's Leading Lunar RealEstate Agency") at http://www.lunarregistry.com/?source=gmoon.

cause changes to, diffuse outer space regimes. I speculate about what potential directions this issue may develop in the last main analysis section of this chapter.

While rational actor models contribute to an understanding of why actors would cooperate on NEO research, they do not explain how an interest in NEO research itself arose. Various actors had mutual interests regarding NEOs, but why? While much research has indicated that NEOs are a serious threat, some counter-studies suggest that the threat is exaggerated (Ward 2006, 66). It could be that the present scientific paradigm emphasizes the role of NEOs in past extinctions, but that the paradigm will eventually be replaced as more is learned about them.[228] The knowledge-based experts that make up NEO research-networks have mostly come to share a belief about NEOs, and this itself could be a causal influence on the development of actors' interests.[229] This intersubjective framework of understanding created a shared narrative about the need for a regime.[230] The above exploration of the historical buildup of the NEO issue-area, through scientific discoveries and the dissemination of that information to the public, indicates how the NEO issue itself was socially constructed. While studies of NEOs in history rest on sound scientific methods, the heightened public awareness of, and funding for, the study of NEOs must be seen for its role in constituting the context in which actors perceived the need to cooperate on an NEO regime.

Actors' interests in NEOs can also be understood in part as a reflection of the rise of the institution of environmental stewardship. The Space Age itself has been attributed with raising global awareness about environmental issues. Satellites have vastly

[228] For more on paradigms and paradigm shifts, see Kuhn 1962.
[229] For more on causality and shared beliefs, see Ruggie 1998b, 868.
[230] An argument taken from John Searle's collective intentionality, as explained in Ruggie 1998b, 870. See also Vogler (2000) on the cognitive approach, 40.

improved scientists' ability to study environmental degradation and climate change. Images of earth from space—and especially the famous frame-filling photograph of the planet taken by the Apollo 17 astronauts—have been credited with impressing on humanity the fragility and ecological unity of planet.[231] Increased awareness of environmental issues created an international social context in which heightened awareness about NEOs would capture the attention of scientists, politicians and the public. A derivative of the environmental stewardship institution is species survival, and the attention given to NEOs in the 2000s both reflected and reinforced global awareness about the potential common fate that humans face in the case of catastrophic environmental destruction.

Actors' interests in asteroid mining can also be better understood when the Post Cold War international social context is taken into consideration. As explored in previous cases, outer space commerce was gradually expanding and becoming normalized from the 1970s onwards—but particularly gaining momentum in the 1990s and 2000s. This reflected a general rise in the market institution, as demonstrated by actors calculating their interests with regards to economic factors (such as the US eventually accommodating SL). Projects such as Galileo also indicate how states and commercial actors were beginning to coordinate more often on joint projects. Increased interaction between the transnational and interstate domain could be important in a mining activity because the expense and expertise required for a mining mission could possibly lead to it being a joint project between state and commercial actors.[232] Thus the rise of the market

[231] See for example Sagan 1980; White 1987.

[232] Both China and the US have suggested that they may in the future mine space objects (BBC News Online 2002). However I believe that it is more likely that such a project would be undertaken as something similar to a public private partnership. There are two reasons for this: for one, it is the commercial sector

and normalization of transnational and inter-state coordination for outer space created the context in which actors began to think more seriously about outer space mining.

Interests in comets and asteroids were thus influenced by the rise in the institutions of environmental stewardship and the market, but what does the case reflect regarding pluralism and solidarism in international society? The NEO regime was to establish cooperation on a joint scientific project—something that could in time increase the number and depth of shared values amongst international actors, and hence influence a gradual move towards greater solidarism in international society (Buzan 2004, 225). However the purpose of gathering scientific information was not for the sake of knowledge itself, but rather directed towards species survival. As such, at the early stage at least, the NEO regime reflected coexistent pluralist international society. The dominance of the regime by the US also reflects great power management—an institution associated with pluralist international society (Buzan 2004, 160).

Buildup of Regime Actors

By the end of the 1990s NEO research projects existed in Western Europe, Eastern Europe, Australia, Canada, Korea and Japan.[233] NEO research was also undertaken by the European Space Agency whose work included a planned robotic mission to attempt to deflect an asteroid out of its orbit.[234] In 1996 the private International Spaceguard Foundation (based in Italy) was established to promote coordination amongst NEO

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that would be most interested in the profit-making potential of asteroid mining. Secondly, in the US at least, I believe that NASA will be pressured by Congress to direct its limited funds towards other projects such as reaching Mars.

[233] See for example the European NEO Search and Follow-up (EUNEASO); Klet Observatory (in the Czech Republic); The Australian Spaceguard Survey; Spaceguard Canada; Spaceguard Croatia; Spaceguard Foundation (Italy); The Japanese Spaceguard Foundation and the Hayabusa rendezvous mission which included a robotic rendezvous with an asteroid; Spaceguard UK; the Korean NEORA program. For more on these missions, see the links on NASA 2006c.

[234] The Don Quijote mission, which was in the planning stages in 2007 (http://www.esa.int/SPECIALS/NEO/).

research groups.[235] NEO research was also promoted by NGOs such as the Committee on Space Research (which has a membership of individual space scientists and promotes inter-state cooperation on space issues), the European Space Science Committee (an NGO that supports ESA), the Association of Space Explorers (whose members must be a former astronaut or cosmonaut), and the Space Generation Advisory Council (an NGO that supports UN space activity and has space science students and young space professionals as its member base).[236] Other small collectives of individuals became tangentially involved in NEO work by, for example, running informative websites (such as the Near Earth Object Dynamic Site).[237] Not all NGOs with individual memberships came from scientific-technical backgrounds. Some like the National Space Society promoted NEO research as part of a wider agenda to support space exploration.[238]

The proliferation of NEO projects and the coordination amongst those projects can be seen in part as the effectiveness of the initial NEO regime. While some cooperation would have taken place in the absence of the regime, the infrastructure it created made coordination easier and hence more likely to occur. However the regime incorporated

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[235] The Working Group on Near-Earth Objects of the International Astronomical Union (IAU) provided impetus for the establishment of the international Spaceguard Foundation. Specifically the International Spaceguard Fondation aims for "...the protection of the Earth environment against the bombardment of objects of the solar system (comets and asteroids)," by promoting and coordinating, "activities for the discovery, pursuit (follow-up) and orbital calculation of the NEO at an international level" (The Spaceguard Foundation 1998).

[236] COSPAR was created by the International Council for Science in 1960 and helped to coordinate non-political cooperation between the US and the USSR on space projects during the Cold War. COSPAR's formal objectives are, "...to promote on an international level scientific research in space, with emphasis on the exchange of results, information and opinions, and to provide a forum, open to all scientists, for the discussion of problems that may affect scientific space research (COSPAR 2006)." The ESSC is a branch of the non-governmental European Science Foundation, and works with the European Space Agency (ESA), the European Commission and national space agencies on space-related issues (ESSC 2006). The SGAC is a non-governmental organization that supports the UN's space applications programs, and has a membership of students and young space professionals (SGAC 2004).

[237] Located at http://Newton.dm.unipi.it/.

[238] The NSS is "...an independent, educational, grassroots nonprofit organization dedicated to the creation of a spacefaring civilization" (NSS 1998-2006) that is based in the US but has a large and global (civilian) membership.

pre-existing norms of cooperation and most actors engaged in the regime would have already had basic interests in cooperation anyway. Therefore cooperation was not particularly complicated and so it is difficult to judge whether the regime had a strong compliance pull.

The UN also became involved in the coordination and encouragement of NEO research. Meetings amongst UN committees and the production of various reports outlined the role the UN should play in NEO research. These included encouraging public awareness of NEO threats, putting forth guidelines for cooperative observation, continually addressing NEO issues, and acknowledging cooperation amongst those actors actively participating in NEO research.[239]

While the UN continues to assert the importance of NEO issues, it has thus far primarily played a monitoring role. This is in part because the American Spaceguard program preceded the UN's work, and the US continues to dominate the NEO regime.[240] At present the regime is also primarily focused on highly technical and scientific research, while political issues (such as NEO deflection or NEO mining) are not yet part of international discussions. While the UN does have specialized scientific committees,

[239] The specific breakdown of these developments is as follows: A 1995 UN Conference encouraged increased public awareness of NEO threats, and put forth guidelines for cooperative observation and research (see for example Ramey 2000). United Nations General Assembly Resolution 60/99, passed in 1999, charged the UNCOPUOS with continuing to consider NEO issues. In July 1999, NEOs were discussed at the UNISPACE III conference, and the UNCOPUOS Scientific and Technical Subcommittee passed a three-year workplan on NEOs at its 41st session in 2002. The Science and Technical Subcommittee continued to address NEOs on its agenda and to report to the UNCOPUOS. In 2006 the General Assembly noted "with satisfaction" that the UNCOPUOS Technical subcommittee would receive a report by the Action Team on Near-Earth Objects (United Nations 2006, Item 6). The list of contributing organizations to NEO issues is in the July 2004 UN document on "Review of UNISPACE III Implementations."

[240] As one example of American dominance of the regime: In 2008 NASA's NEO webpage had links to 34 various NEO projects and programs around the world and based on the internet, while the UN's document listing "contributing organizations to NEO issues" lists the projects of only three countries.

the primary purpose of those committees is not research itself, but rather interpreting research in order to make political recommendations to less technical committees.

The Limits of Cooperation

The above shows that the social context and strategic rationality can explain why various actors decided on the need to collaborate on NEO issues. However a question emerges as to why that cooperation was capped at a certain level? The superficial issue with the NEO regime began as one of research coordination, but many political issues lurk beyond the technical front. Such as: What would be done if an NEO were discovered and needed to be diverted? Who would lead the diversion effort? Should weapons be tested in outer space in case they are needed to destroy an NEO? If a weapon is found that works, should states be allowed to stockpile it? Should NEO mining be allowed, and if so, by whom and with what regulations?

Despite the salience of these issues, such questions were conspicuously absent from the NEO regime. One explanation for this is that current levels of understanding of NEO threats do not warrant the pre-emptive discussion of how to deflect NEOs or manage NEO mining. The purpose of the regime was at first simply information accumulation, and the regime could expand in the future to incorporate new issues and based on new learning.[241] However it is likely that there were also strategic reasons behind the limits of the regime. The case of GSO can be used as an analogy. The GSO regime also began as a regime of technical coordination and mutual avoidance of suboptimal outcomes, as coordinated through the ITU. When members of the regime began discussing political issues regarding orbital slots, the US tried to maintain the definition of the regime as merely technical. This would block political discussions through which the US would

[241] For more on regimes incorporating new issues based on learning, see Keohane 1994 and Keohane 1995.

potentially have to compromise its interests. (Of course, as explored in Chapter Two, political issues were eventually forced into the GSO regime.)

The NEO regime was also primarily technical, but the NEO issue also implicitly embodied political issues. As with GSO, many cooperative members of the regime have also independently raised the issue of NEO deflection, but the most powerful actor, the United States, has not engaged in those discussions. This indicates that instead of the regime being merely limited, certain issues were being actively avoided in wider discussions.

The Implications of Deflection

To understand why an actor would want to strategically avoid the issue of deflection requires exploring the potential implications of the issues. Deflection of a potentially hazardous asteroid or comet would require either destroying it, or changing its orbit. Some scientists have speculated that a solar sail could be attached to such an object and diverted that way.[242] However most proposals have involved the use of significant weapon power (possibly nuclear) to destroy or deflect the object.[243] Other options involve equally dangerous materials such as no-mass.[244]

Preparing for a deflection mission would likely entail building such weapons and testing them in space. The issue of weapons in space is already embedded in other diffuse regimes and patterns of normalized behavior. The Nuclear Test Ban Treaty of 1963 (NTBT) forbid the explosion of nuclear devices in the oceans, atmosphere, or in outer

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[242] See for example Dachwald et. al 1996.
[243] See for example Rees 2003; BBC 1999b (which reviews the views of Member of UK Parliament Lembit Opik).
[244] See for example Rees 2003.

space (Reynolds and Merges 1998, 51).[245] The Anti-Ballistic Missile (ABM) Treaty, signed by the US and USSR in 1972, also indirectly influenced the issue of outer space weaponization by limiting ABM systems in certain areas although, significantly, the US withdrew from the ABM Treaty in 2002.[246] Also according to the OST of 1967 outer space is for "peaceful purposes," and the OST also banned weapons of mass destruction from space (although conventional weaponry was only banned from celestial bodies). This clause is vague, and has been interpreted as meaning either the absence of militarization, or less-restrictively the absence of aggression in space (Ramey 2000). However a strong norm against testing weapons was in place, despite the questions surrounding regulatory boundaries and moral principles.

That this norm exists was demonstrated by the shocked reaction of the international community when China tested an anti-satellite weapon in January 2007—something that had not done since the 1980s when the Cold War superpowers stopped their anti-satellite tests (partly in order to prevent the cluttering of orbit with debris).[247] However the norm is also now less stable given that, after China's ASAT, the US destroyed a malfunctioning reconnaissance satellite in February 2008. Although the recent ASATs are significant developments and have fueled the outer space weaponization debate, ASATs are not nuclear and hence don't violate the norm and laws preventing nuclear weapons in space.[248]

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[245] Technically the Treaty Banning Nuclear Weapons Tests In the Atmosphere, in Outer Space, and Under Water. As far as is publicly known, a nuclear weapon has only been detonated once in space, by the United States in 1957 prior to the regulations (Ramey 200, 1957).
[246] For more on the American withdrawal from the ABM treaty and the implications for space weaponization, see Johsnon-Freese 2007, 102 and 216-217; Sheehan 2007, 100-102.
[247] For more on the history and controversy regarding ASATs, see Sheehan 2007, 102-104;
[248] Outer space weaponization is a huge issue and more detail is beyond the scope of this thesis. For more on outer space weaponization see for example Dolman 2002; Johnson-Freese 2007; Peterson 2005; Sheehan 2007.

Therefore formally raising the issue of deflection would inevitably entail highly charged discussions about weapons in and for space. The fact that this discussion is being avoided can be seen in part as a testament to the compliance pull of the anti-weaponization regime, and the depth to which it is engrained in the social structure of international politics. A more cynical explanation is that some actors may be avoiding the issue in case discussions led to further international restrictions on weapons (i.e., even in the case of NEO threat preparations). Leaving the issue open for the time being leaves open the possibility of eventually justifying weaponization for NEO deflection (Sagan 1994).

Based on the present balance of power and capabilities in outer space, actors such as the US, China, and to a lesser degree Russia, could have interests in justifying weapons buildup in the future based on NEOs. China's recent anti-satellite test indicates such potential. The United States has been open about plans for further weaponization of space (see for example Ramey 2000). Combined with an increasingly pre-emptive and unilateralist foreign policy, this indicates that the US could potentially have an interest in using NEOs to justify space weapons buildup and testing. Russia has a stockpile of space hardware and also strong (albeit progressively commercialized) space capabilities, and its increasingly isolationist practices suggests that it could also have the potential to be interested in avoiding further restrictions on (NEO) weapons testing.

Developing the regime for NEO deflection would also require addressing questions as to who would lead a deflection mission. This question is embedded in geopolitics and competition, particularly given that outer space exploration and exploitation is often touted as the "future of humankind." The state leading a deflection mission would not only be heading the specific deflection project, but also symbolically taking control, for a short time, of humanity's future. Particularly in the absence of an actual threat, discussions regarding leadership would inevitably be bound up in issues of power and prestige amongst states.

The limits of cooperation in the NEO regime reinforce my argument above that the NEO regime reflected coexistent pluralist international society. Great power management is apparent in the regime, not only given that the US was controlling the coordination of research, but also because it was influential on the evasion of discussions related to certain issues that it wanted to avoid. The regime encouraged increased interaction between the three domains—the interstate, the interhuman (as individual scientists and activists who shared some values and aspects of identity), and the transnational (as formally organized non-governmental collections of scientists and activists). Yet the interstate still clearly dominated the other two, leaving little scope to argue that the case reflects world society.

Future Scenarios

This section uses informed speculation to consider several different scenarios that could occur in the future with relation to NEOs. The scenarios consider both exogenous developments (such as the detection of an NEO on target to intercept earth), and more conservative scenarios whereby major changes in NEO research do not occur, but internal mechanisms of the NEO regime and international society influence actor interests and behavior.

Scenario One

The first scenario considers how politics would play out if scientists discovered a comet or asteroid with an earth-intercepting orbit. An initial caveat is that I feel this scenario is highly unlikely to actually occur.[249] It is extremely difficult to calculate the potential of a serious NEO collision in the relatively near future (which, in the context of life-on-earth, would mean the next several thousand years). However scientists have used data from past impacts, as well as existing knowledge about orbiting NEOs, to calculate risk.[250] This research suggests that asteroids larger than 50 meters (similar to the Tunguska comet) impact earth at 100 year intervals; that asteroids larger than a kilometer occur on average every few hundred thousand years; and that objects 10 to 15 kilometers (on a par with the Chicxulub asteroid) occur perhaps once in every 1,000,000 centuries.[251]

However such calculations still have obvious shortcomings and are thus subject to interpretation. As with any statistic, outlier events may occur and thus a hazardous NEO could theoretically approach earth at any time—or at far longer intervals than as calculated above. Conversely, if the statistics were to accurately predict the risk, an extinction level impact would only occur every 1,000,000 centuries—a practically inconceivable timescale. Thus until significantly more information is gathered about NEOs, the perception of risk is similar to that in the case of geosynchronous orbit—based

[249] Some feel that the NEO threat is more immediately salient. See for example Rees 2003; Deudney 2002; BBC 1999b.

