

### **Abstract**

The developing of questions of Outer Space has only been greatly enhanced by the increase of technology and greater involvement by states, private actors and people seeking to use space above the typical uses i.e., satellites. Such an approach has carried on the original views of space delivered by the Apollo programme, which has inspired entrepreneurs, scientists, politicians, and lawyers to challenge and develop hypothetical opinions and business strategy. Nevertheless, outer space is a free for all without jurisdiction. This thesis will consider both the future of space governance and the Committee on Space Research (COSPAR) planetary protection policy.

The uptake of scientific missions through the solar system has formed an enhanced interest as more than ever space exploration is pushing the boundaries are political and legal certainty. The Outer Space Treaty presents a number of fundamental and core elements within space and promotes cooperation through the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS). As such the future of space governance will be considered as to whether the current practice is “fit for purpose”, or whether a new governance regime should be considered for the benefit of space cooperation. Moreover, appropriate discussions around the understanding of astrobiology and how such a road map sets out the need for a planetary protection resource during exploration of space will be examined in detail. COSPARs planetary protection policy will be examined in order to be able to justify whether there is any legal basis for such an implementation or whether the policy remains a recommendation.

**Key words:** Space Law, International Law, Space Governance, Astrobiology, Committee on Space Research (COSPAR), United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), Global Governance, Planetary Protection Policy



## **The Future of The COSPAR Planetary Protection Guidelines: Space Governance and Astrobiology**

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### **Declaration**

This thesis is submitted in partial fulfilment of the requirements of the Open University for a degree of Doctor of Philosophy. The thesis satisfies the Open University's standards of presentation and the QAA doctoral characteristics.

Research undertaken in the faculty of business and law & AstrobiologyOU.

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### **Dedication**

I would like to dedicate part of my interest in Outer Space to Prof. Chris Newman, who from my undergraduate degree until the present day continues to inspire and develop my education and professionalism within higher education. Prof. Simon Lee and Dr Thomas Cheney have challenged my perspectives and understanding of the law. They have provided their time, successes and experience during my thesis which has allowed me to grow and develop throughout my PhD. Dr Susanne Schwenzer has been my sounding wall, my "fixer" and has pushed me to not only think outside of the box, but to develop another "layer" in geological terms. The comfort, support, and cake from AstrobiologyOU has been extra-terrestrial, and these words are simply not enough to convey my thanks and honour at being part of the astrobiology family! Thank you to all of the support received from the OU Law School.

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## **List of Abbreviations**

UNCOPUOS	Committee on the Peaceful Uses of Outer Space
COSPAR	Committee on Space Research
CSA	Canadian Space Agency
EIS	Environmental Impact Statement
ES	The Equality Scheme
ESA	European Space Agency
EU	European Union
GAL	Global Administration Law
IAC	International Astronautical Congress
ICJ	International Courts of Justice
ISS	International Space Station
JAXA	Japan Aerospace Exploration Agency
LEO	Low Earth Orbit
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy
OST	Outer Space Treaty
PP	Planetary Protection
PPIRB	Planetary Protection Independent Review Board
PPP	Panel on Planetary Protection
PPPs	Public Private Partnerships
RLVs	Reusable Launch Vehicles
SSB	Space Studies Board
UK	United Kingdom
ULA	United Launch Alliance
UNOOSA	United Nations Office for Outer Space Affairs
USA	United States of America
VCLT	Vienna Convention on the Law of Treaties
WTO	World Trade Organisation
UNGA	United Nations General Assembly
STSC	Scientific and Technical Subcommittees
GA	General Assembly
ILC	International Law Commission
ITU	International Telecommunications Unions)
CSR	Corporate Social Responsibility
CSAC	COSPAR Scientific Advisory Committee
SSB	The Space Studies Board

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## Points of Reference

Panel on Planetary Protection (PPP)	The Panel on Planetary Protection (PPP) is concerned with biological interchange in the conduct of solar system exploration and use, including: (1) possible effects of contamination of planets other than the Earth, and of planetary satellites within the solar system by terrestrial organisms; and (2) contamination of the Earth by materials returned from outer space carrying potential extraterrestrial organisms. The primary objective of the Panel within COSPAR is to develop, maintain, and promulgate clearly delineated policies that provide specific requirements as to the standards that must be achieved to protect against the harmful effects of such contamination. These policies must be based upon the most current, peer-reviewed scientific knowledge, and should be based upon the principle that COSPAR planetary protection policies should enable the exploration and use of the solar system, not prohibit it. <sup>1</sup>
The United Nations Office for Outer Space Affairs (UNOOSA)	The United Nations Office for Outer Space Affairs (UNOOSA) works to promote international cooperation in the peaceful use and exploration of space, and in the utilisation of space science and technology for sustainable economic and social development. The Office assists any United Nations Member States to establish legal and regulatory frameworks to govern space activities and strengthens the capacity of developing countries to use space science technology and applications for development by helping to integrate space capabilities into national development programmes. <sup>2</sup>

<sup>1</sup> Committee on Space Research (COSPAR) [Committee on Space Research \(COSPAR\) » Panel on Planetary Protection \(PPP\) \(cnes.fr\)](https://www.cnes.fr/en/committees-and-working-groups/committee-on-space-research-cospar) accessed 20/04/23

<sup>2</sup> United Nations Office of Outer Space Affairs (UNOOSA) [About us \(unoosa.org\)](https://www.unoosa.org/) accessed 20/04/23



Committee on the Peaceful Uses of Outer Space (UNCOPUOS)	<p>The Committee on the Peaceful Uses of Outer Space (COPUOS) was set up by the General Assembly in 1959 to govern the exploration and use of space for the benefit of all humanity: for peace, security and development. The Committee was tasked with reviewing international cooperation in peaceful uses of outer space, studying space-related activities that could be undertaken by the United Nations, encouraging space research programmes, and studying legal problems arising from the exploration of outer space.</p> <p>The Committee was instrumental in the creation of the five treaties and five principles of outer space. International cooperation in space exploration and the use of space technology applications to meet global development goals are discussed in the Committee every year. Owing to rapid advances in space technology, the space agenda is constantly evolving. The Committee therefore provides a unique platform at the global level to monitor and discuss these developments.</p> <p>The Committee has two subsidiary bodies: the <a href="#">Scientific and Technical Subcommittee</a>, and the <a href="#">Legal Subcommittee</a>, both established in 1961. The Committee reports to the <a href="#">Fourth Committee of the General Assembly</a>, which adopts an annual resolution on international cooperation in the peaceful uses of outer space.<sup>3</sup></p>
United Nations	<p>The United Nations is an international organization founded in 1945. Currently made up of 193 Member States, the UN and its work are guided by the purposes and principles contained in its founding Charter.<sup>4</sup></p>
International Courts of Justice	<p>The Court's role is to settle, in accordance with international law, legal disputes submitted to it by States and to give</p>

<sup>3</sup> United Nations office for Outer Space Affairs (UNOOSA) [COPUOS \(unoosa.org\)](https://www.unoosa.org/) accessed 20/04/23

<sup>4</sup> United Nations [About Us | United Nations](#) accessed 20/04/23

	advisory opinions on legal questions referred to it by authorized United Nations organs and specialized agencies. <sup>5</sup>
UNISPACE+50	UNISPACE+50 resulted in documents aimed at articulating a comprehensive, inclusive and strategically oriented vision on strengthening international cooperation in the exploration and peaceful uses of outer space, in which space is seen as a major driver of and contributor to the achievement of the Sustainable Development Goals for the benefit of all countries <sup>6</sup>
Space2030: Space as a driver for peace	The event also presented an opportunity for speakers to reflect on the contribution space is making to the 2030 Sustainable Development Agenda and on the benefits of peaceful collaboration in space. <sup>7</sup>
Committee on Space Research (COSPAR)	COSPAR's 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. These objectives are achieved through the organization of Scientific Assemblies, publications, and other means. <sup>8</sup>

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<sup>5</sup> International Courts of Justice [The Court | INTERNATIONAL COURT OF JUSTICE \(icj-cij.org\)](https://www.icj-cij.org/) accessed 20/04/23

<sup>6</sup> Draft resolution entitled "Fiftieth anniversary of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space: space as a driver of sustainable development", A/AC.105/L.313, [V1803310.pdf \(unoosa.org\)](https://www.unoosa.org/pdf/V1803310.pdf) accessed 20/04/23

<sup>7</sup> United Nations Office for Outer Space Affairs [Space 2030 agenda: Space as a driver for peace \(unoosa.org\)](https://www.unoosa.org/) accessed 20/04/23

<sup>8</sup> Committee on Space Research (COSPAR) [Committee on Space Research \(COSPAR\) » About \(cnes.fr\)](https://www.cnes.fr/en/committees-and-panels/cospar) accessed 20/04/23

## **Treaties, Legislation, Cases and UN Documents**

### **International Treaties**

Agreement Governing the Activities of States on the Moon and Other Celestial Bodies  
Resolution 34/68

Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects  
Launched into Outer Space Resolution 2345 (XXII)

Charter of the United Nations

Convention on International Liability for Damage Caused by Space Objects resolution 2777  
(XXVI)

Convention on Registration of Objects Launched into Outer Space Resolution 3235 (XXIX)

Convention on the Prevention and Punishment of the Crime of Genocide, and Text of the  
Convention 260 A (III)

Kyoto Protocol to the United Nations Framework Convention on Climate Change (1997)

Statute of the International Court of Justice UKTS 67

The Convention on the Prevention and Punishment of the Crime of Genocide A/RES/3/260

The Paris Agreement (2015)

Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer  
Space, including the Moon and Other Celestial Bodies Resolution 2222 (XXI)

United Nations Convention on the Law of the Sea 1833 UNTS 397

United Nations, Universal Declaration of Human Rights (1948)

Vienna Convention on the Law of Treaties (1969)

### **Cases**

Anglo-Norwegian Fisheries Case (1951) ICJ Rep. 166

Congo v. Belgium [2002] ICJ 1

Democratic Republic of the Congo v. Uganda), ICJ, Judgement, 19 December 2005  
(Reparations case)

Gabcikovo-Nagymaros Project (Hungary/Slovakia)1997 I.C.J. 7

Legal Consequences of the Separation of the Chagos Archipelago from Mauritius in 1965  
2019/2 <https://www.icj-cij.org/en/case/169/summaries>

Lotus Case PCIJ, Series A, No 10 (The Permanent Court of International Justice)

North Sea Continental Shelf Case [1969] ICJ 1

Prosecutor v Dusko Tadic, International Criminal Tribunal for the Former Yugoslavia, IT-94-I-I, para 11 Case No: IT-94-1-Tbis-R117