[250] The preferred method to rate risk is the Palermo Scale, which incorporates the likelihood of an impact, the seriousness of an impact, and how far into the future an impact may occur (Rees 1993, 95-96). The Palermo Scale was preceded by the Torino Scale, developed by Richard Binzel, a Professor at the Massachusetts Institute of Technology. For more on these risk calculation formulas, see Rees 1993, 95-96. NASA has thus far (through cooperation with other organizations) acknowledged 831 PHAs (NASA 2006, "Target Earth"). Also note that alternative authors have estimated the risk to be much greater. Astronomers Glark Chapman and David Morrison concluded in an analysis that an individual is more likely to be killed by an asteroid than by a nuclear power plant explosion (referenced in Duedney 2003, 151).

[251] For these and other estimates see NASA 2006d; Komisar 2002.

on fluctuating information and human perceptions, as tied up with political and social issues and interests. However, for the purposes of analysis, I will assume for a first scenario that a hazardous NEO "collider" may be discovered in an earth-intercepting orbit and must be deflected.

The global reaction to such an event would depend in part on the time-line of calculated impact. Some objects, such as asteroid 1950 DA, have already been deemed a threat, but for the year 2880.[252] However as outlined in the introduction, in the 1990s other NEOs have been discovered days after they passed beyond earth's orbit. As such a range of timelines are conceivable between detection and impact.

At the most radical end of the spectrum, assuming a relatively short timeline for impact of between one and three months, the US would likely lead the deflection mission, based primarily on its expertise in both space and weaponry. The US is currently the only actor to have experimented with impacting comets (with mission Deep Space in 2005—though Europe's Don Quijote Mission is scheduled to complete a similar mission within the next decade), and also has access to the widest network of state-based, epistemic, and NGO information on NEOs. In such a scenario, the slow and sensitive dynamics of regime formation and change would be subjugated to the need for immediate action. The anti-weaponization regimes would be disregarded in the face of the perceived need for urgent action.

A slightly longer timeline of one to two years before impact would change the picture only slightly. The US would likely still assert leadership and disregard long-standing weaponization regimes in the face of a perceived massive threat. However given enough time, the US would likely seek to form a coalition of junior state partners to support the

[252] UC Santa Cruz Press Release 2003.

mission, in order to dissipate costs, and also legitimize the mission (especially if a rival state such as China also announced intent to launch a diversion mission).

On a longer timeline of 50 to 200 years it is possible that the currently nascent NEO regime would play a far more significant role in a deflection mission. Previous cases in this thesis have shown that regimes become more reified over time and come to exert a compliance pull.[253] The GSO case also suggests that political issues may not be permanently avoided within technical regimes. The regime theory literature also suggests that regimes adjust over time, incorporating new issues as they arise. If NASA achieves its goal of mapping out 90% of NEOs by 2008 the picture of NEO threats will be far more complete. If at that point a serious threat is uncovered, but with an impact date far in the future, international negotiations would likely in part determine how to deal with it. For spacefaring states, the purpose of space exploration would shift dramatically towards earth security (Deudney 2003, 147). With the threat so far in the future powerful states such as the US would not blatantly defy the interests of the international community and pre-existing regimes out of concern for its reputation, and because doing so would open up the possibility for other states such as China to do the same. The US would more likely use diplomatic means to establish an international project plan for deflecting the mission with the US as the leader, as a way of manipulating, rather than ignoring pre-existing norms and rules. Within the next decade, Europe's own NEO projects will also make Europe a valuable partner, and hence ESA would likely have a slightly less junior status than other partner-states. Japan may also have developed sufficient NEO expertise to be an important partner in a deflection project.

[253] On this also see Keohane 1983.

Assuming that a deflection was successful, the institution of species survival and environmental stewardship would be dramatically reinforced. It is possible that the avoidance of collective destruction would encourage the strengthening of the interhuman domain, through the building a sense of community of common fate, and by emphasizing universally shared values—hence moving society towards a world society.[254] However it is more likely that, given that a mission would be under US leadership with partners only amongst certain spacefaring states, that the prevailing sense would be of pluralist coexistence, in reflecting coordination for species survival. The mission would also necessarily undermine international law by requiring (most likely at this point) nuclear weapons to be used in space—however this would mean an undermining of specific aspects of the diffuse regimes that make up specific outer space law, as opposed to an undermining of the significance of international law as a social institution. It would also reinforce the institution of great power management by reasserting the role of the hegemon as the dominant force in the international system, and the great responsibilities that such hegemons have.

Scenario Two

A second potential future development relates to the decision to mine asteroids near earth. Significant space infrastructure would need to be developed to make mining feasible, and hence I doubt that actual mining would occur any time in the next half-century. However discussions about mining have already begun and hence negotiations on a regime will occur far sooner. Given the failure of the Moon Treaty (which was partly caused by the pro-mining lobby [White 1991, 830]), it seems likely that a regime

[254] For more on ecological interdependence building a sense of world community, see Hurrell 1995a and Hurrell 1995b; Hurrell 2002).

which is conducive to mining will develop. While some non-state actors, such as private entrepreneurs selling plots of land on celestial bodies, and also some academic authors (for example Deudney 2003) are enthusiastic in their claims that private property rights for space are forth-coming, I believe that mining would develop through a more state-centric regime.[255]

The Law of the High Seas can be used as a partial analogy. At present, according to the OST and also as seen in cases such as GSO, objects are allowed to occupy but not own "locations" in outer space. If resources may be claimed after extraction it is likely that states will be granted mining rights to an area surrounding a mining base on an asteroid (similarly to how the Law of the Seas has adjusted to permit complicated and controversial mining rights to states according to various factors such as the Exclusive Economic Zones).

Based on costs, mining would likely be undertaken at first at least in part with the support of states. Private companies may eventually assume solo mining projects, but the regime would likely nest into pre-existing outer space regimes that establish state-based registration (similar to the Sea Launch case, where a partially non-state and trans-state actor was harnessed into a state-governing regime). The development of such a regime would likely be controversial, particularly amongst non-space-faring and developing nations. As in the case of GSO, small victories may be achieved by such actors, for example a regulatory body (most likely at this point within the UN) collecting taxes on mined materials for redistribution. But the likelihood of anything stronger, such as the Moon Treaty's stipulation that mining be "equitably distributed" is highly unlikely.

[255] As an example of a company selling plots of land on celestial bodies, see the Lunar Registry website ("Earth's Leading Lunar RealEstate Agency") at http://www.lunarregistry.com/?source=gmoon.

The regime described above would be reflective of current international society, in that the complex status of potential mining actors (as quasi-state) reflects globalization and the strengthening of the transnational domain and rise of the market institution, but where states continue to be the main actor in international politics. However the mining regime could, in time and if private entities took over most mining projects, contribute to the erosion of that state power. The ITF and FOCs demonstrate that the high seas are difficult to monitor, and enforcing regulation over mining outer space missions would be even harder. Such missions could take years and occur in remote parts of outer space. As in SL, a government official could be required to travel on any mission, but this would be expensive for any government, and also the remoteness of the mining community would put any such official at risk of "going native"—changing their loyalties to that of the mining group. The ability of private actors to carry out such a feat as asteroid mining also presupposes a huge increase in the power and influence of corporations, and hence such a mining scenario would likely occur in the future when state-power was already in decline because of other processes associated with globalization.

My assumption that mining would be undertaken in accordance to pre-established rules and procedures indicates that I suspect the institution of international law would remain a dominant institution in international society. International law and international regimes would increasingly be influenced by, adhered to by, and even created by non-state actors, a process that is already beginning, as was seen in the case of Sea Launch—again suggesting that international law is not necessarily a derivative of sovereignty, but a primary institution in its own right. Such a scenario would also reinforce the rise of the market as an institution (as interests would be increasingly influenced by and reconstitute that institution).

Scenario Three

The most likely future scenario is that NASA and the partners of the NEO regime will complete the Spaceguard plan of mapping out 90% of all NEOs, and determine that there are no imminent threats. The regime at that point will have become stable enough and habitualized so that it would not disintegrate (and there would still be need for NEO research given that a rogue object could still fall into an earth-intercepting orbit). In the case of GSO, perception of orbital slot scarcity was largely allayed in the 1990s, but the regime remained in place because of its usefulness in coordinating activity, and also simply because of habit and inertia. I suspect that the NEO regime would be the same.

Given the enthusiasm of the non-governmental actor network invested in NEOs, the political questions of deflection and mining would likely eventually be forced into the regime. In the absence of an obvious threat, the highly internalized anti-weapons regime would probably lead opinion against weapons testing. The negotiations would involve actors undertaking complex political posturing to assert, legitimize and justify their interests. With the absence of a clear justification for testing weapons, however, weaponization would be blocked by the regime. Actors would likely comply, for a time at least, based on a complexity of interests including reputation in the context of law-impregnated international community, the sense of obligation to adhere to the regime (Hurrell 1995b, 59) because of long-standing principled beliefs that have made weapons taboo (Ruggie 1998b, 867), and strategically because at present the regime works on reciprocity and if one state were to begin to test weapons, others would be more likely to do so as well.

However two factors could lead to weaponization of space for NEOs: firstly if weaponization (both illegal such as nuclear or taboo such as ASATs) occurred independent of NEOs, weapons buildup for NEOs could follow. Secondly, NEO research could eventually lead to scientific support for weapons testing against comets or asteroids in space. As mentioned above, NASA has already launched a projectile into an asteroid, and ESA has a similar project that will be undertaken imminently. If similar projects in the future lead the scientific community to support experiments with weapons against NEOs, that epistemic community could lead opinion for the international community to sanctify doing so.

If the NEO regime continues to encourage cooperation, and in the absence of pressure to test weapons, the regime would reinforce cooperative international society. In the absence of an imminent threat, the NEO research network would no longer be seen as a matter of coexistence but rather cooperation, and hence would reinforce a move towards solidarism on the international society spectrum. At that point the NEO regime could serve a functionalist purpose of creating further interlinkages between global actors and thus encouraging further cooperation. The United Nations has already stated that the NEO regime should be viewed as an opportunity to expand international collaboration, and the potential for it to do so is real.[256]

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[256] For example, in stating that, "The field of NEO research should be viewed not only as an exciting scientific discipline, but also as a service to humankind and a very good opportunity to encourage and promote international collaboration (UN 1999, 136)," and in directing the Science and Technical Subcommittee to, "...lead efforts towards better coordination at the global level of research, detection, search and follow-up observations of NEOs and other relevant activities by identifying action to be take at the national level or through international cooperation" (UN 2004, 70).

However if weaponization goes forward without the legitimization of the international community, the derivative institution of international law would decline, while great power management would rise. This would reflect a shift towards power political pluralist international society and the reassertion of the interstate domain. If a single power such as the US achieved weaponization of space this would undermine the balance of power and reinforce a hegemonic unipolar system. If multiple powers placed weapons in space, there could be the threat of war, or else the reassertion of a balance of power rooted in mutually assured destruction.

Conclusion

The case of NEOs requires an analysis of an informational regime that serves to bring together a variety of actors to research the potential threats posed by comets and asteroids. However the very understanding of that threat also reflects how NEOs and outer space more generally, is constantly subject to interpretation of the issue-area and oftentimes influenced by wider international politics. The lack of discussion regarding diversion scenarios and serious commitment to developing a mining regime indicates the interests of powerful actors, and also how actors came to develop those interests based on the circumstances of the international social context in which they are embedded. The tensions between cooperation and power politics, the interstate and transnational domains, and pluralist and solidarist tendencies are apparent in the complex picture that emerges from the analysis.

The final chapter of the thesis considers all of the case studies together. After undertaking a detailed analysis of five case studies, what general conclusions can be drawn about the main question: why actors have cooperated in outer space, and what that cooperation tells us about wider international politics and society? And what do these conclusions reflect on regime theory and the English School of international relations?

Chapter 7: Conclusion and Analysis

"Space exploration will tell us more about ourselves than about space. The farther out human beings look, the further inward we see."

—Ivan White in the *Overview Effect* (1987)

"It has often proved true that the dream of yesterday is the hope of today, and the reality of tomorrow"

—Robert Goddard (Clark University 2008)

For millennia humans have looked to the cosmos for religious, philosophic, and scientific reasons. October 2007 marked the 50th anniversary of humanity's entry into the Space Age. The geopolitics of the past fifty years have created the context in which actors approached issues regarding outer space, and outer space has also been part of the reconstitution of those geopolitics. In one sense, outer space can be seen as a classic collective action problem—a global commons that requires actors to coordinate in order to avoid a tragedy scenario. However the regime theory approach highlights how outer space is also unique in providing many opportunities for cooperation; for example, because space projects are so expensive, or because the circular nature of the planet requires coordination for celestial observations. The English School approach also opens up an understanding of how outer space may be unique in reinforcing certain trends in international society towards solidarism or even world society, such as the rise of environmental stewardship, the undermining of sovereignty and territoriality, or the gradual reinforcement of the notion of a common global community. However it is also unique in its ability to influence elements of pluralism, such as through military technology, or by providing an outlet for competition between states.

The five previous case studies analyzed in-depth how humanity has approached problems of cooperation, competition, and coordination in and for outer space, and what this tells us about wider world politics. What more general conclusions and themes can now be drawn out about these case studies as a collective and outer space politics more generally? What do the cases tell us about why and how regimes have been developed for outer space, what types of regimes those are and how they have emerged, and how they relate to each other? What do the case studies considered together tells us about the evolution of international society and international society institutions over time? The analysis has proceeded by applying regime theory and the English School to these cases, and in the final chapter it is also possible to reflect back on the theories themselves: to consider where and how they have proved useful; to highlight their strengths and shortcomings; and finally to consider how the two theoretical approaches relate to each other.

Regime Theory

Throughout the case studies there were examples of actors deciding to pursue cooperation and coordination on outer space issue-areas. This section reviews cooperation and regime development through the different strands of regime theory as introduced in Chapter One. Regime theory relies on rational actor models to explain how and why actors develop their interests, and considers how regimes play a role in cooperation. What conclusions can now be drawn regarding actor cooperation and also regarding the usefulness of various aspects of the regime theory approach?

Structuralist Regime Theory

Structuralist and modified structuralist regime theory were introduced in Chapter One as relying on rational actor models to answer the question of why actors decide to cooperate. Rational actor models assume that actors choose the best action for utility-maximization, according to stable preference functions and constraints facing them, and calculated through cost-benefit analyses. Structuralist regime theorists specifically focus on actors' interests in power-maximization and concern over relative gains, and assert that regimes are mostly strategic regimes: formal and created by great powers to maintain, advance, and formalize their own interests (a hegemonic regime).

Analysis of the case studies suggests that strategic regimes are rare, and there were only three points at which such a theoretical approach proved useful. The early space station regime was drafted to protect US gains while also reinforcing its image as a leader in the Cold War era, and hence maximize US power while limiting vulnerability. GPS in its early stages also had characteristics of a strategic regime, in that the US guarded its relative gains by using Selective Availability and also kept the best signals reserved for the US military. In its current stage the NEO regime also has characteristics of a strategic regime because it establishes cooperation to obtain information, but *de facto* control of that information lies with the US (and hence gives that country relative advantages). The regime also intentionally stops short of addressing plans and restrictions for future activity that the US does not yet want to address.

According to structuralist regime theorists, regimes are merely epiphenomenon and have no causal effect on either the regeneration of interests or on behavior and outcomes. The early ISS regime is the only one of the three strategic regimes that can arguably be seen as epiphenomenon. Plans for the space station project were continually redesigned, delayed and even threatened to be cancelled by the US (most often because of domestic politics). In the early stages the ISS regime itself did not play a role in influencing America's interests and behavior with regards to the Space Station. The nascent GPS regime could have been epiphenomenon because the US asserted the right to shut public GPS signals down. However (as explored further below) the fact that the signal was never shut down suggests that the regime *was* influencing US behavior. The NEO regime is too embryonic to make broader conclusions about its status as either epiphenomenon or an intervening variable, but I have argued that in most future scenarios the regime will influence interests and behavior to some degree.

Structuralist regime theory approaches proved useful in analyzing the early stages of the ISS, GPS, and NEO regimes. However therein lies a key theme: the GPS and ISS regimes were strategic at *early stages*, but evolved over time to become more stable, complicated, and less reliant on the hegemon (and the NEO regime will likely do so in the future). As structuralist regime theorists argue, in some cases regime formation may be related primarily to the indices of power—but the cases of this thesis show that once in place regimes evolve to become less reliant on those power structures.

Modified Structuralist Regime Theory

Several themes consistent with a modified structuralist approach to regimes emerged from the analysis. Modified structuralists suggest that certain issues inherently create opportunities for actors to determine that cooperation is rational and beneficial—especially when that issue-area is inherently complex, and/or inherently transnational. The case study analysis indicates that cooperation occurs not strictly because of the interests and manipulations of the most powerful (and to beget more power) but because actors calculate that it is in their interest to cooperate for both relative and absolute gains.