Rainbow Warrior Arbitration 82 ILR

S.S Wimbledon PCIJ Series A No.1 (France v. Turkey) (1927) PCIJ Series A

The Trail Smelter Arbitration Case (United States vs Canada), U.N. Rep. Int'L Arb. Awards

### **UN General Assembly Resolutions**

Agreement Governing the Activities of States on the Moon and Other Celestial Bodies Resolution 34/68

Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space General Assembly resolution 1962 (XVIII)

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 (A/RES/51/122, 1997)

Establishment of an International Law Commission (with annex), (A/RES/174 (II)), OXIO 34 1947 United Nations General Assembly Resolution 174 (II)

International co-operation in the peaceful uses of outer space 1721 (XVI)

Principles relating to remote sensing of the Earth from Space Resolution 41/65

Principles Relevant to the Use of Nuclear Power Sources in Outer Space Resolution 47/68

United Nations General Assembly Resolution 174 (II) Establishment of an International Law Commission (with annex), (A/RES/174 (II)), OXIO 34

### **UN Documents and Reports**

Committee on the Peaceful Uses of Outer Space and its Subcommittee (2021) Legal Subcommittee,

UNISPACE+50: Thematic priorities and the way ahead towards 2018 (2016) A/AC.105/2016/CRP.3

United Nations/Germany Conference on International Cooperation Towards Low-Emission and Resilient Societies (2017) UNIS/OS/490

UNOOSA (United Nations Office for Outer Space Affairs), UNISPACE+50 and its Thematic Priority “International Cooperation Towards Low-emission and Resilient Societies”: Role of Space Research and Technology (2008)

International cooperation in the peaceful uses of outer space (2022) A/RES/76/76

The “Space2030” Agenda: space as a driver of sustainable development (2021) A/RES/76/3

Continuity of the work of the Committee on the Peaceful Uses of Outer Space and its subsidiary bodies (2020) A/RES/75/92

International cooperation in the peaceful uses of outer space (2019) A/RES/74/82

International cooperation in the peaceful uses of outer space (2018) A/RES/73/91

Fiftieth anniversary of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space: space as a driver of sustainable development (2018) A/RES/73/6

Consideration of the fiftieth anniversary of the United Nations Conference on the Exploration and Peaceful Uses of Outer Space (2017) A/RES/72/79

Report of the Committee on the Peaceful Uses of Outer Space (2017) A/72/20

Recommendations on national legislation relevant to the peaceful exploration and use of outer space (2013) A/RES/68/74

Committee on the Peaceful Uses of Outer Space Legal Subcommittee, Report of the Legal Subcommittee on its fifty-fourth session, held in Vienna from 13 to 24 April 2015, 2015) A/AC.105/1090

United Nations General Assembly, Annotated provisional agenda, 2016) A/AC.105/C.2/L.297

Report of the Working Group on Space and Global Health on the work conducted under its multi-year workplan, 2022

United Nations Committee on the Peaceful Uses of Outer Space, Report on the United Nations/Brazil/United Arab Emirates Space for Women expert meeting: initiatives, challenges and opportunities for women in space, 2022) A/AC.105/C.1/121

International Law Commission, Summaries of the Work of the International Law Commission (2022) [https://legal.un.org/ilc/summaries/1\\_13.shtml](https://legal.un.org/ilc/summaries/1_13.shtml)

Security Council Reform - Statement by H.E. Tijjani Muhammad Bande, President of the 74th Session of the United Nations General Assembly, 2020) <https://www.un.org/pga/74/2020/02/13/security-council-reform-2/>

Yearbook of the International Law Commission 1957, Vol. II, 1957) <https://www.un-ilibrary.org/content/books/9789213624944>

Report of the United Nations Conference on Environment and Development A/CONF151/26 (Vol I), 1992)

Recommendations on national legislation relevant to the peaceful exploration and use of outer space (2013) Resolution 68/74

ILC Drafting Committee on the identification of Customary International Law, 2015)

Fiftieth anniversary of the United Nations Conference on the Exploration and Peaceful Uses of Outer Space: The Committee on the Peaceful Uses of Outer Space and global governance of outer space activities (A/AC105/1137, 2016)

Compendium on mechanisms adopted in relation to non-legally binding United Nations instruments on outer space (A/AC105/C2/2019/CRP16, 2019)

United Nations, Report of the Committee on the Peaceful Uses of Outer Space, 2019)

Transforming our world: the 2030 Agenda for Sustainable Development, 2021)

General Assembly Adopts Resolution Seeking International Court's Advisory Opinion on Pre-independence Separation of Chagos Archipelago from Mauritius, 2022)

Draft resolution entitled "Fiftieth anniversary of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space: space as a driver of sustainable development" (A/AC105/L313, 2018)

Committee on the Peaceful Unedited transcript Uses of Outer Space Legal Subcommittee (2009) COPUOS/LEGAL/T.785

[https://www.unoosa.org/pdf/transcripts/legal/LEGAL\\_T785E.pdf](https://www.unoosa.org/pdf/transcripts/legal/LEGAL_T785E.pdf)

UNOOSA, UNISPACE+50, 2018)

<https://www.unoosa.org/oosa/en/ourwork/unispaceplus50/index.html>

UNOOSA, Revised Zero draft of the "Space2030" Agenda and implementation plan (A/AC105/2019/CRP15, 2019)

UNOOSA, Committee on the Peaceful Uses of Outer Space: Membership Evolution, 2021)

<https://www.unoosa.org/oosa/en/ourwork/copuos/index.html>

UNOOSA, Space 2030 agenda: Space as a driver for peace, 2022)

<https://www.unoosa.org/oosa/en/outreach/events/2018/spacetrust.html>

Working Group on the "Space2030" Agenda, (2020) A/RES/76/3

Sixty-Fourth session (31 May - 11 June 2021), 2021) [Ref. OOSA/2021/53 - CU 2021/194].

## **National Laws and Policy**

### **United States of America**

National Environmental Policy Act 1970 Pub.L. 91–190

Commercial Space Launch Act (1984 - Pub.L.98-575)

National space policy of the United States 2010

National Space Policy 2020

US Commercial Space Launch Competitiveness Act, Pub.L. 114-90, 114th

Congress, 25 November 2015, 51 U.S.C.

**United Kingdom of Great Britain and Northern Ireland**

The Space Industry Regulations 2020

Space Industry Act 2018

Outer Space Act 1986

## **1 Chapter One: Purpose of the Project**

### **1.1 Structure of the thesis**

The consideration of this thesis considers the future of space governance and the Committee on Space Research (COSPAR) planetary protection policy. International space law, international public law, a general understanding of international governance models and what the future may look like are discussed below.

Chapter One will deal with the introduction of these areas and show an explorative understanding for what is to come. From an analytical point of view Chapter One will open the conversations on space governance and the current considerations on such an advanced area of law. The chapter will then go on to consider international law and the foundational elements needed to demonstrate an understanding of the nature of why international legal considerations and certainty are important. The final discussions within this chapter will seek to understand COSPAR and their planetary protection policy. By doing so, this thesis will begin with the basic elements required to express a number of hypothesis and critical analyse throughout. Chapter One will also follow the conformity of a PhD thesis and consider methodology, questions, reasonings, hypothesis among of regulatory elements before concluding the chapter. Chapter Two will offer foundations of literature with an allowance of definitions that can be referred to when required.

Chapter Three will then open and number of considerations while dealing with space governance. Additional introductions through the current space governance models such as the committee on the peaceful uses of outer space (UNCOPUOS) and future legal concepts for space such as Space2030 and UNISPACE+50. Such early considerations will allow the thesis to develop a coherent and developing understanding of where states see space governance advancing in the future. Moreover, a more critical analysis of international law will take place here to further elaborate the issues and geopolitical nature of international public and space laws as a legal concept. Developing legal pragmatisms such a customary international law and the Artemis Accords will be considered to further create an analogue on why space needs a change and what are the practical considerations now. Before concluding this chapter, the thesis will set out the current systems and legal application for this thesis to develop in future chapters. This chapter could be considered as the foundational chapter to which other chapters develop from.



Chapter Four will consider the need for adaptive governance and consider the future of space governance as a developing feature. This chapter will install a number of models for what space may look like in the future, and to how these models can work while developing in space. Chapter Four will demonstrate the need and development of accountability and legitimacy within the realms of space. Before concluding the chapter will consider the behaviour and decline of states through a number of theoretical governance models that are developing within the areas of space governance. This chapter creates an important steppingstone towards to overall question and to what is the future of space governance.

Chapter Five will then create the road map for COSPAR and their planetary protection policy. The developing question of the future of planetary protection policy for such space activities will be developed within this chapter, to understand additional elements within the research question, but also to create a meaningful argument for what a future may look like. Chapter Five will begin by opening astrobiology and the significance to what the science brings to the legal ambiguities. Astrobiology will then move into the nature and developing understanding of COSPAR and their planetary protection policy. The developing question throughout this chapter will enable to question on what the future of COSPARs planetary protection policy in the region of space is, and what legal certainty the policy creates for space civilisations. Before concluding this chapter, the legal considerations, and the international ability to approach the science and nonlegal route will take place in the form of obligations and compliance. By creating such a consideration, the thesis seeks to formulate clear evidence to the current issues within the international community and develop a forward-thinking approach to the future of planetary protection policy.

Finally, Chapter Six will answer the question on the future of space governance and COSPARs planetary protection policy. This chapter will critically analyse the above chapters in order to develop a coherent and progressive understanding of space law, governance, astrobiology and planetary protection policy. Moreover, ideas and consideration of how international law can play a large part in this development will be subject to scrutiny on how this might look like. Applications of jurisprudence, international principles and an overall set of practicalities will bring this chapter to a close. Final conclusions and recommendations will be normatively added to better allow future work and individual concepts to be formed throughout the space community on the future of space law, governance, astrobiology, and planetary protection policy.

## **1.2 Purpose of Research**

This project is rooted within international space law and governance, and Planetary Protection Policy. The evaluation of these topics will lead to consideration of the future of the space governance framework, with a focus on the Committee of Space Research (COSPAR) and its Planetary Protection Policy. In doing so, the importance of developing an understanding of international law and geopolitics will be necessary to understand and critically analyse the future of such models, while positively recommending adaptations. Throughout the project international legal instruments, mechanisms and theories will be considered to create an original concentrated piece of research. The reasoning behind the project is to attempt to understand the international legal community and its approach to the likes of COSPAR and other space governance models with an approach to space. As with any early legal approach, the Outer Space Treaty<sup>9</sup> will be an important document to consider and understand. The foundations of space law, once understood, will play more of a foundational approach throughout this research to enable the work to grow through an established doctrine. Article IX will play an intrinsic factor through the concepts of international space law, and the understanding of Planetary Protection Policy. The development and notions under article IX will play a role to be able to establish a critical approach to space and the fragile environment outer space offers. Environmental harms, transboundary harms and a precautionary approach are all developed areas within international environmental law, and yet the understanding of article IX creates a synergic approach to offer such considerations and those of due regard and process. These principles present a unique dichotomy of international space law and practice. The need to understand such principles and to attempt to establish legal certainty is a consideration of this research. While considering the future of space governance and COSPAR, it is important to look further afield to the likes of non-legal agreements, customary international law, state practice and space development.