In all five cases the initial decision to coordinate or cooperate can be explained as a rational calculation, either to avoid sub-optimal outcomes or to advance relative gains. The modified structuralist regime theory approach therefore builds on the structuralist approach, but assumes that egotistical actors will find themselves in situations where cooperation is reasonable and where pursing cooperation may offer gains to all actors. In the case of geosynchronous orbit, it was apparent to even powerful actors like the US that coordinating radio-frequency usage and orbital slot allocation was prudent in order to avoid sub-optimal outcomes (in the form of radio-frequency interference or satellite collision through unregulated activity). The initial space station regime was dominated by a hegemon with specific interests in mind, but the project was also innately conducive to collaboration (and with potential benefits for all partners)—in order to distribute the significant costs, to take advantage of dispersed expertise amongst different countries (and particularly in adding the Russians) and as a way for lesser powers to inspire their domestic space industries. European cooperation on the Galileo project also dispersed costs, utilized various partners' expertise, and inspired industry. Cooperation amongst Sea Launch's corporate partner companies can be understood as a rational way to share expenses and also to take advantage of pre-existing technical hardware and capabilities.[257] The informative NEO regime serves to avoid duplication of comet and asteroid detection efforts and also to take advantage of geographically diverse telescopes in order to monitor all areas of the sky.

[257] The issue of whether SL is a regime is discussed further in the section on Grotian regimes, below.

Modified structuralist regime theorists list a range of benefits that lead rational actors to determine that it is in their interest to coordinate or cooperate, and many of these were borne out in the cases of this thesis. The GSO regime served to help avoid problems of over-exploitation and also technical coordination; the ISS regime allowed some actors to develop new capabilities (including hardware construction and development); the GNSS, SL, and NEO regimes allowed for the effective use of pre-existing capabilities. All of the regimes served to reduce transaction costs amongst members and establish management (by providing clear exchange of information, decision-making procedures, and conflict negotiation). However I argue that *initial* cooperation can be explained by rational calculations, and the promise of various gains. In many cases actors came to behave over time and with regards to specific issues in a way not entirely explicable through basic rational actor accounts. Understanding why requires looking at other influences on actors' interests and identities, and is explored further below in the Grotian regime theory and also English School sections.

Compliance Pull: Rational Actor Models and Interdependence

Modified structuralists also assert that regimes develop a compliance pull over time. Relying on rational actor models, was it apparent in any of the cases that the regime served to reconstitute actors' basic interests in a way that reinforced their commitment to the regime? That is, did regimes create circumstances in which actors' basic interests were changed, although still based on egotistical calculations? Two cases most obviously demonstrate such a compliance pull. As above, the ISS began primarily as a strategic regime (although offered mutual and various benefits to all partners). As redundant parts were eliminated and funds were exchanged between countries the project became physically, financially and politically interdependent—its operability was dependent on various partners fulfilling their commitments to the station. As such each partner relied increasingly on the others for the project's success. The regime, once in place, caused the US to change its basic interests, and hence the regime acted as an intervening variable. The influence of this can particularly be seen in the US's compromising on its basic tenet of "no exchange of funds" and "no exchange of technology" to guarantee Russia's ability to fulfill its commitments to the station.

The second case that best demonstrates this mechanism is the GNSS regime. A reminder that the US launched its Global Positioning System in 1978, and in 2008 Europe is in the process of launching its rival Galileo system—and together they are considered Global Navigational Satellite Systems (GNSS). The US sought to continue its dominance of GNSS (through its GPS system) but relied on the ITU's system of radio-frequency allocation to coordinate its activity with other radio-frequency users. The ITU eventually allocated frequencies to Galileo that overlapped GPS. In order to maintain a functioning GPS system the US had to re-evaluate its core interests in GNSS and accept major changes (towards interoperability of the two systems, not just for the benefit of users, but with issues of whether one actor could "shut down" the signal of another in order to protect the US GNSS industry). As such the ITU regime created vulnerabilities that forced the US to adjust its core interests—and hence acted as an intervening variable.

In all cases regimes also developed a less tangible compliance pull, rooted in social factors such as obligation and legitimacy, which are explored further in the Grotian regime theory section below. For now it is apparent that sometimes regimes can serve to reconstitute even basic causal and egoistic interests. For the ISS and GNSS, the regime served to change the circumstances in which actors calculated their basic interests. Can any themes be drawn out regarding why it is these two cases that exemplified this mechanism? In these two cases there was a higher degree of interdependence amongst actors and hence reciprocity. The space station became increasingly physically interdependent, which lead to power being redistributed amongst actors, as each had the ability to injure all others by defecting. With GNSS, once Galileo was legitimized by the ITU and had launched an initial Galileo satellite (which indicated the seriousness of Europe's intention to launch the project[258]) the GPS system became interdependent with the Galileo system on a very basic radio-frequency level. As such, these two cases are unique in that, once the regime was established, relevant actors were mutually reliant and the possibility of betrayal bound them together. In the other case studies coordination led to benefits but was not necessary (such as the NEO regime, where coordinating was not necessary, but beneficial).

Regime Evolution

A final theme that emerged from the case studies that relates to the modified structuralist regime theory approach is that regimes are flexible and can change over time. An important question emerged as to whether regimes changed as imposed by actors, or through gradual unintentional evolution. This section considers imposed changes, and gradual evolution is considered further in the section below on Grotian regime theory. Three cases demonstrated various ways in which actors came to impose changes that could have threatened the existence of the regime, but wherein the regime adjusted and persisted. LDCs managed (via the one member one vote decision-making procedures of the ITU) to impose linguistic changes regarding equitable access and rights for less developed countries within the emerging GSO regime. The language around GSO

[258] The ITU considers an initial satellite launch as a "validation launch". The first Galileo satellite was launched in 2005.

was changed to suggest that states have a moral right to exploit GSO once they have the capability to do so. I argued that this imposed change to the regime's principles was merely semantic at first but eventually led to adjustments in broader understandings about equality. This eventually led to a change of rules (from *a priori* to the hybrid system) and subsequently to the regime's norms.

The US imposed significant changes to the space station regime by inviting Russia to join without consulting other partners. Adding the Russians changed the regime in several ways: technical aspects were adjusted (in terms of station-design), management was adjusted (with concomitant readjustment of power amongst members) and some of the underlying principles of the regime were changed too—from competition to Post Cold War cooperation. The US also imposed significant operational changes to the regime governing Sea Launch (in terms of monitoring and export license provision).

What more general conclusions can be garnered from these three cases of imposed changes? The cases indicate how "regimes" as a concept are unique and different from straight-forward agreements, international law, or "paper regimes"—all of which have a formal element but fail to sufficiently establish norms, principles and don't necessarily converge expectations. The Bogota Declaration can be used as a comparison in that it was an agreement but failed to change behavior or expectations and hence was not a regime. The regimes remained stable despite changes to various aspects of their makeup. This indicates that regimes are dynamic rather than static. Young (1983) asserts that a change to a regime's principles represents fundamental regime change (as opposed to just regime evolution where norms are changed), but the cases suggest that a regime's norms, principles, or decision-making procedures (and often some combination of the three) can be adjusted without resulting in a serious disjuncture in the regime's character. As long as the focus of the regime remains on the same issue-area, rooted in the same diffuse regimes (discussed further below) and most importantly, understood by actors as a continuation of the same reified regime, then it can be seen as the same regime.

A second general note is that, through the case of GSO, it is apparent that it is not necessarily only powerful actors that can impose changes to regimes. It was the very decision-making procedures of the ITU regime (which gave one member one vote in the ITU) that allowed for less powerful actors to coordinate and impose change, which eventually influenced the course of the regime's evolution. Again, this demonstrates how a mix of factors including decision-making procedures contribute to the creation of regimes.

Grotian Regime Theory

Structuralist and modified structuralist regime theory approaches, with their positivistic tendencies, often lead to an analysis of specific, negotiated regimes. Grotian regime theorists are more expansive and assert that regimes are an unavoidable feature of international life. Patterns of behavior over time generate social expectations, and those social expectations constitute a regime. These basic premises of Grotian regime theory imply a shift away from strict rational actor models towards incorporating social dynamics that constrain actor behavior and influence the formulation of actors' interests. As such Grotian regime theory builds upon, but also expands the approach to understanding actors' interest formulation and behavior with regards to various issue-areas.

Moving beyond specific, negotiated regimes implicitly raises the question of what exactly constitutes a regime. The Grotian approach has the potential to expand the definition to the point of considering any short-term patterns of behavior as a "regime," which could result in the loss of analytical clarity. However a strict definition relying on explicit negotiated regimes would require eliminating relevant implicit and non-imposed evolutions of patterns of behavior that clearly influence the rise of more specific regimes. These questions are extensively addressed in regime theory and international organization literature, although the specific case studies of this thesis also reflect upon and contribute to this debate.

Diffuse Regimes

The Grotian regime theory notion of diffuse regimes highlighted the question of what constitutes a regime, but also proved very useful in analyzing the thesis cases. Diffuse regimes were introduced in Chapter One as regimes that are multi-issue, have a significant number of actors who subscribe to their principles or at least adhere to their norms, and that have specific regimes nested in them. Within the cases certain "background" agreements about outer space and the high seas pre-established conceptual, linguistic, and legal understandings which formed the basis for negotiations on specific issue-areas.

Throughout the cases several diffuse regimes were identified: the Outer Space Treaty of 1967, the 1968 Agreement on the Rescue of Astronauts and the Return of Objects Launched into Outer Space, the 1972 with the Convention on International Liability for Damage Caused by Space Objects and the 1974 Convention on Registration of Objects Launched into Outer Space. The regulations of the International Telecommunication Union were also identified as a diffuse regime.

Considering these diffuse regimes implicitly moves the analysis into a different methodological realm whereby analyzing actors' rational calculations are considered with reference to more broad pre-existing constraints. However all "diffuse" regimes found in the case studies were also specific, negotiated regimes with origins in power politics. The rise of the OST was specifically considered in Chapter Two—how Sputnik established a precedent or norm for outer space neutrality, but how the Treaty was also rooted in the strategic interests of the US and USSR. The diffuse regimes outlined in this thesis were negotiated, agreed, and ratified. As such they could fit various other definitions such as "paper regimes" or simply as international treaties or international law.

However certain characteristics make these treaties diffuse regimes. At a basic level each treaty was widely ratified and hence "has a significant number of actors who subscribe to their principles or at least adhere to their norms" (Hopkins and Puchala 1983, 64). Establishing the diffuse regimes also required increased social interaction between actors (in the case of outer space regimes, through the UN and the UNCOPUOS) and required the convergence of certain values and understandings about outer space. In establishing decision-making procedures those regimes then encouraged further institutionalization of cooperation (as the case studies exemplified).[259]

The diffuse regimes played a constitutive (as opposed to just regulatory) role. That is, they defined the set of practices that make up any particular consciously organized social activity and specified what counts as that activity (Ruggie 1998, 22). Diffuse regimes served to establish understandings between actors as to how outer space is conceived. These regimes then served to create the language, social and legal context in which actors calculated more specific activity. Actors accepted space objects as enclaves of state-

[259] For more on social interactions leading to value convergence, see Mayer and Zurn 1997, 394.

territory, passing through neutral territory; that space objects had to be registered (even with the complications of which state was responsible for an object as in the case of SL launches); that liability with regards to space objects rested with the state. The state-centric language of the different regimes also pre-established that states would be the main "players" in outer space politics. These basic assumptions constituted the understandings within which actors then came to develop and pursue interests with regards to more specific outer space issue-areas.

Regimes as Pervasive

The concept of diffuse regimes proved useful in understanding the broader regime context in which actors calculated interests and understandings regarding more specific outer space issue areas. However this still leaves a gap between specific and diffuse regimes—does a specific regime have to be negotiated and rooted in ratified agreements, or can it evolve as part of implicit norms, principles and decision-making procedures?

In all cases but one, understanding the long-term development of a regime usefully incorporated periods prior to its formalization. That is, patterns of behavior often established what was usefully called informal regimes. GSO governance was presumed to be rooted in diffuse regimes (of the OST and ITU), but over time a more specific regime evolved and eventually became codified in various documents within the ITU and UN. The GPS system was not intended to be a regime but norms, principles and actor-expectations built up around it to create a regime long before those norms and tenets were codified in the GNSS Agreement. Governance of SL was also initially nested in pre-existing diffuse regimes but over time a more specific regime evolved and eventually became codified in agreements. The ISS was the only case where a regime was formalized before serving to pattern behavior over time. In most cases, patterns of behavior came to have the status of norms, which then served to reinforce behavior and reinforce actors' expectations about how they and others would behave. Eventually more extensive principles and decision-making procedures emerged as the regimes developed and became formalized.

Thus the case studies suggest that there are a wide range of behavior and inter-actor relationships that can be defined as regimes despite the lack of formal agreements to codify them. The case studies reinforced the notion that regimes are pervasive and that explaining their emergence and evolution requires analyzing the space in between diffuse regimes and specific regimes, when patterns of behavior come to take on regime characteristics.

However if we accept the notion of diffuse regimes and that regimes are pervasive and present where there are consistent patterns of behavior over time, the question then becomes, what is *not* a regime? Is there a risk that the definition has been expanded so broadly as to incorporate all forms of social interaction? Two key factors still make regimes a distinctive concept. The basic definition of regimes can be returned to: they must contain norms, principles, and decision-making procedures, and must allow actors to formulate convergent expectations about behavior. The case of GPS is a useful example of when patterns of behavior cross over to becoming a regime. When GPS was first made publicly available there was a pattern of behavior and social interaction (between the active service provider and passive users)—however it took time for actors to expect the service to continue and for the provision of the service to become normalized. Once expectations were in place and an industry grew up around GPS, the norm of consistent service developed a principled dynamic in that users felt there was a moral right to have access to the service. In this process of evolution an informal regime was established.

The second point is implicit in the first: an informal regime exists where certain patterns of behavior have existed over a period of time, and have hence proved durable. For example, a one-off instance of coordination or cooperation does not constitute a regime. Also an agreement does not automatically generate a regime. Agreements may be part of a regime, or form the basis of it, but must serve to pattern behavior and expectations *over time* to become a regime.

Compliance Pull: Obligation and Legitimacy

While rational actor models assume that actors comply with regimes based on basic calculations, Grotian regime theory considers how less tangible social factors, such as legitimacy, image and obligation also influence actor behavior. Regime compliance pull based on such factors emerged as a strong theme in all of the cases of this thesis. A question emerged as to how such factors could be "seen" as influencing actors' interests and behavior. It was apparent that actors often complied with a regime even when it was not obviously in their basic interests to do so and where there was no enforcement mechanism to punish defectors. The US did not defect from the GSO regime but worked diplomatically to prove the rectitude and legitimacy of its position on *a priori* allocation. The US eventually accepted a compromise solution (the hybrid system), which was not explicitly in American interests, but doing so preserved its image as a benign leader. I argued above that the ISS regime had a compliance pull rooted in rational re-calculations based on the regime, but compliance can also be seen as influenced by part of partners' sense of obligation to the regime and concern over reputation in the case of defection. Despite domestic pressure on several partners to abandon the Station, the program continued and amongst the various reasons for doing so was that actors had committed to the project and felt obliged to fulfill that commitment. The fact that ESA pushed for the US to raise the profile of its commitment to the ISS demonstrates how actors were both influenced by and also understood how obligation influenced actor behavior. The US never shut down the GPS signal, which is best explained by a sense of obligation due to actors' expectations about the service and the desire to protect its image as a leader (especially during the Cold War period). Sea Launch could have simply been shut down by the US, but instead an expensive regime was established, in part because of the US's sense of obligation to continue to allow the company's operation because of the regime that had already been formed around it. I argued that the NEO regime will likely in future remain stable—at least at a basic level of exchange of information—because of the sense of obligation felt by actors to continue to comply, even if circumstances change and actors no longer find compliance with the regime to be in their basic interests.

A second theme that emerged from the cases is that the desire for legitimacy, sense of obligation, and protection of image has the potential to undermine power structures amongst actors. Despite being the most powerful actor in the GSO and ISS regimes the US accepted compromises in order to maintain the regime. Conversely, in the case of Sea Launch, the ITF and country of Kiribatis were less powerful actors but were able to exert power by threatening the company's image and legitimacy.

Regime Theory: Critique

A regime theory approach (and particularly the structuralist and modified structuralist strands) had one significant benefit: a clear methodology that is easily operationalized. Regime theory provides clear questions which apply easily to empirical material, such as

"How was this in an actor's rational interest?"; "Was the regime effective?"; "What type of regime is it?" "Is the regime stable?" This analytical rigor provided a clear framework in which to approach, interpret and explain the material. In approaching the empirical material it was useful to have such clear questions, which could be applied to specific cases and across different time-frames. Having a clear starting point (that actors are rational and calculate their interests based on cost-benefit analyses) led to clear explanations about how and why actors developed certain interests.

However this strength is also part of regime theory's weakness as in some ways it requires conservatively accepting as a given certain assumptions about context and causality. Regime theory primarily relies on investigating regulative rules—rules that have a clear causal effect on pre-existing activity. Actors are assumed to develop interests and identities and coordinate behavior in the pre-constituted world.[260] Thus in using regime theory several aspects of context are taken for granted, such as Westphalian sovereignty, the systemic structure and how individual states understand their position and formulate an identity based on that structure. For example, in the case of GSO the regime theory approach led to focusing on actors' interests formation within the system that they found themselves in, but missed important questions about how Westphalian sovereignty created that system in the first place. Sovereignty pre-constituted understandings that states were the legitimate actors for negotiating GSO governance, and the Cold War bipolar system shaped the identities and interests of individual and/or groups of states (with some states conceiving themselves to be bound together as "Less Developed Countries," or with the US seeing itself as "leader of the free world"). Thus a

[260] For more on this see for example Ruggie 1998, 32-35.

strict regime theory analysis can lead to overlooking broader factors related to the social and political processes that underpin politics and actor behavior.