Planetary Protection remains an important aspect of space exploration. As with the key principles found in article IX, Planetary Protection Policy enjoys a free range of considerations throughout international law. However, the implementation of such becomes problematic within space activities. As there is no one unified acceptable document that outlines such a policy, although COSPAR has created a document that it believes to be best practice. As a non-governmental actor, COSPAR works with states to better create a legitimate, and sought after,

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<sup>9</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI)

policy of acceptance. Moreover, it is a wraparound of such information that COSPAR provides unique and qualified updates to its Planetary Protection Policy, as to keep this updated with the best science and application for space activities. As this policy is not a treaty, it does not bind states to a foregoing legal place. However, COSPAR offers this to all. Many states such as the United Kingdom and the combination of member states such as the European Union have accepted the policy in order to allow for transactions to occur. This unified approach allows for a degree of certainty, albeit not legal. Therefore, a more formative approach must be taken to better help develop and understand Planetary Protection Policy and COSPAR as one unit. The search for legal certainty is the aspiration for every lawyer to obtain and, within these areas, key concepts will be sought and critically analysed to attempt to consider the future of COSPAR and planetary protection.

The final consideration of this research is found within the remit of space governance, with a primary focus on the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS). The fragmentation of the UN has been challenged since the adoption of international space law and even the principles of treaty law. The primary concept of cooperation, peace and security has been hindered by the veto powers of the permanent members of the United Nations. The growing debate within international environmental law and climate change, under-developed the approach and legitimacy of the UN. The General Assembly and the international community find themselves in an unqualified remit to which areas of ultimate resources are free and available for states to use. Therefore, this research asks whether the current space governance structure is the best form, or whether the need for a new governance model needs to be considered for the future of space to allow for a new and enhanced form of legal certainty. Therefore, the consideration of a tripartite approach to international law which encompasses space law, non-legal principles and the formation of future space policy will all be considered within this research.

### **1.3 Hypotheses**

1. There is significant acceptance for a Planetary Protection Policy within the areas of all space activities. There is, however, no universal acceptance of the contents of such policy.
2. Within a space governance model, the application of non-binding agreements can be a continuous form of international best practice that creates certainty as far as “best practice”.
3. A doctrine of similarity can be applied so if they are of similar nature and reasonable.

## **1.4 Research Question**

1. What is the future of space governance and planetary protection going forward in a successive and diverse area of international law?

## **1.5 Methodology**

The methodology for this research will take place under a socio-legal umbrella, but equally can be understood as a doctrinal and interdisciplinary methodology. The hypothesis and research question seek to question and address the grey areas within the literature as well as the larger problems within the international legal community. Moreover, throughout the research subjective areas as legal positions will be used to argue for a broad legal underpinning above the current scholarly thought. The researcher seeks to offer a number of distinctive approaches to the work and produce several pieces of original legal theory on the basis of international legal understanding, governance, and organisational development as well as a fractional approach to understanding the future of space governance and planetary protection policy. Moreover, consideration of this work will seek to challenge other doctrinal legal research, institutional culture and international social problems that plague the space community legally and politically. Core concepts will seek to push the levels of imagination, level development and scholars to create a greater original scope of research for the future of space law, governance, and planetary protection.

Throughout this work, primary and secondary sources will be examined in order to understand and demonstrate a wide approach to subject areas and space community issues. Due to the wide range of sources, it will be important to consider legal and political developments such as the illegal invasion of Ukraine and other relationships, while critically analysing such an approach. In the first instance, a literal approach will be taken to understand the foundations of the research and to better help this research develop. Following on from the methodology space governance and global governance models will be able to understand the issues and concerns raised during the literature review. Moreover, the natural progressions of international legal theory and laws will be deemed to be able to demonstrate a broad understanding with application to the formative ideas of the thesis. Finally, considerations of astrobiology and planetary protection policy will be discussed to enable the thesis to develop a firm understanding of the possible futures they may expand into.

The expansion of theory is imperative within this thesis. As the question and overall hypothesis extend questions and interdisciplinary will be considered to promote and develop legal

certainty as to the development of space governance and the future of COSPARs planetary protection policy. The foundational aspects of international legal theory will firstly be introduced to enable the reader to understand the foundational elements of this thesis and the laws around outer space. The development of these sections will form the understanding of where international space law is currently in the wider control of international law. As part of the foundational exploration of such laws the approach has been restrictive due to the amount of cross over and availability. For example, only the Outer Space Treaty has been a consistent consideration. Others such as the liability convention have been used for reference, but the principles have been considered as to the OST. Other international legal theories such as the doctrine of similarity has played an essential amount in establishing academic literature and the development of the arguments used within the thesis. The final consideration based on the legal application, is that an interdisciplinary view of international law has been used to balance and extend arguments of outer space from a varied number of legal sources. As such, this thesis will introduce international environmental law as a referenced understanding. These arguments will be considered through Chapter One and Two, with applicable references throughout the entire thesis.

As the thesis progresses through international legal theory, governance theory of models is introduced. These models are basic and are not “models” typically found in the sciences or international relations. For this thesis, when a model is discussed, it simply means a current practice or practices that are recognised and currently used. This has been done deliberately to allow the reader to gain a foundational understanding of other management or governance practices that may apply to space. Ideas and understanding of legitimacy, accountability, behaviour, and the global commons will at this stage be introduced to create ideas for the following chapters and to consider whether the approach of the current governance system can be altered, and if so, how can this be done given the current system we have. The principal approach is not a criticism of the United Nations Committee on the Peaceful Uses of Outer Space, but it is instead focused on what can be enhanced and what is the future of the committee. This distinction is an important one to understand and to consider through the analysis of the areas of international global governance theory.

The global commons, previously mentioned above, will allow the thesis to consider the future of the Committee on Space Research and their Planetary Protection Policy. Key concepts will open this chapter to allow the reader to gain a general overview of the areas of astrobiology, and the current grounds of development within the science sector, and how this alters the need

for legal certainty from the view of a lawyer. The importance of understanding the current form of astrobiology and planetary protection allows us to consider where it is going in the future, and to what are the obstacles which are foreseeable. The development of a roadmap or strategic review of thesis areas is important to therefore consider the development of the Committee on Space research and to its validity within international law. Therefore, the future of the Committee on Space Research presents a normative question to develop around the current international model of best practice, environmental protection, and scientific development. Therefore, understanding the rationale of the Committee of Space Research and their functionality within the international community will allow for a debate of the development of a “planetary protection policy” as to what this may consider in the future. One of the final considerations and aspects throughout the thesis will be the acknowledgement that the OST has the legal potential to be a self-regulated treaty under the norms within the international community. Although, this is not a firm hypothesis of this thesis, the principles of the future of space governance through the international legal systems must be considered in the wider context.

## **1.6 Ethical Considerations**

There are no ethical considerations while researching this thesis. The researcher has sought advice from his supervisors and has followed the Open University Ethical Consideration policies.

## 2.0 Introduction Foundations

### 2.1 Space Governance

The framework of international space governance is located within the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) provides an additional two subcommittees. The Legal subcommittee is one, and the other is the Scientific and Technical Subcommittee. Both committees are represented within the international community and responsible for aspects of space activities. With a mandate for progression, these representatives have formulated and intend to drive the way for sustainable development throughout the space industry as identified in Space2030.<sup>10</sup> Many comparisons can, and should, be made within the space environment towards that of the Earth environments, to which states find it difficult to agree on legal certainty, such as climate change. The space community is therefore at an impasse while developing an understanding of what sustainable space looks like, and how to achieve such a task. Therefore, such an early definition of space governance can be summarised as the functions within UNCPUOS that govern the general understanding of international space law. Moreover, the concepts within the UN Charter should be considered as a unified acceptable governance model for international consensus on a theoretical and abstract area of politics. Given the ability of the OST article III to consider international law beyond the scope of the current agreed space law model, a synergist approach through international space and public law can be partnered as one. Committee on the Peaceful Uses of Outer Space (UNCOPUOS) The Committee on the Peaceful Uses of Outer Space (COPUOS) was set up by the General Assembly in 1959 to govern the exploration and use of space for the benefit of all humanity: for peace, security, and development. The Committee was tasked with reviewing international cooperation in peaceful uses of outer space, studying space-related activities that could be undertaken by the United Nations, encouraging space research programmes, and studying legal problems arising from the exploration of outer space.

The Committee was instrumental in the creation of the five treaties and five principles of outer space. International cooperation in space exploration and the use of space technology applications to meet global development goals are discussed in the Committee every year. Owing to rapid advances in space technology, the space agenda is constantly evolving. The Committee therefore provides a unique platform at the global level to monitor and discuss these

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<sup>10</sup> Draft resolution entitled “Fiftieth anniversary of the first United Nations Conference on the Exploration and Peaceful Uses of Outer Space: space as a driver of sustainable development” (A/AC105/L313, 2018)



developments. The Committee has two subsidiary bodies: the Scientific and Technical Subcommittee, and the Legal Subcommittee, both established in 1961. The Committee reports to the Fourth Committee of the General Assembly, which adopts an annual resolution on international cooperation in the peaceful uses of outer space.<sup>11</sup>

The 2020 agenda sets out the goals for sustainable space, with the application of UNISPACE+50<sup>12</sup> being a key factor. UNCOPUOS delivers the agenda in a particular way, with the acknowledgement of current space ventures. For example, agenda item three references the involvement and strengthening of the relationship between states, intergovernmental, NGO's, industry, and private actors. This is an important aspect throughout the international community and for this research. Within the international legal system, the approach only considers states when considering the law. The development of super actors such as NGOs and parties that under the notion of international law would not normally be recognised, can be a major factor in the community's outlook towards space and how it envisages the governance and involvement of the future. As an early exclusion the legal aspects of private actors apart from COSPAR will not be considered and will remain an idea for future works.