Regime theory investigations can be too context dependent in that the analysis is pre-empted by assumptions already built in to the formal models used.[261] Actors have a wide range of potential actions in front of them, and regime theory tends to invert the research process by asking how actors behaved and then finding the strategic reason for doing so. Oftentimes actions have unintended consequences and regime theory requires reducing the world to clear explanations based on rigorous models that do not do justice to the complexities of politics.

Regime theory therefore fails to provide the tools to consider certain aspects of the wider context of international politics and the various influences that shape actors' decisions. Deeper trends such as the gradual rise of the global market can be accounted for through basic calculations (for example, actors had a rational interest in encouraging their domestic satellite industry) but regime theory fails to account for the significance of why actors were in a position to be influenced by these factors (how did the growth of the satellite industry come about in the first place, and how did this tie into wider global trends?). The notion of diffuse regimes goes some way towards expanding the analysis to consider the pre-existing context in which actors calculate decisions. However diffuse regimes still fail to provide tools for understanding how wider systemic dynamics came about historically and how political organization may be changing in fundamental ways (such as through globalization). If actors existed in a true prisoner's dilemma-type scenario then basic calculations with social scientific models would be sufficient for understanding politics—but social dynamics dramatically influence not only how actors

[261] For more on this, see Keohane 1994, 53.

decide to act but how they are pre-constituted and pre-constrained by the social and political environment in which they find themselves.

Regime theory's acceptance of the state-centric system also means that it lacks the tools for understanding the role of non-state actors. Regime theory authors generally agree that the primary actors in international regimes are states. However the Sea Launch case in particular highlighted how quasi-state actors could come to rely on rules, norms, principles, and decision-making principles around which expectations converge. On a basic conceptual and linguistic level it could be that regime theorists simply need to accept the notion of "transnational regimes," whereby global (but non-state) actors establish regimes.[262] Authors such as Haufler argue that activities of private organizations can be similar to states in establishing international regimes (1995, 94). However the current state-centric focus of regime theory limits the degree to which is can be usefully applied to cases in which non-state actors play a significant role.

The general acceptance by regime theorists of Westphalian sovereignty as a given also means that regime theory is unable to incorporate broader questions of how the system may be fundamentally changing. The state is still the dominant actor in international relations and interstate society is more dominant than interhuman or transnational society—yet the relationship between state and non-state actors is increasingly complicated in an era of globalization. Regime theory fails to offer the language or tools to deal with such issues.

A final critique of regime theory is that it lacks clarity in its usage of some terms, and particularly "norms" and "principles." Krasner defines "principles" as standards or rules

[262] Some regime theory authors have taken up this point. See for example Mayer and Zurn 1997, 404, and also Haufler 1995.

of personal conduct, and "norms" as valued, socially established, or even merely average behavior (1983a, 2). Regime theorists acknowledge that the distinction between the two is not always clear and that norms are often derived from principles. However through empirical application it was apparent that norms also often led to the establishment of what could be deemed principles—for example when the norm of open GPS signals eventually led to the sense that keeping those signals available was an American moral duty (especially once safety-of-life-applications came to rely on them). While the terms can still be used usefully within a regime theory approach, clarifying the relationship between the two should be a focus of future research.

The English School

Regime theory was useful in explaining actor behavior, but didn't provide the tools to consider how actors were constituted by the social context they existed in—that is, what social factors preceded the constitution of actors' identities and understands which then influenced their rational decision-making. The English School was useful in incorporating such constitutive elements into the analysis. The regime theory approach also led to narrowing the analysis to specific issue-areas—for example to focusing on individual agreements. The Grotian strand of regime theory lead to the analysis of diffuse regimes, but those diffuse regimes were still related to a general issue area (outer space, the high seas, or the radio-frequency spectrum). The English School approach provided the tools for considering how each case and issue-area was embedded in international society.

Institutions

While it proved difficult to apply the English School approach to the empirical material, in each case I looked for evidence of how international society institutions were in a pattern of rise, evolution, and decline and how this influenced the context in which actors existed. What conclusions can be drawn about the institutions of international society based on the case studies? In Chapter One Buzan's definition of institutions was adopted as "relatively fundamental and durable practices, that are evolved more than designed," and a list of primary, derivative, and secondary institutions was replicated from Buzan on page twenty-fiveof this thesis.[263] Institutions are different from what regime theory sometimes calls institutions (which I refer to as organizations) in that they are foundational and constitutive of actors and their patterns of legitimate activity in relation to each other (Buzan 2004, 166-169).

Institutions are in some ways similar to diffuse regimes, but in application to empirical material it proved useful to have them each as distinct concepts. Diffuse regimes fit the definition of "a set of implicit or explicit principles, norms, rules, and decision-making procedures around which actor expectations converge *in a given area of international relations*" (my italics added). Diffuse regimes are more specific with regards to what issue-area they relate to, whereas institutions are far more broad and can be understood as influencing the international political context over a long-time scale and across myriad issue-areas. Although both international society institutions and diffuse regimes are constitutive, the case studies also suggest that diffuse regimes often also have a regulatory component as well, while institutions do not.

Sovereignty and Territoriality

[263] The original graph being in Buzan 2004, 166-169.

Despite the fact that outer space is a global commons, highly remote and territorially complex, sovereignty and territory remained significant in constituting the foundation of actors' understandings when approaching problems in outer space. In all cases sovereignty's derivative of international law pre-established that states would be the main "players" in the "game" of outer space politics. Outer space was defined as neutral territory, but activity that occurred there was based on state-centric ideas. Satellites were considered the property of individual states, and registered with the "launching state." Nationals on the Space Station were under the legal jurisdiction of their respective countries. The component parts of the Space Station were the responsibility of individual partner-states. Sea Launch was to be registered as a company in a specific country, and its ships to fly beneath a nation-state's flag.

However the unique geography of outer space also created challenges that led to the undermining of the close link between sovereignty and territoriality. A few examples from the cases exemplify this point. Satellites in GSO remain "fixed" above the territory beneath them, but the ITU has reiterated that states may not claim "ownership" status of their orbital positions. The ISS was technically divided into component parts under individual states' ownership, yet once in space the Station was interdependent, and the multi-national crew rely on (and live in) the station as an integrated entity. Sea Launch technically adhered to state-centric laws, but in fact undermined them by registering the company in a tax haven, and in using flags of convenience on their ships. The case of NEOs forces humans to appreciate that their collective fate could be threatened by objects that are indiscriminate to territorial boundaries.

Outer space may therefore be playing a role in the gradual redefinition and/or decline of the sovereignty and territory institutions. I argued in the cases of GSO and GNSS that satellites themselves may also be reflecting back on (and undermining) Westphalian sovereignty by creating the shrinking of space and time associated with globalization, and also by providing images of the earth as a single ecological and political community which challenges hard boundaries. This so-called "Overview Effect" is embodied in the quote that, "When astronauts see the Earth from space they comprehend that it is a *natural* unity. Satellites embody the message that the planet is also becoming a *social* unity" (White 1987, 59).

Taking the cases together, what overall theme therefore emerges with regards to sovereignty and territoriality as primary institutions? Sovereignty remains durable and continues to constitute actors' understanding of the international system, despite the challenges of globalization. The eventual subordination of Sea Launch indicates that sovereignty remains robust despite the challenges thrown up by the global economy. The case of NEOs also demonstrates how states may address transnational issues but continue to manage those areas within a state-centric framework. However the cases suggest that inherently transnational regions such as outer space and multinational projects such as the ISS and SL may be changing sovereignty's relationship with territoriality. Territoriality (and its derivative of boundaries) may be in decline, but sovereignty is evolving.

Great Power Management and Balance of Power

The influence of great power management and its derivative balance of power also emerged as a strong theme in all five cases. Rational actor models help explain why powerful states pursue their own interests because they have the capability to do so. However in the institutional context great power management was seen as being influential when states used their influence to maintain system order—including, at times, curbing their own power. American behavior in particular was at times directed towards intentionally maintaining balance and order in the system. For example the US eventually compromised its core interests with regards to GSO in order to accommodate the interests of lesser powers. Great power management was also seen when the US propped up Russia in the ISS project at the end of the Cold War. The US has also accepted responsibility for coordinating the NEO regime. The balance of power was also seen in the case of GNSS, where Europe established the Galileo system as an alternative to GPS—but with deeper motivations towards establishing European independence and a counter-balance to the US.

Did outer space ever appear to play a role in reconstituting great power management and its derivatives? The Space Race in general can be seen as playing a role in the balance of power in the bipolar Cold War system, and the string of space stations developed by each power in the 1970s and 1980s reflected but also reinforced the balance of power. Adding Russia to the ISS can also be seen as reconstituting (to a small degree at least) the balance of power within the Post Cold war era.

One final point must be conceded with regards to great power management: it proved extremely difficult to determine wherein actors' behavior was simply rationally calculated, and where it could be understood as influenced by great power management. For example, were US concessions on GSO really influenced by the great power management institution, or was it merely the fact that the ITU's one member one vote system forced the US into a compromise position? While this issue is addressed further below, for now I argue that although it is difficult to find evidence, great power management probably did at times play a constitutive role. The US self-consciously saw itself as a leader, which in itself indicates how certain institutional influences were pre-establishing things like identity—which in turn influenced how actors came to understand their interests.

The Market

The market institution appeared to be rising across all of the cases. This rise seemed to be more closely related to the chronology of cases, as opposed to the specifics of each case—that is, the influence of the market was least strong in the earlier cases and the Cold War, and gained influence in the Post Cold War era. In the earliest case of GSO the market was not a significant influence but did play a minor role in constituting American interests related to encouraging its satellite industry in the 1970s and 1980s. The market did not constitute actors' interests with regards to space stations during the Cold War, but its influence on interests in space stations is apparent in more recent years. The rise of private space industry created the opportunity for Russia to commercialize Mir, and actors have also come to have commercial interests with regards to the ISS. The creation of GPS was not influenced by the market but the system itself inspired the GNSS industry. The GPS industry in turn generated the context in which there was demand for Galileo—a global navigational satellite system strongly influenced and defined by commercialism. Sea Launch is the most obvious case wherein the rise of the market helped to create the very context in which the case arose: Post Cold War liberal economics established the context (and conditions of possibility) in which the partner companies developed interest in the SL project. The rise of the market has also influenced how the issue of comets and asteroids is defined and understood. Having an interest in mining celestial bodies is rational (if the financial payoff outweighs the cost of extraction), but the rise of the market can be understood as influencing why such ideas about mining emerged when they did, and why they are now taken seriously.

Buzan argues that the market institution has tensions with that of sovereignty and territoriality, although this is complicated by the fact that liberal states encourage and rely upon international economics for their strength (Buzan 2004, 261). In all cases of this thesis bar one it appears that the latter is more true: although the market is serving to influence actors' interests, it is the state that eventually legitimizes, accepts, and even encourages that influence. As above, it was the US that desired for a GEOSAT market to arise and incorporated those interests into its position on GSO; despite hesitations, the US and other ISS partners have formally proclaimed interests in bringing commercial actors into the Station; Europe as a collective actor has intentionally designed Galileo to be influenced by commercial actors; the US eventually reinstated Sea Launch's export license and allowed it to operate.

However this relationship between the institutions could change over time to where the rise of the market causes the decline of sovereignty. This potentiality is best demonstrated by the possibility of commercial actors mining asteroids—in doing so commercial actors could bypass the state and state-centric international law. Yet there is little likelihood of this occurring in the near future because of the costs and technology that such mining would require. If anything, the state would likely be at least partially involved in any mining activity, again reinforcing the notion that the market and sovereignty are compatible institutions.

Nationalism

Nationalism as a primary institution did not prove useful in the analysis of any of the cases. This is perhaps because nationalism relates specifically to the process through which territory is made sacred through the process of popular sovereignty. Although issues of territoriality have been significant in outer space politics, as of yet no territorial occupation or ownership in outer space has been significant enough to lead to a nation-state to feel nationalistic about it. An exception could be Mir, which was large and inhabited and inspired a sense of pride amongst the Russian public. However in the rest of the cases studied, nationalism was not a significant influence.

Equality of Peoples and Environmental Stewardship

Equality of peoples and environmental stewardship were also influential in two cases, although far less significantly than that of the other institutions reviewed above. The language used by less developed countries regarding equitable access to GSO was part of wider movements for greater global equality in the 1960s and 1970s. The ITF's demands for seamen's rights on SL's ships can also be seen as part of wider human rights movements. Although Kiribatis' use of environmentalism was partly strategic (because of that country's desire to have its own launch site on the equator), the fact that the argument was couched in environmental terms and caused SL and the US to evaluate SL's environmental impact indicates the general rise of environmentalism in the 1990s.

Buzan argues that the human rights agenda has the potential to undermine the institution of sovereignty, specifically in providing justification for intervention. However in the case of GSO (and similarly to the market, above) equality of peoples was roughly compatible with sovereignty. The argument for "equitable access" to GSO was in part a mechanism of the balance of power—as less developed countries formed a voting block against the system hegemon. However the arguments were tied directly to the rights of individuals to disseminate and reproduce their own culture (through the New World Information and Communications Order) and hence also related to individual rights. The ITF's attack on Sea Launch's use of flags of convenience does, however, indicate how equality of peoples could undermine the jurisdiction of the state in some instances because a non-state human rights organization assumed jurisdiction over what should have been a state-regulated location.

Satellites and the Space Station may also be helping to reinforce the rise of environmental stewardship by improving earth-monitoring capabilities and providing images of earth as an interconnected and vulnerable organism. Satellites have improved scientists' ability to assess environmental degradation. Images of earth from outer space show the earth without boundaries which I argued above has the potential to undermine state-centricism, but also impresses on humanity the ecological unity of the planet. Increased awareness about potentially hazardous comets and asteroids also reinforces the sense of a common community of fate and survival of species.

The Three Domains

As outlined in Chapter One, Buzan's reformulation of the English School introduces three domains: the interhuman, interstate, and transnational. This triadic distinction is intended to improve the analytical ability of the English School to incorporate the role of non-state actors, particularly in an era of globalization. Having theoretical tools to deal with non-state actors proved useful in the case studies of Sea Launch and of NEOs. The corporate members of Sea Launch (and their customers) could be understood as part of the transnational domain and epistemic communities (that were highly influential in the case of NEOs) as part of the interhuman domain

The question then emerges as to how the three domains relate to each other, as each domain helps shape the nature of the others, and also operates in the conditions created the three together.[264] The Sea Launch case in particularly demonstrates how the transnational domain (as represented by the SL member-companies as well as the ITF) operated within but also raised challenges to the inter-state domain. However the inter-state domain eventually subordinated the transnational. The case of the ISS also demonstrated how the inter-state domain (through project member states), transnational domain (through tourism companies), and interhuman domain (in the form of the individual tourists) are in complex interplay with each other. While these two cases showed how the three domains can at times be antagonistic, they also suggest that the relationship between the three are rarely zero-sum.[265] They serve at times to redefine each other by both undermining and also reinforcing each other. For example, the US challenged Sea Launch but also eventually legitimized its operation by creating the complex monitoring regime for the company. It is also apparent in these two cases how the domains are sometimes interdependent—Sea Launch (representing the transnational) relied on the US (representing the inter-state) for its operation, but the US was also dependent economically on the success of multinational corporations such as SL. The case of NEOs also demonstrates this interdependence in that the US dominates the regime but relies on networks of transnational epistemic communities for the information-gathering and scientific analysis on which the Spaceguard project rests.

What Type of Society?

Part of the core question of this thesis relates to what outer space cooperation tells us about wider international politics and international society. English School terminology relating to pluralist and solidarist international society was applied to the individual

[264] Buzan 2004, 201. Buzan also notes the relationship between transnational actors and the society of states as one of the most interesting questions relating to the three domains (2004, 137).
[265] Buzan also speculates that the three domains are rarely zero-sum (2003, 137).

cases: if each case were a microcosm, what sort of international society was it rooted in? To briefly review from Chapter One, pluralist international society focuses on establishing a livable order, while mutually respecting sovereignty and differences between actors. A solidarist international society would have many shared norms, rules, and institutions and lead to cooperation in pursuit of joint gains or the realization of shared values. In Buzan's graph (reproduced on page #) pluralist and solidarist international society run along a spectrum with differently labeled societies contained between them. (Within pluralism: starting at asocial and moving to power political, and then coexistence. Within solidarism: starting at cooperative, and moving to convergence, and then confederative societies.) Actors in a coexistent international society will agree minimally on survival and avoidance of disorder but not have significant shared values beyond that. In a cooperative international society war will be downgraded and there will be joint projects.

Given that primary institutions define the basic character of any society and constitute it, considering what institutions were influential in each case can help define what type of society was reflected. Pluralist coexistent societies are directed towards constituting a society of states and establishing coexistence and as such tend to reflect the strength of diplomacy, international law, the balance of power, war and role of great powers, sovereignty/ non-intervention and territoriality (Buzan 2004, 191-192). In a cooperative international society, the market is likely to be a strong influence as well as environmental stewardship and human rights (Buzan 2004, 193-194).

What trends and conclusions about international society can be garnered by considering the five case studies together? Most of the cases reflected coexistent (pluralist bordering on solidarist) or cooperative (solidarist bordering on pluralist) society. The GSO regime was initially an archetypal coordination regime rooted in the logic of coexistence. Introducing the issue of "equitable access" and the value of equality, however indicated a shift towards a cooperative society. Buzan argues that "big science" projects such as the ISS often reflect cooperative society. However the ISS's origin in competition, great power management, sovereignty and territoriality complicates any general conclusion that it reflected solidarism. Adding Russia to the project made it more explicitly cooperative, although the language of competition threatens to re-emerge as the station is once again pitted against another rising space power: China. GPS evolved into a cooperative regime although the lack of shared values and sense that GPS was a "joint" project keeps it firmly on the pluralist side of the international society spectrum. The mediating GNSS regime is rooted in interoperability but avoids addressing issues regarding values such as commercialism or going beyond basic coordination, and hence reflects coexistent pluralism. The eventual subordination of Sea Launch to the US reflects great power management and hence pluralism. The NEO regime is firmly cooperative but that cooperation is directed towards mutual survival and hence is rooted in coexistence rather than shared values.

An exception within the cases is Galileo, which clearly reflected a subglobal convergent solidarist international society. The institutions and values reflected in Galileo relate to the homogenization of domestic institutions within the larger project of European integration. The Galileo project was an intentional act of coordinating policy, undertaking collective action and creating an appropriate regime and organizations—all characteristics of solidarism (Buzan 2004, 147).

What themes emerge about wider international society when the "international societies" reflected in each case are considered together? What do the cases of cooperation tell us about wider international society? Despite occasional acts of cooperation (such as détente and the ASTP) outer space politics during the Cold War reflected wider coexistent pluralism. At the end of the Cold War there was greater cooperation and thus a slight shift towards solidarism. Post Cold War European integration represents the presence of a strong subglobal international society and also (particularly in the 2000s) increased independence of Europe from the US. In the 1990s and 2000s the increased interaction between the three domains indicated the influence of globalization on world politics, although the inter-state domain remains dominant and hence there is no scope to argue that there is a shift towards world society. There was also a shift back towards coexistent pluralist society in the later 1990s and 2000s largely based on the re-emergence of the derivative institutions balance of power (through the rise of China and the growing strength of a unified Europe, both of which reflected and reconstituted outer space politics) and as related to increased US unilateralism and protectionism.

I have reviewed how international society could be interpreted in each individual case, and how that ties into wider international society during the time-frame under consideration. A final question is whether it can be seen that each of the cases served to play a role in reconstituting wider international/ world society? Outer space may be providing opportunities (intended or unintended) for the reinforcement of a sense of global community, common community of fate, and inter-personal relationships that cross state boundaries. In various cases I argued that, while perhaps unintended, satellites have played a role in the "shrinking of space and time" that is associated with globalization. By connecting individuals across the planet, either through telephones or real-time media, satellites serve to reinforce interpersonal connections across boundaries and also reinforce an "imagined community" whereby people in various parts of the world can "experience" the lives of others. Satellites and space missions such as Apollo and the ISS have also provided images of earth as an interdependent organism.[266] Satellites are also heavily used for environmental monitoring, thus reconstituting the environmental movement—which as above could be associated with coexistence but also reinforces the sense of a common fate (which requires recognizing our common humanity, and undermines the sense of "borders" and hence territoriality). The case of near-earth objects, while arguably socially constructed and sensationalized, also serves to implant in public consciousness the sense of common fate. If the "self" is defined according to the "other," outer space is unique in providing the potential of a common threat (such as NEOs or aliens) which could cause humans to recognize their common identity.

Conversely, the cases suggest that outer space has also in the past played a role in reinforcing discourses of dominance and difference that reconstitute pluralist international society. The Space Race itself shows how outer space can provide an outlet for states seeking to prove their technological, economic and ideological prowess with the constant underlying issue of militarization and weaponization of space. As above, I believe that the compliance pull of regimes will limit the degree to which states will defer from pre-existing regimes that seek to limit the weaponization of outer space and its use

[266] NASA is the only US government organization to have its own television channel, which broadcasts images of the earth as it passes beneath the station.

as a warfare high ground. However the inherent nature of most outer space technology as "dual-use" opens up extensive possibilities for states to adhere to international law while actually seeking the weaponization and dominance of space.

The English School: Critique

The English School usefully brings into the analysis the mutually constitutive nature of global actors and international politics—of agents and structures.[267] The English School approach recognizes that actors are historical products of the international system, and the system is the historical product of its constitutive elements (Arts 2000, 529). By incorporating constructivist questions the English School asks what precedes the rational calculations of actors and how does behavior reconstitute the context in which those actors exist? This is a strength of the English School as it greatly expands the analysis in a way that leads to greater understanding of both actors and international society. The English School also usefully accounts for the influence of ideational structures and their influence on actors. Considering actors' interests and identities increases understanding of why those actors pursue particular courses of action. The English School also takes account for how the long historical rise, evolution and decline of deep-rooted patterns of behavior (in the form of institutions) influence and are also influenced by actors.

However a significant problem with the English School approach is operationalization: how can social meanings, ideational structures, international societies and institutions be "seen"? Wanting to "see" such entities could in once sense be contrary to the English School's basic objection to behavioralism, as outlined by Bull in his case for a classical approach. I agree that many influences on actors are intangible and that

[267] For more on the mutually constitutive relationship in the English School, I recommend Arts 2000, 529, Buzan 2004 17 and 201 and Bellamy 2005, 6-7, Dunne 2005a.

looking for observable evidence of them is counter-productive, if not contradictory. However the problem remains nonetheless that if the English School is to be made clearly applicable to empirical material, some sort of method is needed for interpreting such intangible entities. Interpretivism is one option: according to Dunne, an explanation for why x or y happened is the reasons given by the actors themselves, an account that needs to be recovered in the context of other prevailing beliefs of social norms (2004, 169). Yet the cases in this thesis show that oftentimes actors provide one reason for doing things, but it is apparent that their actual intentions are elsewhere (for example, Kiribatis' concern for the environment, or the US's desire to use GSO "efficiently"). However analyzing actors' language can help make general conclusions about the influence of, for example, institutions: Kiribatis may have been using environmentalism as a cover for other interests, but the very fact that environmental arguments carried any weight with actors at that time indicates a more general rise environmental stewardship.

English School authors often say that the English School approach should be applied to empirical material.[268] Yet authors rarely attempt to apply the English School to specific cases. Bull and Watson reviewed international societies throughout history but their analysis was focused on international society as a whole and not on individual case studies (1984). Buzan also applies the English School approach to international politics, but again his review focuses on broad trends within international society (Buzan 2004, 228-240). This could indicate that the English School is useful in analyzing broad historical evolutions in international politics but is not applicable to specific cases. Yet if this is the case English School theorists should be more explicit about what it is that the

[268] See for example Buzan 2004, 190.

English School seeks to describe (and consider how these difficulties limit the potential of the English School to be a "grand theory").[269]

Despite the significant shortcomings regarding operationalization, the English School also proved useful in areas where regime theory did not. By bringing in the notion of domains the English School was better equipped than regime theory to incorporate analysis of non-state actors and their relationship with the state system. This generally relates to the English School's more broad historical approach, and the recognition that states are only one potential form of political organization (Bellamy 2005, 7). Thus the English School provides tools for understanding the role of Westphalian sovereignty in the present international order and also how that sovereignty came about and how it may be undergoing fundamental changes in the future (and particularly with relation to globalization).

Although the English School's "three domains" proved useful in application to the cases the distinction between domains was also problematic. The notion of interhuman, interstate and transnational societies purports to expand the analysis of international/ world politics to incorporate the diversity of actors present in the system. However the taxonomy in a way reinforces the very atomistic categorizations that are part of the conceptual problem—the case of Sea Launch showed that actors may not be either state, or transnational, or non-state, but a complex mix of the three. The tourist on the space station was an individual, but was enabled by a company (and the company had close ties to the Russian Space Agency). Buzan notes that the three domains may be at play with each other and that the categories may evolve in a way that changes which category a

[269] Buzan poses the question of whether the English School has the potential to be grand theory (2004, 270).

group of actors fits into—specifically in that as interhuman networks become more developed they become transnational actors. Yet this does not address the core problem that actors may fit the category of several different domains at the same time.

Buzan notes that his reformulation of primary and secondary institutions into the graph reproduced on page twenty-five be a starting point for discussion rather than a closure. After applying the English School to the case studies I believe that international law should be a primary institution (as Bull and others considered it) and not a derivative of sovereignty. In all cases of this thesis international laws were clearly established by states, rooted in state-centric language and primarily arbitrated over by states (or state-based IGOs such as the UN). However it was also apparent that actors such as the ITF (with regards to seamen on ships) have helped to establish and enforce certain "international laws." It does not seem implausible that in the future non-state or quasi-state actors will create and adhere to "international laws" as distinct from states. For this reason I believe that international law should be considered a primary institution, or that a separate category of "transnational law" will need to be created.

A final critique of the English School (and particularly Buzan's reformulated version) is that there seems to be a risk of propagating terms and taxonomies to the point of loosing analytical clarity and the ability to apply the approach to empirical material. For example, Buzan outlines the difference between "thick" and "thin" international societies, the "thinness" or "thickness" of a society being how pluralist or solidarist that society is (Buzan 2004, 59-60 and 154-155). The concept of "thick" and "thin" rarely proved useful in application to the cases, because the pre-existing terminology was already efficient. Another example of a word that I believe put the English School at risk of terminological excess is "second-order societies," defined by Buzan as, "those in which the members are not individual human, beings, but durable collectives of humans possessed of identities and actor qualities that are more than the sum of their parts" (2004, xviii). My concern is that such terminological proliferation could open up the English School to critiques of being unnecessary bombastic.

However, to soften slightly the previous critique, it must be noted that a strong benefit of the English School approach in application to the cases was its extensive range of tools for analyzing complex cases in a complicated world. It is the ability to analyze a wide range of political activity over different historical periods and international orders, using a range of methods and nuanced analytical tools that gives the English School the potential to be grand theory.[270]

Regime Theory and the English School: Similarities and Differences

Much literature has been written on the similarities and differences between regime theory and the English School.[271] After applying both theories to specific case studies I believe that there are similarities not yet highlighted in the literature—yet also fundamental differences between them. One difference between regime theory and the English School is their use of language and terminology.[272] Regime theory's use of language reflects its American social science roots, and English School languages reflects its roots in mostly European-based classical approaches.[273] One particular similarity not previously discussed in the literature comparing regime theory and the English School, is the relationship between Buzan's coercion, calculation, and belief and regime theory's

[270] For more on the English School as grand theory, see Buzan 2004, pages.
[271] See for example Evans and Wilson 1992; Buzan 2004; Waever 1998.
[272] A point also made by 1992.
[273] This is not meant to over-look that many founders and subsequent authors working within the English School were from widespread geographical locations.

notion of strategic, modified structuralist and Grotian regimes. There are differences between the two trialectics: coercion, calculation, and belief refers to how and why actors have internalized values, while the strategic, modified structuralist and Grotian regime theory approach address why actors have decided to cooperate and create regimes. However both trialectics refer to what motivates actors and both have implications for the stability of societies/ regimes. This therefore reinforces the idea that regime theory and the English School have some similar ideas that are rooted in different terminology.

However I would not exaggerate the degree to which it is "only" language that separates the two, as there are more fundamental differences.[274] There are methodological differences between regime theory and the English School, rooted in the English School's constructivist tendencies and regime theory's reliance on rational actor models, which influenced the way that they could be applied to the empirical material of the case studies. The definition of institutions provides an example: for English School theorists institutions are "relatively fundamental and durable practices, that are evolved more than designed, and… they are constitutive of actors and their patterns of legitimate activity in relation to each other," whereas what regime theory refers to as institutions is akin to what the English School would call organizations. This distinction embodies the deeper differences between the two approaches, and in particular how the English School is interested in constitution, and regime theory on regulation. In applying the approaches to empirical material, these methodological differences led to different starting points and often to differing (though not necessarily contradictory) conclusions.

[274] This is contrary to Evans and Wilson, who suggest that the differences between the two are largely merely linguistic.

Another major difference between the English School and regime theory is of scale. As noted by Evans and Wilson, regime theory tends to focus on specific cases of cooperation for narrow issue-areas (1992, 339). Regime theory focuses on actors' interests in the immediate- to medium-term outcomes of behavior. Regime theory's consideration of consequences is often limited to the specific issue-area under consideration. The English School leads to a consideration of what actors' interests are on a longer-term scale and how actors' interests were constituted. The English School also scales up its analysis of outcomes and consequences by considering not only the specific outcomes effect a specific issue-area, but also how they are embedded in wider international politics, and also how the consequences of action on the reconstitution of international politics and society.

This difference of scale was highly apparent in the application of each approach to the case studies. The regime theory approach easily applied to specific issues and organizations, and was useful in interrogating actors' narrow interests regarding each case. However it failed to provide a sense of the broader political and also historical context in which each case was embedded. While regime theory could account for factors such as geopolitics (e.g., the influence of the Cold War), it didn't provide tools for expanding the scale further, to consider how international politics could be undergoing fundamental changes (such as through globalization) and how the outer space cases both reflected and also at times reconstituted those changes. The English School, on the other hand, usefully provided the methodology and terminology to consider these broad arguments—yet lacked the tools to focus more narrowly in on providing explanatory purchase over the detail of each case.

Regime Theory and the English School: Incommensurable or Complementary?

Although regime theory and the English School can be directed towards similar questions (such as "why do actors cooperate?"), through the case studies it became apparent how their methodologies dictate different starting points when undertaking analysis of empirical material. Assuming rational calculations within a given context is significantly different from seeking to excavate what that context is and how it influences the very foundations and identities upon which actors develop their interests. This leads to the question of how they relate to each other in application to specific empirical material. Do they provide entirely different stories, rooted in different world views? Are they incommensurable?

The case studies and analysis in this chapter indicate that regime theory and the English School are not incommensurable, despite their differences. The English School is methodologically pluralist, and informed by three traditions that each has its own methodological preferences. As such, the English School is able to incorporate the analysis of regime theory, and at times built upon it where the realist/ rational actor tradition fails to provide a complete explanation of events. As above, the English School is also broader than regime theory, and hence can often expand the issue-specific analysis provided by regime theory to considering the wider international social context. Yet the detail and explanatory power of regime theory was also necessary in order to achieve an in-depth analysis and understanding of each case. The continuum of approaches between regime theory and the English School provides a range of tools for understanding outer space politics and its place in wider world politics.

Conclusion

Why have actors decided to cooperate on issues of outer space, and what does that cooperation tells us about wider international politics and international society? This thesis has considered five case studies that range chronologically throughout the past fifty years of the Space Age. It is apparent from this analysis that actors often undertake cooperation as a matter of strategic interest—to avoid mutually undesirable outcomes. Yet outer space is also unique in providing many instances in which cooperation is inherently desirable. Actors also had selfish reasons for establishing diffuse outer space regimes, but those diffuse regimes also served to pre-constitute actors' understandings about outer space governance in more specific issue areas. Future research should continue to focus on cooperation in and for outer space, and in particular to consider the role of diffuse regimes and how regimes are related to each other.

The decision to cooperate (or limit cooperation) in each case also tells us about international society and wider international politics. During the Cold War the cases primarily reflected coexistent pluralist international society, and the strength of the institutions of great power management and alliances. At the end of the Cold War the cases at times have reflected cooperative solidarist international society and also globalization, through the rise of the market institution. In the Post Cold War era, the type of actors influencing outer space politics has also changed in a way so as to suggest the increased interaction of the three domains. I have also argued that outer space not only reflected, but at times served to reconstitute some of these developments and changes in international society. Outer space inherently challenges the conceptualization of the state as rooted in the close relationship between sovereignty and territoriality. Outer space may also be contributing to the reconstitution of institutions such as the market (through its role in financial exchanges and also because the outer space industry has become a relevant component of the global economy) or environmental stewardship (by improving our earth-monitoring capabilities, and also presenting humanity with threats to species survival such as that posed by NEOs). Outer space technology has also been involved more generally in the "shrinking of space and time" associated with globalization. There is scope for further research on this relationship between globalization and outer space, although finding evidence of that relationship could prove difficult. Further attempts should be made to apply the English School to empirical material, in order to continue to challenge theorists to address the problem of operationalization: either to force English School theorists to be more direct about the difficulties that the English School approach causes analysts of specific case studies, or else to seek to redress this shortcoming of the approach by re-evaluating the English Schools methodology and methods.

Less than a century ago rocket scientist Robert Goddard was ridiculed across America for proposing that mankind may one day place an object on the moon. Since the onset of the Space Age, outer space has rapidly become a part of the everyday life on earth, and remains shaped by and engrained in international politics. The next fifty years of exploration and exploitation will undoubtedly present new challenges of opportunities for humanity, and the way that humanity approaches those challenges and opportunities will undoubtedly continue to reflect on and reinforce wider international politics.