However, the space community is only as strong as its members, and the UN due to geopolitical development is a particularly weaker group than in 1967. Although, this may allow a different latitude, the issues of sovereignty and space commitments have all seen a large insurance of space-based activities, to further secure space and test other states capabilities. It must therefore be considered whether UNCOPUOS is still the best governance model for the future of space governance, or whether a hybrid approach must be considered for future activities. Not until the proactive approach to sustainability has the community questioned UNCOPUOS and factored in the need for greater participation within the community.<sup>13</sup> The greater gaps within the global governance framework present a typical view of space, that could allow for a greater governance forum. By developing an adaptive, proactive, and varied framework, space governance could provide adequate information, resources, values, community interaction,

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<sup>11</sup> United Nations office for Outer Space Affairs (UNOOSA) COPUOS (unoosa.org) accessed 20/04/23

<sup>12</sup> , *Fiftieth anniversary of the United Nations Conference on the Exploration and Peaceful Uses of Outer Space: the Committee on the Peaceful Uses of Outer Space and global governance of outer space activities* (A/AC105/1137, 2016)

<sup>13</sup> Trur A, 'Governance aspects of space sustainability: The role of epistemic actors as enablers of progress' (2021) 180 Acta Astronautica 451

inclusivity and a more open view than the likes the current institution has.<sup>14</sup> The consideration is therefore whether a global governance framework can be created as a patchwork<sup>15</sup> angle to space that allows for future activities to be effectively and efficiently adopted under international law and governance. Moreover, an important application of the current governance structure is that of principles and non-legally binding agreements between states and actors. The new and topical area of political agreements has been seen to be a positive term for developing space. As such as the Moon Agreement was rejected by a large cohort of states, treaty law in space is no longer a preferable feature.<sup>16</sup> It is therefore of utmost importance to create a more proactive framework to allow the passage of agreements outside of the current assembly.

The stagnant legal approach of UNCOPUOS during the time since conception of the treaties, rallies both truth and uncertainty. The illegal invasion of Ukraine by Russia, and political concerns that creates uncertainty which manifests into a domino effect throughout the United Nations creates a negative effect on the realms of law and governance in outer space. And space and the current governance models are not spared from uncertainty from Earth. Therefore, the current space governance system is susceptible to the geopolitical nature, as are many international laws. It is therefore important to consider such needs at this early stage of development, to question and develop a coherent argument to discover the future of space governance. It is therefore imperative that this thesis questions the prime elements of space governance as to the current model with the international structure. Early observations provide for UNCOPUOS to be a model with self-direction as to space. This thesis therefore questions this approach and seeks to discover whether there is a better alternative to strengthen the approach of space governance. As this will become a large element, the thesis will consider the global governance model to indefinitely the options that already exist within international law. The thesis will consider the approaches of adaptive governance models that are created from such a machine government model, and to those that offer a value approach, humanity intrinsic approach and those that develop based on accountability and legitimacy. As such,

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<sup>14</sup> Migaud MR, Greer RA and Bullock JB, 'Developing an Adaptive Space Governance Framework' (2021) 55 Space policy 101-400

<sup>15</sup> Thérien J-P and Pouliot V, 'Global governance as patchwork: the making of the Sustainable Development Goals' (2020) 27 Review of International Political Economy 612

<sup>16</sup> Witte JM and Reincke HW, Challenges to the International Legal System Interdependence, Globalization, and Sovereignty: The Role of Non-binding International Legal Accords (Oxford University Press 2003) 16-24

Chapter Three will consider the strengthen of such ideas and whether these models could create a future for space governance outside of the current understanding.

The next section will consider international law broadly to understand the international legal theory and a limited view of international jurisprudence to allow for the conversation to develop the areas of the future of space governance, and to what legal certainty may look like in the future.

## **2.2 Considerations of International Law**

This section will bring together aspects of international law and provide the groundwork for the proposed project and develop an area for analysis. The section below will consider the Vienna Convention Law of Treaties and its role within international space law. Following that, the review will introduce international space law, before delving into the OST and the considerations of COSPAR, planetary protection and space governance. The final section will consider customary international law and the importance of such in an area within space. The importance of this section will play a significant aspect in the enhancement of the future of space governance. Developing the current mechanisms of the OST will be exploited to better understand the current system of space governance and how this can adapt and evolve outside of the Outer Space Treaty and other international space treaties.

### ***2.2.1 Vienna Convention Law of Treaties 1969***

Treaties between states on matters of space safety and protection are regulated under the Vienna Convention.<sup>17</sup> Commonly referred to as the “treaty of treaties”, the Vienna Convention lists comprehensive procedures, guidelines and rules on the definitions, interpretations, amendments, and operation of various international treaties. According to Crawford, the Vienna Convention acts as a form of codification of state practices and the international customary laws regarding treaties.<sup>18</sup> Opened and adopted on 23 May 1969, the Vienna Convention became operational in 1980. Article four of the Vienna Convention discusses non-retroactivity of older treaties, to which the OST would be stated as such.<sup>19</sup> However, future litigation or dispute may be considered; otherwise, the relationship and use of both treaties in tandem would offer such a positive argument for the close relationship between the Vienna Convention and the OST. Therefore, as an early observation this work will conclude that the

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<sup>17</sup> Villiger ME, Customary international law and treaties: a study of their interactions and interrelations, with special consideration of the 1969 Vienna Convention on the Law of Treaties, vol 7 (Brill 1985) 665

<sup>18</sup> J Crawford, *Brownlie's Principles of Public International Law* (Oxford University Press 2019)

<sup>19</sup> Vienna Convention on the Law of Treaties (1969) article 28

OST has been adopted and follows the laws and articles within the Vienna Convention as either a form of custom or a political acceptance.