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Appendix A

Treaty on Principles Governing the Activities of States in the Exploration and use of Outer Space, Including the Moon and Other Celestial Bodies

The "Outer Space Treaty"
Opened for signature at Moscow, London and Washington on January 27, 1967

THE STATES PARTIES TO THIS TREATY,

INSPIRED by the great prospects opening up before mankind as a result of man's entry into outer space,

RECOGNIZING the common interest of all mankind in the progress of the exploration and use of outer space for peaceful purposes,

BELIEVING that the exploration and use of outer space should be carried on for the benefit of all peoples irrespective of the degree of their economic or scientific development,

DESIRING to contribute to broad international co-operation in the scientific as well as the legal aspects of the exploration and use of outer space for peaceful purposes,

BELIEVING that such co-operation will contribute to the development of mutual understanding and to the strengthening of friendly relations between States and peoples,

RECALLING resolution 1962 (XVIII), entitled "Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space," which was adopted unanimously by the United Nations General Assembly on 13 December 1963,

RECALLING resolution 1884 (XVIII), calling upon States to refrain from placing in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction or from installing such weapons on celestial bodies, which was adopted unanimously by the United Nations General Assembly on 17 October 1963,

TAKING account of United Nations General Assembly resolution 110 (II) of 3 November 1947, which condemned propaganda designed or likely to provoke or encourage any threat to the peace, breach of the peace or act of aggression, and considering that the aforementioned resolution is applicable to outer space,

CONVINCED that a Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, will further the Purposes and Principles of the Charter of the United Nations,

HAVE AGREED ON THE FOLLOWING:

Article I

The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind.

Outer space, including the moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies.

There shall be freedom of scientific investigation in outer space, including the moon and other celestial bodies, and States shall facilitate and encourage international co-operation in such investigation.

Article II

Outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.

Article III

States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international co-operation and understanding.

Article IV

States Parties to the Treaty undertake not to place in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, instal such weapons on celestial bodies, or station such weapons in outer space in any other manner.

The moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration of the moon and other celestial bodies shall also not be prohibited.

Article V

States Parties to the Treaty shall regard astronauts as envoys of mankind in outer space and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of another State Party or on the high seas. When astronauts make such a landing, they shall be safely and promptly returned to the State of registry of their space vehicle.

In carrying on activities in outer space and on celestial bodies, the astronauts of one State Party shall render all possible assistance to the astronauts of other States Parties.

States Parties to the Treaty shall immediately inform the other States Parties to the Treaty or the Secretary-General of the United Nations of any phenomena they discover in outer space, including the moon and other celestial bodies, which could constitute a danger to the life or health of astronauts.

Article VI

States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space, including the moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization.

Article VII

Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the moon and other celestial bodies.

Article VIII

A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body. Ownership of objects launched into outer space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or by their return to the Earth. Such objects or component parts found beyond the limits of the State Party of the Treaty on whose registry they are carried shall be returned to that State Party, which shall, upon request, furnish identifying data prior to their return.

Article IX

In the exploration and use of outer space, including the moon and other celestial bodies, States Parties to the Treaty shall be guided by the principle of co-operation and mutual assistance and shall conduct all their activities in outer space, including the moon and other celestial bodies, with due regard to the corresponding interests of all other States Parties to the Treaty. States Parties to the Treaty shall pursue studies of outer space, including the moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter and, where necessary, shall adopt appropriate measures for this purpose. If a State Party to the Treaty has reason to believe that an activity or experiment planned by it or its nationals in outer space, including the moon and other celestial bodies, would cause potentially harmful interference with activities of other States Parties in the peaceful exploration and use of outer space, including the moon and other celestial bodies, it shall undertake appropriate international consultations before proceeding with any such activity or experiment. A State Party to the Treaty which has reason to believe that an activity or experiment planned by another State Party in outer space, including the moon and other celestial bodies, would cause potentially harmful interference with activities in the peaceful exploration and use of outer space, including the moon and other celestial bodies, may request consultation concerning the activity or experiment.

Article X

In order to promote international co-operation in the exploration and use of outer space, including the moon and other celestial bodies, in conformity with the purposes of this Treaty, the States Parties to the Treaty shall consider on a basis of equality any requests by other States Parties to the Treaty to be afforded an opportunity to observe the flight of space objects launched by those States.

The nature of such an opportunity for observation and the conditions under which it could be afforded shall be determined by agreement between the States concerned.

Article XI

In order to promote international co-operation in the peaceful exploration and use of outer space, States Parties to the Treaty conducting activities in outer space, including the moon and other celestial bodies, agree to inform the Secretary-General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of the nature, conduct, locations and results of such activities. On receiving the said information, the Secretary-General of the United Nations should be prepared to disseminate it immediately and effectively.

Article XII

All stations, installations, equipment and space vehicles on the moon and other celestial bodies shall be open to representatives of other States Parties to the Treaty on a basis of reciprocity. Such representatives shall give reasonable advance notice of a projected visit, in order that appropriate consultations may be held and that maximum precautions may be taken to assure safety and to avoid interference with normal operations in the facility to be visited.

Article XIII

The provisions of this Treaty shall apply to the activities of States Parties to the Treaty in the exploration and use of outer space, including the moon and other celestial bodies, whether such activities are carried on by a single State Party to the Treaty or jointly with other States, including cases where they are carried on within the framework of international inter-governmental organizations.

Any practical questions arising in connexion with activities carried on by international inter-governmental organizations in the exploration and use of outer space, including the moon and other celestial bodies, shall be resolved by the States Parties to the Treaty either with the appropriate international organization or with one or more States members of that international organization, which are Parties to this Treaty.

Article XIV

This Treaty shall be open to all States for signature. Any State which does not sign this Treaty before its entry into force in accordance with paragraph 3 of this Article may accede to it at any time.

This Treaty shall be subject to ratification by signatory States. Instruments of ratification and instruments of accession shall be deposited with the Governments of the United Kingdom of Great Britain and Northern Ireland, the Union of Soviet Socialist Republics and the United States of America, which are hereby designated the Depositary Governments.

This Treaty shall enter into force upon the deposit of instruments of ratification by five Governments including the Governments designated as Depositary Governments under this Treaty.

For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Treaty, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

The Depositary Governments shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification of and accession to this Treaty, the date of its entry into force and other notices.

This Treaty shall be registered by the Depositary Governments pursuant to Article 102 of the Charter of the United Nations.

Article XV

Any State Party to the Treaty may propose amendments to this Treaty. Amendments shall enter into force for each State Party to the Treaty accepting the amendments upon their acceptance by a majority of the States Parties to the Treaty and thereafter for each remaining State Party to the Treaty on the date of acceptance by it.

Article XVI

Any State Party to the Treaty may give notice of its withdrawal from the Treaty one year after its entry into force by written notification to the Depositary Governments. Such withdrawal shall take effect one year from the date of receipt of this notification.

Article XVII

This Treaty, of which the English, Russian, French, Spanish and Chinese texts are equally authentic, shall be deposited in the archives of the Depositary Governments. Duly certified copies of this Treaty shall be transmitted by the Depositary Governments to the Governments of the signatory and acceding States.

IN WITNESS WHEREOF the undersigned, duly authorised, have signed this Treaty.

DONE in triplicate, at the cities of London, Moscow and Washington, the twenty-seventh day of January, one thousand nine hundred and sixty-seven.

Appendix B

Agreement on the Rescue of Astronauts and the Return of Objects Launched into Outer Space

The "Rescue Agreement"
Opened for signature at Washington, London and Moscow on April 22, 1968

THE CONTRACTING PARTIES,

NOTING the great importance of theTreaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, which calls for the rendering of all possible assistance to astronauts in the event of accident, distress or emergency landing, the prompt and safe return of astronauts, and the return of objects launched into outer space,

DESIRING to develop and give further concrete expression to these duties,

WISHING to promote international co-operation in the peaceful exploration and use of outer space,

PROMPTED by sentiments of humanity,

HAVE AGREED ON THE FOLLOWING:

Article 1

Each Contracting Party which receives information or discovers that the personnel of a spacecraft have suffered accident or are experiencing conditions of distress or have made an emergency or unintended landing in territory under its jurisdiction or on the high seas or in any other place not under the jurisdiction of any State shall immediately:

notify the launching authority or, if it cannot identify and immediately communicate with the launching authority, immediately make a public announcement by all appropriate means of communication at its disposal;

notify the Secretary-General of the United Nations,who should disseminate the information without delay by all appropriate means of communication at his disposal.

Article 2

If, owing to accident, distress, emergency or unintended landing, the personnel of a spacecraft land in territory under the jurisdiction of a Contracting Party, it shall immediately take all possible steps to rescue them and render them all necessary assistance. It shall inform the launching authority and also the Secretary-General of the United Nations of the steps it is taking and of their progress. If assistance by the launching authority would help to effect a prompt rescue or would contribute substantially to the effectiveness of search and rescue operations, the launching authority shall co-operate with the Contracting Party with a view to the effective conduct of search and rescue operations. Such operations shall be subject to the direction and control of the

Contracting Party, which shall act in close and continuing consultation with the launching authority.

Article 3

If information is received or it is discovered that the personnel of a spacecraft have alighted on the high seas or in any other place not under the jurisdiction of any State, those Contracting Parties which are in a position to do so shall, if necessary, extend assistance in search and rescue operations for such personnel to assure their speedy rescue. They shall inform the launching authority and the Secretary-General of the United Nations of the steps they are taking and of their progress.

Article 4

If, owing to accident, distress, emergency or unintended landing, the personnel of a spacecraft land in territory under the jurisdiction of a Contracting Party or have been found on the high seas or in any other place not under the jurisdiction of any State, they shall be safely and promptly returned to representatives of the launching authority.

Article 5

Each Contracting Party which receives information or discovers that a space object or its component parts has returned to Earth in territory under its jurisdiction or on the high seas or in any other place not under the jurisdiction of any State, shall notify the launching authority and the Secretary-General of the United Nations.

Each Contracting Party having jurisdiction over the territory on which a space object or its component parts has been discovered shall, upon the request of the launching authority and with assistance from that authority if requested, take such steps as it finds practicable to recover the object or component parts.

Upon request of the launching authority, objects launched into outer space or their component parts found beyond the territorial limits of the launching authority shall be returned to or held at the disposal of representatives of the launching authority, which shall, upon request, furnish identifying data prior to their return.

Notwithstanding paragraphs 2 and 3 of this Article, a Contracting Party which has reason to believe that a space object or its component parts discovered in territory under its jurisdiction, or recovered by it elsewhere, is of a hazardous or deleterious nature may so notify the launching authority, which shall immediately take effective steps, under the direction and control of the said Contracting party, to eliminate possible danger of harm.

Expenses incurred in fulfilling obligations to recover and return a space object or its component parts under paragraphs 2 and 3 of this Article shall be borne by the launching authority.

Article 6

For the purposes of this Agreement, the term "launching authority" shall refer to the State responsible for launching, or, where an international intergovernmental organization is responsible for launching, that organiz ation, provided that that organization declares its acceptance of the rights and obligations provided for in this Agreement and a majority of the States members of that organization are Contracting Parties to this Agreement and to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies.

Article 7

This Agreement shall be open to all States for signature. Any State which does not sign this Agreement before its entry into force in accordance with paragraph 3 of this Article may accede to it at any time.

This Agreement shall be subject to ratification by signatory States. Instruments of ratification and instruments of accession shall be deposited with the Governments of the United Kingdom of Great Britain and Northern Ireland, the Union of Soviet Socialist Republics and the United States of America, which are hereby designated the Depositary Governments.

This Agreement shall enter into force upon the deposit of instruments of ratification by five Governments including the Governments designated as Depositary Governments under this Agreement.

For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Agreement, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

The Depositary Governments shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification of and accession to this Agreement, the date of its entry into force and other notices.

This Agreement shall be registered by the Depositary Governments pursuant to Article 102 of the Charter of the United Nations.

Article 8

Any State Party to the Agreement may propose amendments to this Agreement. Amendments shall enter into force for each State Party to the Agreement accepting the amendments upon their acceptance by a majority of the States Parties to the Agreement and thereafter for each remaining State Party to the Agreement on the date of acceptance by it.

Article 9

Any State Party to the Agreement may give notice of its withdrawal from the Agreement one year after its entry into force by written notification to the Depositary Governments. Such withdrawal shall take effect one year from the date of receipt of this notification.

Article 10

This Agreement, of which the English, Russian, French, Spanish and Chinese texts are equally authentic, shall be deposited in the archives of the Depositary Governments. Duly certified copies of this Agreement shall be transmitted by the Depositary Governments to the Governments of the signatory and acceding States.

IN WITNESS WHEREOF the undersigned, duly authorised, havesigned this Agreement.

DONE in triplicate, at the cities of London, Moscow and Washington, the twenty-second day of April, one thousand nine hundred and sixty-eight.

Appendix C

Convention on International Liability for Damage Caused by Space Objects

The "Liability Convention"
Opened for signature at London, Moscow, and Washington on March 29, 1972

The States Parties to this Convention,

RECOGNISING the common interest of all mankind in furthering the exploration and use of outer space for peaceful purposes,

RECALLING the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies,

TAKING into consideration that, notwithstanding the precautionary measures to be taken by States and international intergovernmental organisations involved in the launching of space objects, damage may on occasion be caused by such objects,

RECOGNIZING the need to elaborate effective international rules and procedures concerning liability for damage caused by space objects and to ensure, in particular, the prompt payment under the terms of this Convention of a full and equitable measure of compensation to victims of such damage,

BELIEVING that the establishment of such rules and procedures will contribute to the strengthening of international co-operation in the field of the exploration and use of outer space for peaceful purposes,

HAVE AGREED ON THE FOLLOWING:

Article I

For the purposes of this Convention:

The term "damage" means loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organisations;

The term "launching" includes attempted launching;

The term "launching State" means:

a state which launches or procures the launching of a space object;

a State from whose territory or facility a space object is launched;

The term "space object" includes component parts of a space object as well as its launch vehicle and parts thereof.

Article II

A launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the earth or to aircraft in flight.

Article III

In the event of damage being caused elsewhere than on the surface of the earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the latter shall be liable only if the damage is due to its fault or the fault of persons for whom it is responsible.

Article IV

In the event of damage being caused elsewhere than on the surface of the earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, and of damage thereby being caused to a third State or to its natural or juridical persons, the first two States shall be jointly and severally liable to the third State, to the extent indicated by the following:

If the damage has been caused to the third State on the surface of the earth or to aircraft in flight, their liability to the third State shall be absolute;

If the damage has been caused to a space object of the third State or to persons or property on board that space object elsewhere than on the surface of the earth, their liability to the third State shall be based on the fault of either of the first two States or on the fault of persons for whom either is responsible.

In all cases of joint and several liability referred to in paragraph 1 of this Article, the burden of compensation for the damage shall be apportioned between the first two States in accordance with the extent to which they were at fault; if the extent of the fault of each of these States cannot be established, the burden of compensation shall be apportioned equally between them. Such apportionment shall be without prejudice to the right of the third State to seek the entire compensation due under this Convention from any or all of the launching States which are jointly and severally liable.

Article V

Whenever two or more States jointly launch a space object, they shall be jointly and severally liable for any damage caused.

A launching State which has paid compensation for damage shall have the right to present a claim for indemnification to other participants in the joint launching. The participants in a joint launching may conclude agreements regarding the apportioning among themselves of the financial obligation in respect of which they are jointly and severally liable. Such agreements shall be without prejudice to the right of a State sustaining damage to seek the entire compensation due under this Convention from any or all of the launching States which are jointly and severally liable.

A State from whose territory or facility a space object is launched shall be regarded as a participant in a joint launching.

Article VI

Subject to the provisions of paragraph 2 of this Article, exoneration from absolute liability shall be granted to the extent that a launching State establishes that the damage has resulted either wholly or partially from gross negligence or from an act or omission done with intent to cause damage on the part of a claimant State or of natural or juridical persons it represents.

No exoneration whatever shall be granted in cases where the damage has resulted from activities conducted by a launching State which are not in conformity with international law including, in particular, the Charter of the United Nations and the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer space, including the Moon and Other Celestial Bodies.

Article VII

The provisions of this Convention shall not apply to damage caused by a space object of a launching State to:

nationals of that launching State;

foreign nationals during such time as they are participating in the operation of that space object from the time of its launching or at any stage thereafter until its descent, or during such time as they are in the immediate vicinity of a planned launching or recovery area as the result of an invitation by that launching State.

Article VIII

A State which suffers damage, or whose natural or juridical persons suffer damage, may present to a launching State a claim for compensation for such damage.

If the State of nationality has not presented a claim, another State may, in respect of damage sustained in its territory by any natural or juridical person, present a claim to a launching State.

If neither the State of nationality nor the State in whose territory the damage was sustained has presented a claim or notified its intention of presenting a claim, another State may, in respect of damage sustained by its permanent residents, present a claim to a launching State.

Article IX

A claim for compensation for damage shall be presented to a launching State through diplomatic channels. If a State does not maintain diplomatic relations with the launching State concerned, it may request another State to present its claim to that launching State or otherwise represent its interests under this Convention. It may also present its claim through the Secretary-General of the United Nations, provided the claimant State and the launching State are both Members of the United Nations.

Article X

A claim for compensation for damage may be presented to a launching State not later than one year following the date of the occurrence of the damage or the identification of the launching State which is liable.

If, however, a State does not know of the occurrence of the damage or has not been able to identify the launching State which is liable, it may present a claim within one year following the date on which it learned of the aforementioned facts; however, this period shall in no event exceed one year following the date on which the State could reasonably be expected to have learned of the facts through the exercise of due diligence.

The time-limits specified in paragraphs 1 and 2 of this Article shall apply even if the full extent of the damage may not be known. In this event, however, the claimant State shall be entitled to revise the claim and submit additional documentation after the expiration of such time-limits until one year after the full extent of the damage is known.

Article XI

Presentation of a claim to a launching State for compensation for damage under this Convention shall not require the prior exhaustion of any local remedies which may be available to a claimant State or to natural or juridical persons it represents.

Nothing in this Convention shall prevent a State, or natural or juridical persons it might represent, from pursuing a claim in the courts or administrative tribunals or agencies of a launching State. A State shall not, however, be entitled to present a claim under this Convention in respect of the same damage for which a claim is being pursued in the courts or administrative tribunals or agencies of a launching State or under another international agreement which is binding on the States concerned.

Article XII

The compensation which the launching State shall be liable to pay for damage under this Convention shall be determined in accordance with international law and the principles of justice and equity, in order to provide such reparation in respect of the damage as will restore the person, natural or juridical, State or international organisation on whose behalf the claim is presented to the condition which would have existed if the damage had not occurred.

Article XIII

Unless the claimant State and the State from which compensation is due under this Convention agree on another form of compensation, the compensation shall be paid in the currency of the claimant State or, if that State so requests, in the currency of the State from which compensation is due.

Article XIV

If no settlement of a claim is arrived at through diplomatic negotiations as provided for in Article IX, within one year from the date on which the claimant State notifies the launching State that it has submitted the documentation of its claim, the parties concerned shall establish a Claims Commission at the request of either party.

Article XV

The Claims Commission shall be composed of three members: one appointed by the claimant State, one appointed by the launching State and the third member, the Chairman, to be chosen by both parties jointly. Each party shall make its appointment within two months of the request for the establishment of the Claims Commission.

If no agreement is reached on the choice of the Chairman within four months of the request for the establishment of the Commission, either party may request the Secretary-

General of the United Nations to appoint the Chairman within a further period of two months.

Article XVI

If one of the parties does not make its appointment within the stipulated period, the Chairman shall, at the request of the other party, constitute a single-member Claims Commission.

Any vacancy which may arise in the Commission for whatever reason shall be filled by the same procedure adopted for the original appointment.

The Commission shall determine its own procedure.

The Commission shall determine the place or places where it shall sit and all other administrative matters.

Except in the case of decisions and awards by a single-member Commission, all decisions and awards of the Commission shall be by majority vote.

Article XVII

No increase in the membership of the Claims Commission shall take place by reason of two or more claimant States or launching States being joined in any one proceeding before the Commission. The claimant States so joined shall collectively appoint one member of the Commission in the same manner and subject to the same conditions as would be the case for a single claimant State. When two or more launching States are so joined, they shall collectively appoint one member of the Commission in the same way. If the claimant States or the launching States do not make the appointment within the stipulated period, the Chairman shall constitute a single-member Commission.

Article XVIII

The Claims Commission shall decide the merits of the claim for compensation and determine the amount of compensation payable, if any.

Article XIX

The Claims Commission shall act in accordance with the provisions of Article XII.

The decision of the Commission shall be final and binding if the parties have so agreed; otherwise the Commission shall render a final and recommendatory award, which the parties shall consider in good faith. The Commission shall state the reasons for its decision or award.

The Commission shall give its decision or award as promptly as possible and no later than one year from the date of its establishment, unless an extension of this period is found necessary by the Commission.

The Commission shall make its decision or award public. It shall deliver a certified copy of its decision or award to each of the parties and to the Secretary-General of the United Nations.

Article XX

The expenses in regard to the Claims Commission shall be borne equally by the parties, unless otherwise decided by the Commission.

Article XXI

If the damage caused by a space object presents a large-scale danger to human life or seriously interferes with the living conditions of the population or the functioning of vital centres, the States Parties, and in particular the launching State, shall examine the possibility of rendering appropriate and rapid assistance to the State which has suffered the damage, when it so requests. However, nothing in this Article shall affect the rights or obligations of the States Parties under this Convention.

Article XXII

In this Convention, with the exception of Article XXIV to XXVII, references to States shall be deemed to apply to any international intergovernmental organisation which conducts space activities if the organisation declares its acceptance of the rights and obligations provided for in this Convention and if a majority of the States members of the organisation are States Parties to this Convention and to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies.

States members of any such organisation which are States Parties to this Convention shall take all appropriate steps to ensure that the organisation makes a declaration in accordance with the preceding paragraph.

If an international intergovernmental organisation is liable for damage by virtue of the provisions of this Convention, that organisation and those of its members which are States Parties to this Convention shall be jointly and severally liable; provided, however, that:

any claim for compensation in respect of such damage shall be first presented to the organisation;

only where the organisation has not paid, within a period of six months, any sum agreed or determined to be due as compensation for such damage, may the claimant State invoke the liability of the members which are States Parties to this Convention for the payment of that sum.

Any claim, pursuant to the provisions of this Convention, for compensation in respect of damage caused to an organisation which has made a declaration in accordance with paragraph 1 of this Article shall be presented by a State member of the organisation which is a State Party to this Convention.

Article XXIII

The provisions of this Convention shall not affect other international agreements in force in so far as relations between the States Parties to such agreements are concerned.

No provision of this Convention shall prevent States from concluding international agreements reaffirming, supplementing or extending its provisions.

Article XXIV

This Convention shall be open to all States for signature. Any State which does not sign this Convention before its entry into force in accordance with paragraph 3 of this Article may accede to it at any time.

This Convention shall be subject to ratification by signatory States. Instruments of ratification and instruments of accession shall be deposited with the Governments of the United Kingdom of Great Britain and Northern Ireland, the Union of Soviet Socialist Republics and the United States of America, which are hereby designated the Depositary Governments.

This Convention shall enter into force on the deposit of the fifth instrument of ratification.

For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Convention, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

The Depositary Governments shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification of and accession to this Convention, the date of its entry into force and other notices.

This Convention shall be registered by the Depositary Governments pursuant to Article 102 of the Charter of the United Nations.

Article XXV

Any State Party to this Convention may propose amendments to this Convention. Amendments shall enter into force for each State Party to the Convention accepting the amendments upon their acceptance by a majority of the States Parties to the Convention and thereafter for each remaining State Party on the date of acceptance by it.

Article XXVI

Ten years after the entry into force of this Convention, the question of the review of this Convention shall be included in the provisional agenda of the United Nations General Assembly in order to consider, in the light of past application of the Convention, whether it requires revision. However, at any time after the Convention has been in force for five years, and at the request of one third of the States Parties to the Convention, and with the concurrence of the majority of the States Parties, a conference of the States Parties shall be convened to review this Convention.

Article XXVII

Any State Party to this Convention may give notice of its withdrawal from the Convention one year after its entry into force by written notification to the Depositary Governments. Such withdrawal shall take effect one year from the date of receipt of this notification.

Article XXVIII

This Convention, of which the English, Russian, French, Spanish and Chinese texts are equally authentic, shall be deposited in the archives of the Depositary Governments. Duly certified copies of this Convention shall be transmitted by the Depositary Governments to the Governments of the signatory and acceding States.

Appendix D

1974 Convention on Registration of Objects Launched Into Outer Space

The "Registration Convention"
Adopted by the General Assembly of the United Nations, at New York, on November 12, 1974

THE STATES PARTIES TO THIS CONVENTION,

RECOGNIZING the common interest of all mankind in furthering the exploration and use of outer space for peaceful purposes,

RECALLING that the Treaty on principles governing the activities of States in the exploration and use of outer space, including the moon and other celestial bodies, of 27 January 1967 affirms that States shall bear international responsibility for their national activities in outer space and refers to the State on whose registry an object launched into outer space is carried,

RECALLING also that the Agreement on the rescue of astronauts, the return of astronauts and the return of objects launched into outer space of 22 April 1968 provides that a launching authority shall, upon request, furnish identifying data prior to the return of an object it has launched into outer space found beyond the territorial limits of the launching authority,

RECALLING further that the Convention on international liability for damage caused by space objects of 29 March 1972 establishes international rules and procedures concerning the liability of launching States for damage caused by their space objects,

DESIRING, in the light of the Treaty on principles governing the activities of States in the exploration and use of outer space, including the moon and other celestial bodies, to make provision for the national registration by launching States of space objects launched into outer space,

DESIRING further that a central register of objects launched into outer space be established and maintained, on a mandatory basis, by the Secretary-General of the United Nations,

DESIRING also to provide for States Parties additional means and procedures to assist in the identification of space objects,

BELIEVING that a mandatory system of registering objects launched into outer space would, in particular, assist in their identification and would contribute to the application and development of international law governing the exploration and use of outer space,

HAVE AGREED ON THE FOLLOWING:

Article I

For the purposes of this Convention:

The term "launching State" means:

a State which launches or procures the launching of a space object;

a State from whose territory or facility a space object is launched;

The term "space object" includes component parts of a space object as well as its launch vehicle and parts thereof;

The term "State of registry" means a launching State on whose registry a space object is carried in accordance with article II.

Article II

When a space object is launched into earth orbit or beyond, the launching State shall register the space object by means of an entry in an appropriate registry which it shall maintain. Each launching State shall inform the Secretary-General of the United Nations of the establishment of such a registry.

Where there are two or more launching States in respect of any such space object, they shall jointly determine which one of them shall register the object in accordance with paragraph 1 of this article, bearing in mind the provisions of article VIII of the Treaty on principles governing the activities of States in the exploration and use of outer space, including the moon and other celestial bodies, and without prejudice to appropriate agreements concluded or to be concluded among the launching States on jurisdiction and control over the space object and over any personnel thereof.

The contents of each registry and the conditions under which it is maintained shall be determined by the State of registry concerned.

Article III

The Secretary-General of the United Nations shall maintain a Register in which the information furnished in accordance with article IV shall be recorded.

There shall be full and open access to the information in this Register.

Article IV

Each State of registry shall furnish to the Secretary-General of the United Nations, as soon as practicable, the following information concerning each space object carried on its registry:

name of launching State or States;

an appropriate designator of the space object or its registration number;

date and territory or location of launch;

basic orbital parameters, including:

nodal period,

inclination,

apogee,

perigee;

general function of the space object.

Each State of registry may, from time to time, provide the Secretary-General of the United Nations with additional information concerning a space object carried on its registry.

Each State of registry shall notify the Secretary-General of the United Nations, to the greatest extent feasible and as soon as practicable, of space objects concerning which it has previously transmitted information, and which have been but no longer are in earth orbit.

Article V

Whenever a space object launched into earth orbit or beyond is marked with the designator or registration number referred to in article IV, paragraph 1 (b), or both, the State of registry shall notify the Secretary-General of this fact when submitting the information regarding the space object in accordance with article IV. In such case, the Secretary-General of the United Nations shall record this notification in the Register.

Article VI

Where the application of the provisions of this Convention has not enabled a State Party to identify a space object which has caused damage to it or to any of its natural or juridical persons, or which may be of a hazardous or deleterious nature, other States Parties, including in particular States possessing space monitoring and tracking facilities, shall respond to the greatest extent feasible to a request by that State Party, or transmitted through the Secretary-General on its behalf, for assistance under equitable and reasonable conditions in the identification of the object. A State Party making such a request shall, to the greatest extent feasible, submit information as to the time, nature and circumstances of the events giving rise to the request. Arrangements under which such assistance shall be rendered shall be the subject of agreement between the parties concerned.

Article VII

In this Convention, with the exception of articles VIII to XII inclusive, references to States shall be deemed to apply to any international intergovernmental organization which conducts space activities if the organization declares its acceptance of the rights and obligations provided for in this Convention and if a majority of the States members of the organization are States Parties to this Convention and to the Treaty on principles governing the activities of States in the exploration and use of outer space, including the moon and other celestial bodies.

States members of any such organization which are States Parties to this Convention shall take all appropriate steps to ensure that the organization makes a declaration in accordance with paragraph 1 of this article.

Article VIII

This Convention shall be open for signature by all States at United Nations Headquarters in New York. Any State which does not sign this Convention before its entry into force in accordance with paragraph 3 of this article may accede to it at any time.

This Convention shall be subject to ratification by signatory States. Instruments of ratification and instruments of accession shall be deposited with the Secretary-General of the United Nations.

This Convention shall enter into force among the States which have deposited instruments of ratification on the deposit of the fifth such instrument with the Secretary-General of the United Nations.

For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Convention, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

The Secretary-General shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification of and accession to this Convention, the date of its entry into force and other notices.

Article IX

Any State Party to this Convention may propose amendments to the Convention. Amendments shall enter into force for each State Party to the Convention accepting the amendments upon their acceptance by a majority of the States Parties to the Convention and thereafter for each remaining State Party to the Convention on the date of acceptance by it.

Article X

Ten years after the entry into force of this Convention, the question of the review of the Convention shall be included in the provisional agenda of the United Nations General Assembly in order to consider, in the light of past application of the Convention, whether it requires revision. However, at any time after the Convention has been in force for five years, at the request of one third of the States Parties to the Convention and with the concurrence of the majority of the States Parties, a conference of the States Parties shall be convened to review this Convention. Such review shall take into account in particular any relevant technological developments, including those relating to the identification of space objects.

Article XI

Any State Party to this Convention may give notice of its withdrawal from the Convention one year after its entry into force by written notification to the Secretary-General of the United Nations. Such withdrawal shall take effect one year from the date of receipt of this notification.

Article XII

The original of this Convention, of which the Arabic, Chinese, English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Secretary-General of the United Nations, who shall send certified copies thereof to all signatory and acceding States.

IN WITNESS WHEREOF the undersigned, being duly authorized thereto by their respective Governments, have signed this Convention, opened for signature at New York on the fourteenth day of January one thousand nine hundred and seventy-five.

Appendix E

Agreement Governing the Activities of States on the Moon and Other Celestial Bodies

The "Moon Treaty"
Opened for signature at New York on 18 December 1979

THE STATES PARTIES TO THIS CONVENTION,

NOTING the achievements of States in the exploration and use of the moon and other celestial bodies,

RECOGNIZING that the moon, as a natural satellite of the earth, has an important role to play in the exploration of outer space,

DETERMINED to promote on the basis of equality the further development of co-operation among States in the exploration and use of the moon and other celestial bodies,

DESIRING to prevent the moon from becoming an area of international conflict,

BEARING in mind the benefits which may be derived from the exploitation of the natural resources of the moon and other celestial bodies,

RECALLING the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, the Convention on International Liability for Damage Caused by Space Objects, and the Convention on Registration of Objects Launched into Outer Space,

TAKING INTO ACCOUNT the need to define and develop the provisions of these international instruments in relation to the moon and other celestial bodies, having regard to further progress in the exploration and use of outer space,

HAVE AGREED ON THE FOLLOWING:

Article 1

The provisions of this Agreement relating to the moon shall also apply to other celestial bodies within the solar system, other than the earth, except in so far as specific legal norms enter into force with respect to any of these celestial bodies.

For the purposes of this Agreement reference to the moon shall include orbits around or other trajectories to or around it.

This Agreement does not apply to extraterrestrial materials which reach the surface of the earth by natural means.

Article 2

All activities on the moon, including its exploration and use, shall be carried out in accordance with international law, in particular the Charter of the United Nations, and taking into account the Declaration on Principles of International Law concerning Friendly Relations and Co-operation among States in accordance with the Charter of the United Nations, adopted by the General Assembly on 24 October 1970, in the interest of maintaining international peace and security and promoting international co-operation and mutual understanding, and with due regard to the corresponding interests of all other States Parties.

Article 3

The moon shall be used by all States Parties exclusively for peaceful purposes.

Any threat or use of force or any other hostile act or threat of hostile act on the moon is prohibited. It is likewise prohibited to use the moon in order to commit any such act or to engage in any such threat in relation to the earth, the moon, spacecraft, the personnel of spacecraft or man-made space objects.

States Parties shall not place in orbit around or other trajectory to or around the moon objects carrying nuclear weapons or any other kinds of weapons of mass destruction or place or use such weapons on or in the moon.

The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on the moon shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration and use of the moon shall also not be prohibited.

Article 4

The exploration and use of the moon shall be the province of all mankind and shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development. Due regard shall be paid to interests of present and future generations as well as to the need to promote higher standards of living conditions of economic and social progress and development in accordance with the Charter of the United Nations.

States Parties shall be guided by the principle of co-operation and mutual assistance in all their activities concerning the exploration and use of the moon. International co-operation in pursuance of this Agreement should be as wide as possible and may take place on a multilateral basis, on a bilateral basis or through international intergovernmental organizations.

Article 5

States Parties shall inform the Secretary-General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of their activities concerned with the exploration and use of the moon. Information on the time, purposes, locations, orbital parameters and duration shall be given in respect of each mission to the moon as soon as possible after launching, while information on the results of each mission, including scientific results, shall be furnished upon completion of the mission. In the case of a mission lasting more than sixty days, information on conduct of the mission including any scientific results, shall be given periodically, at thirty-day intervals. For missions lasting more than six months, only significant additions to such information need be reported thereafter.

If a State Party becomes aware that another State Party plans to operate simultaneously in the same area of or in the same orbit around or trajectory to or around the moon, it shall promptly inform the other State of the timing of and plans for its own operations.

In carrying out activities under this Agreement, States Parties shall promptly inform the Secretary-General, as well as the public and the international scientific community, of any phenomena they discover in outer space, including the moon, which could endanger human life or health, as well as of any indication of organic life.

Article 6

There shall be freedom of scientific investigation on the moon by all States Parties without discrimination of any kind, on the basis of equality and in accordance with international law.

In carrying out scientific investigations and in furtherance of the provisions of this Agreement, the States Parties shall have the right to collect on and remove from the moon samples of its mineral and other substances. Such samples shall remain at the disposal of those States Parties which caused them to be collected and may be used by them for scientific purposes. States Parties shall have regard to the desirability of making a portion of such samples available to other interested States Parties and the international scientific community for scientific investigation. States Parties may in the course of scientific investigations also use mineral and other substances of the moon in quantities appropriate for the support of their missions.

States Parties agree on the desirability of exchanging scientific and other personnel on expeditions to or installations on the moon to the greatest extent feasible and practicable.

Article 7

In exploring and using the moon, States Parties shall take measures to prevent the disruption of the existing balance of its environment, whether by introducing adverse changes in that environment, by its harmful contamination through the introduction of extra-environmental matter or otherwise. States Parties shall also take measures to avoid harmfully affecting the environment of the earth through the introduction of extraterrestrial matter or otherwise.

States Parties shall inform the Secretary-General of the United Nations of the measures being adopted by them in accordance with paragraph 1 of this article and shall also, to the maximum extent feasible, notify him in advance of all placements by them of radio-active materials on the moon and of the purposes of such placements.

States Parties shall report to other States Parties and to the Secretary-General concerning areas of the moon having special scientific interest in order that, without prejudice to the rights of other States Parties, consideration may be given to the designation of such areas as international scientific preserves for which special protective arrangements are to be agreed upon in consultation with the competent bodies of the United Nations.

Article 8

States Parties may pursue their activities in the exploration and use of the moon anywhere on or below its surface, subject to the provisions of this Agreement.

For these purposes States Parties may, in particular:

Land their space objects on the moon and launch them from the moon;

Place their personnel, space vehicles, equipment, facilities, stations and installations anywhere on or below the surface of the moon.

Personnel, space vehicles, equipment, facilities, stations and installations may move or be moved freely over or below the surface of the moon.

Activities of States Parties in accordance with paragraphs 1 and 2 of this article shall not interfere with the activities of other States Parties on the moon. Where such interference may occur, the States Parties concerned shall undertake consultations in accordance with article 15, paragraphs 2 and 3, of this Agreement.

Article 9

States Parties may establish manned and unmanned stations on the moon. A State Party establishing a station shall use only that area which is required for the needs of the station and shall immediately inform the Secretary-General of the United Nations of the location and purposes of that station. Subsequently, at annual intervals that State shall likewise inform the Secretary-General whether the station continues in use and whether its purposes have changed.

Stations shall be installed in such a manner that they do not impede the free access to all areas of the moon of personnel, vehicles and equipment of other States Parties conducting activities on the moon in accordance with the provisions of this Agreement or of article I of the Treaty of Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies.

Article 10

States Parties shall adopt all practicable measures to safeguard the life and health of persons on the moon. For this purpose they shall regard any person on the moon as an astronaut within the meaning of article V of the Treaty on Principles Governing the Activities of States on the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies and as part of the personnel of a spacecraft within the meaning of the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space.

States Parties shall offer shelter in their stations, installations, vehicles and other facilities to persons in distress on the moon.

Article 11

The moon and its natural resources are the common heritage of mankind, which finds its expression in the provisions of this Agreement, in particular in paragraph 5 of this article.

The moon is not subject to national appropriation by any claim of sovereignty, by means of use or occupation, or by any other means.

Neither the surface nor the subsurface of the moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person. The placement of personnel, space vehicles, equipment, facilities, stations and installations on or below the surface of the moon, including structures connected with its surface or subsurface, shall not create a right of ownership over the surface or the subsurface of the moon or any areas thereof. The foregoing provisions are without prejudice to the international regime referred to in paragraph 5 of this article.

States Parties have the right to exploration and use of the moon without discrimination of any kind, on the basis of equality and in accordance with international law and the provisions of this Agreement.

States Parties to this Agreement hereby undertake to establish an international regime, including appropriate procedures, to govern the exploitation of the natural resources of the moon as such exploitation is about to become feasible. This provision shall be implemented in accordance with article 18 of this Agreement.

In order to facilitate the establishment of the international regime referred to in paragraph 5 of this article, States Parties shall inform the Secretary-General of the United Nations as well as the public and the international scientific community, to the greatest extent feasible and practicable, of any natural resources they may discover on the moon.

The main purposes of the international regime to be established shall include:

The orderly and safe development of the natural resources of the moon;

The rational management of those resources;

The expansion of opportunities in the use of those resources;

An equitable sharing by all States Parties in the benefits derived from those resources, whereby the interests and needs of the developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the moon, shall be given special consideration.

All the activities with respect to the natural resources of the moon shall be carried out in a manner compatible with the purposes specified in paragraph 7 of this article and the provisions of article 6, paragraph 2, of this Agreement.

Article 12

States Parties shall retain jurisdiction and control over their personnel, space vehicles, equipment, facilities, stations and installations on the moon. The ownership of space vehicles, equipment, facilities, stations and installations shall not be affected by their presence on the moon.

Vehicles, installations and equipment or their component parts found in places other than their intended location shall be dealt with in accordance with article 5 of the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space.

In the event of an emergency involving a threat to human life, States Parties may use the equipment, vehicles, installations, facilities or supplies of other States Parties on the moon. Prompt notification of such use shall be made to the Secretary-General of the United Nations or the State Party concerned.

Article 13

A State Party which learns of the crash landing, forced landing or other unintended landing on the moon of a space object, or its component parts, that were not launched by it, shall promptly inform the launching State Party and the Secretary-General of the United Nations.

Article 14

States Parties to this Agreement shall bear international responsibility for national activities on the moon, whether such activities are carried out by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions of this Agreement. States Parties shall ensure that non-governmental entities under their jurisdiction shall engage in activities on the moon only under the authority and continuing supervision of the appropriate State Party.

States Parties recognize that detailed arrangements concerning liability for damage caused on the moon, in addition to the provisions of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies and the Convention on International Liability for Damage Caused by Space Objects, may become necessary as a result of more extensive activities on the moon. Any such arrangements shall be elaborated in accordance with the procedure provided for in article 18 of this Agreement.

Article 15

Each State Party may assure itself that the activities of other States Parties in the exploration and use of the moon are compatible with the provisions of this Agreement. To this end, all space vehicles, equipment, facilities, stations and installations on the moon shall be open to other States Parties. Such States Parties shall give reasonable advance notice of a projected visit, in order that appropriate consultations may be held and that maximum precautions may be taken to assure safety and to avoid interference with normal operations in the facility to be visited. In pursuance of this article, any State Party may act on its own behalf or with the full or partial assistance of any other State Party or through appropriate international procedures within the framework of the United Nations and in accordance with the Charter.

A State Party which has reason to believe that another State Party is not fulfilling the obligations incumbent upon it pursuant to this Agreement or that another State Party is interfering with the rights which the former State Party has under this Agreement may request consultations with that State Party. A State Party receiving such a request shall enter into such consultations without delay. Any other State Party which requests to do so shall be entitled to take part in the consultations. Each State Party participating in such consultations shall seek a mutually acceptable resolution of any controversy and shall bear in mind the rights and interests of all States Parties. The Secretary-General of the United Nations shall be informed of the results of the consultations and shall transmit the information received to all States Parties concerned.

If the consultations do not lead to a mutually acceptable settlement which has due regard for the rights and interests of all the States Parties, the parties concerned shall take all measures to settle the dispute by other peaceful means of their choice and appropriate to the circumstances and the nature of the dispute. If difficulties arise in connexion with the opening of consultations or if consultations do not lead to a mutually acceptable settlement, any State Party may seek the assistance of the Secretary-General, without seeking the consent of any other State Party concerned, in order to resolve the controversy. A State Party which does not maintain diplomatic relations with another State Party concerned shall participate in such consultations, at its choice, either itself or through another State Party or the Secretary-General as intermediary.

Article 16

With the exception of articles 17 to 21, references in this Agreement to States shall be deemed to apply to any international intergovernmental organization which conducts space activities if the organization declares its acceptance of the rights and obligations provided for in this Agreement and if a majority of the States members of the organization are States Parties to this Agreement and to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies. States members of any such organization which are States Parties to this Agreement shall take all appropriate steps to ensure that the organization makes a declaration in accordance with the provisions of this article.

Article 17

Any State Party to this Agreement may propose amendments to the Agreement. Amendments shall enter into force for each State Party to the Agreement accepting the amendments upon their acceptance by a majority of the States Parties to the Agreement and thereafter for each remaining State Party to the Agreement on the date of acceptance by it.

Article 18

Ten years after the entry into force of this Agreement, the question of the review of the Agreement shall be included in the provisional agenda of the General Assembly of the United Nations in order to consider, in the light of past application of the Agreement, whether it requires revision. However, at any time after the Agreement has been in force for five years, the Secretary-General of the United Nations, as depository, shall, at the request of one third of the States Parties to the Agreement and with the concurrence of the majority of the States Parties, convene a conference of the States Parties to review this Agreement. A review conference shall also consider the question of the implementation of the provisions of article 11, paragraph 5, on the basis of the principle referred to in paragraph 1 of that article and taking into account in particular any relevant technological developments.

Article 19

This Agreement shall be open for signature by all States at United Nations Headquarters in New York.

This Agreement shall be subject to ratification by signatory States. Any State which does not sign this Agreement before its entry into force in accordance with paragraph 3 of this article may accede to it at any time. Instruments of ratification or accession shall be deposited with the Secretary-General of the United Nations.

This Agreement shall enter into force on the thirtieth day following the date of deposit of the fifth instrument of ratification.

For each State depositing its instrument of ratification or accession after the entry into force of this Agreement, it shall enter into force on the thirtieth day following the date of deposit of any such instrument.

The Secretary-General shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or accession to this Agreement, the date of its entry into force and other notices.

Article 20

Any State Party to this Agreement may give notice of its withdrawal from the Agreement one year after its entry into force by written notification to the Secretary-General of the United Nations. Such withdrawal shall take effect one year from the date of receipt of this notification.

Article 21

The original of this Agreement, of which the Arabic, Chinese, English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Secretary-General of the United Nations, who shall send certified copies thereof to all signatory and acceding States.

IN WITNESS WHEREOF the undersigned, being duly authorized thereto by their respective Governments, have signed this Agreement, opened for signature at New York on 18 December 1979.

Appendix F

The Bogota Declaration

Announced at the Intergovernmental Conference on Cultural Policies in Latin America and the Caribbean, Bogotá, 20 January 1978

We, the representatives of the Governments of Latin America and the Caribbean, members of UNESCO, meeting in Bogotá from 10 to 20 January 1978 in the Intergovernmental Conference on Cultural Policies in Latin America and the Caribbean, in full agreement with the ideals and aspirations of UNESCO,

Considering

- that culture, as the sum total of the values and creations of a society and the expression of life itself, is essential to life and not a simple means or subsidiary instrument of social activity;
- that true development must be born of the special genius and determination of each people and their creative personalities;
- that, accordingly, development, if it is to be effective and ethically valid, must draw its inspiration from culture and strive to affirm it, in other words, it must include a cultural dimension as one of its essential components;
- that culture, since it embraces every realm of human activity and existence, possesses a universality which concerns mankind as a whole;
- that culture, stemming as it does from the particular temperament and reality of each people, whether collectively or through individual creators, is tied to its roots and must remain faithful to them or lose its authenticity;
- that authenticity of a culture does not conflict with the adoption of positive elements from other cultures;
- that genuine culture thus has a twofold nature, at one and the same time universal and specific, and that it is faithfulness to its roots that gives it its full universality;
- that the richness of a culture and the vitality of its dissemination are founded in its grass-roots authenticity and in the search for and expression of truth, goodness and beauty;
- that the basis for this entire process is none other than human freedom conceived as the inalienable principle of social life and spiritual creation;

Considering further

- that cultural development must take into account two inseparable constituent elements:

(a) the process directed towards an overall betterment of the life of individuals and peoples, which presupposes a political, administrative and economic context, or in other words, a specific framework of potentialities; and

(b) cultural identity, from which it derives and whose furtherance and affirmation it promotes within an overall context;

- that cultural identity, the basis of the life of peoples, stems from the past and is projected towards the future, which implies that it is never static but simultaneously historical and forward-reaching, and thus ever perfecting and renewing itself;
- that the dynamic nature of cultural identity and its integration in overall development imply a continuous adaptation to new objectives and goals;
- that the present circumstances of mankind require a reconciliation of traditional ways with the exigencies of modern life, a harmonious balance between spiritual values and the satisfaction of material necessities, equal freedom and dignity for all men and peoples, the participation of all in cultural enjoyment and creation and in the formulation of relevant policies, the establishment of a new world order that is more just and more humane, the effective political, socio-economic and cultural independence of all states, and repudiation of colonialism, neo-colonialism and imperialism, of violence and of all discrimination, whether for reasons of sex, ideology, politics or religion;
- that because of their free character, cultural creation and development should be preserved from all internal or external coercion and their fullest expansion should be stimulated and supported;
- that from this follows the need for coherence in the promoting action of the State and other public and private entities, and freedom of intellectual, artistic and spiritual expression;
- that cultural policy calls for broad-based, responsible and democratic participation of the mass communication media in the spirit of this Declaration;

Bearing in mind

- that Latin America and the Caribbean constitute a region of multiform culture with homogeneous subregions having some common traits and other diverging ones, as a result of their different historical development and consequently sometimes are characterized by differing requirements for the affirmation of their cultural identity;
- that such pluralism is founded principally on the diversity of cultural, social and ethnic contributions, some of them aboriginal American, others brought in from outside through European colonization (Spanish, Portuguese, English, French and Dutch) as well as African and Asian contributions, plus later waves of immigration from Europe and the Near East;
- that these foreign cultural components have been modified by the environment of the Americas, which has imprinted upon them the seal of our region;
- that the diversity of origin and of cultural and political development in Latin America and the Caribbean has created several different zones corresponding to as many

languages of European extraction, in some of which there also exist a number of indigenous tongues, dialects and other linguistic variations that are in turn the expression of cultures which are themselves multiform;

- that in view of the diversity characteristic of the peoples of Latin America and the Caribbean, it must be recognized that each of them has the right to maintain its own character and to assume responsibility for it, and consequently, a corresponding right to shape its own future;
- that this complex situation must be viewed as the expression of a social and cultural wealth, which makes Latin America and the Caribbean a crossroads of intellectual currents and ethnic contributions from the entire world, and confers upon the region a mission of universality;
- that a strong desire exists in the various subregions to achieve better understanding of one another, mutual spiritual cross-fertilization and a growing cultural integration within a flexible unity which, while respecting the pluralistic nature of Latin America and the Caribbean, will give the region its rightful place in the concert of nations and the future of mankind;
- that much of the information generated about Latin America and the Caribbean often contradicts or damages the most authentic interests of the region and the criteria which define its cultural identity, as well as the efforts being made to achieve technological independence and the full exercise of the sovereignty of the states, owing to political or economic interests;

Proclaim the following principles governing cultural policy in Latin America and the Caribbean:

1. All the cultures of the region possess the same dignity.

2. Every people or group of peoples has both the right and the duty to determine independently its own cultural identity, based on its historical antecedents, its individual values and aspirations, and its sovereign will.

3. Each of the cultural components of Latin America and the Caribbean must be duly and justly esteemed, preserved and developed in accordance with its characteristics and without prejudice or detriment to the others.

4. Cultural authenticity is based on recognition of the components of cultural identity, whatever their geographic origin and however they have mingled.

5. Cultural autonomy is inseparable from the full exercise of sovereignty, territorial integrity and possibilities for broad communication with the world. It is therefore of vital interest to Latin America and the Caribbean that the enclaves and isolation of all kinds that still affect such autonomy in the region should be eliminated.

6. It is the responsibility of the State to promote and support cultural development in accordance with the specific characteristics of each people, and to guarantee freedom of creation.

7. Culture and cultural development are closely linked to communication, education, science and technology and consequently the policies for each should be concerted within the context of integral development.

8. Throughout the region there is a manifest determination to achieve integration which, while respecting the specific qualities of each people, will result in a common destiny for Latin America and the Caribbean.

9. Latin America and the Caribbean, a region that is open to contact with all the cultures of the earth, has a mission to serve mankind and the interests of true universality.

10. Latin America and the Caribbean share the yearning for justice, sovereignty, freedom, well-being and peace for all peoples, both within and beyond its ambit, and maintains fraternal relations with the other regions of the world which, like itself, are on the path to development.

11. In order to ensure the exercise of their sovereignty, the safeguarding of their interests and cultural identity, as well as their technological independence, the countries of Latin America and the Caribbean should strengthen and expand their own systems of communication and information, at both the national and regional levels, and thus contribute to the establishment of an international information order that is more just and more consonant with the aspirations of all peoples of the world.

12. Latin America and the Caribbean respects the cultural identity of all peoples, firmly demands respect for its own, and rejects all forms of cultural domination.