Among the Vienna Convention, contents include three critical articles on the general rules of interpretation, the supplementary means of interpretation and the interpretation of treaties authenticated in two or more languages.<sup>20</sup> These provisions are provided under articles 31, 32 and 33 of the treaty. Providing a well-defined system for interpreting international treaties, especially the OST, is an integral part of planetary protection due to state interests and their ambitions. The three articles of the Vienna Convention have established the basis for resolving significant controversies regarding interpreting outer space laws.<sup>21</sup> A common issue associated with space law and governance includes the authority of different states, especially in the enforcement of the Planetary Protection Policy. According to Jakhu and Pelton, formulating and agreeing to a successful system of governance on the matters of space is a significant challenge.<sup>22</sup> The problem is likely to be complicated further with more states engaging in a wide range of commercial space ventures, including the idea of space mining, orbit-servicing and providing private flights for citizens.<sup>23</sup>

Article 15 of the Vienna Convention outlines the consent for being bound by a treaty assessments. Therefore, should a state ratify the treaty, they agree that the Vienna Convention provisions will apply.<sup>24</sup> Criddle states that in both the nationalist and internationalist approaches, contract laws general principles play a central role.<sup>25</sup> This implies that only backwards contamination, i.e., contamination of Earth by materials returned from space, is a factor for the established general international laws on planetary protection through the OST. Such ideas of forward and backwards contamination are routed within space exploration to limit the harmful events on the space environment and from bringing interfering microbes back to Earth. There must be a form of agreement, contractual intention, and consideration to work efficiently across all states. There are also provisions contained in the Vienna Convention on

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<sup>20</sup> Sullivan R, 'On the Interpretation of Treaties: The Modern International Law as Expressed in the 1969 Vienna Convention on the Law of Treaties. By Ulf Linderfalk. Dordrecht, The Netherlands: Springer, 2007. 440 pages' (2010) 47 Canadian yearbook of international law 661

<sup>21</sup> Borgen C, 'Resolving treaty conflicts' (2005) 37 The George Washington international law review 573

<sup>22</sup> Pelton JN and Jakhu RS, Global Space Governance: An International Study (Space and Society, Springer 2017)1-7

<sup>23</sup> Pelton JN and Jakhu RS, Global Space Governance: An International Study (Space and Society, Springer 2017) 1-7

<sup>24</sup> Sullivan R, 'On the Interpretation of Treaties: The Modern International Law as Expressed in the 1969 Vienna Convention on the Law of Treaties. By Ulf Linderfalk. Dordrecht, The Netherlands: Springer, 2007. 440 pages' (2010) 47 Canadian yearbook of international law 661

<sup>25</sup> Criddle E, 'The Vienna Convention on the Law of Treaties in U.S. treaty interpretation' (2004) 44 Virginia journal of international law 431

invalidation, termination, and suspension of treaties.<sup>26</sup> Article 72 on the consequences of the suspension of the operation of a treaty states that:

*Unless the Treaty otherwise provides or the parties otherwise agree, the suspension of the operation a treaty under its provision or per the present Convention: (a) releases the parties between which the operation of the Treaty is suspended from the obligation to perform the Treaty in their mutual relations during the period of the suspension; (b) does not otherwise affect the legal relations between the parties established by the Treaty.*<sup>27</sup>

In most international laws, especially those governing planetary protection, the tension between the stability of the treaty relations and the sovereignty of states is always evident. Mostly, the tension results from the question of implied rights of termination or enforcement.<sup>28</sup> Article 62 of the Vienna Convention is overly restrictive in its requirement for application. The article states that “*a fundamental change of circumstances which has occurred concerning those existing at the time of the conclusion of a treaty, and which was not foreseen by the parties may not be invoked as a ground for terminating or withdrawing from the treaty.*”<sup>29</sup> The possibility of Planetary Protection Policy by association therefore applies. Thus, the Vienna Convention may apply directly through Article IX of the OST. This sceptical analysis is untried and typically incorrect. Ordinarily, since COSPAR is an international NGO, international law does not apply. In conformity under the OST article IX, a policy may reflect a soft law or by extension of a term within the treaty that can be loosely interpreted under article 62 of the Vienna Convention and Article III of the OST in which:

*“States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the Moon and other celestial bodies, under international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding”.*

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<sup>26</sup> Djeffal C, 'Commentaries on the law of treaties: A review essay reflecting on the genre of commentaries' (2013) 24 European journal of international law 1223

<sup>27</sup> Sullivan R, 'On the Interpretation of Treaties: The Modern International Law as Expressed in the 1969 Vienna Convention on the Law of Treaties. By Ulf Linderfalk. Dordrecht, The Netherlands: Springer, 2007. 440 pages' (2010) 47 Canadian yearbook of international law 661

<sup>28</sup> Djeffal C, 'Commentaries on the law of treaties: A review essay reflecting on the genre of commentaries' (2013) 24 European journal of international law 1223

<sup>29</sup> Djeffal C, 'Commentaries on the law of treaties: A review essay reflecting on the genre of commentaries' (2013) 24 European journal of international law 1223

The originality of this idea has either not been considered fully, or elements have been considered but remain fragmented. Only by considering the law of treaties and applying the evolutionary articles within the OST can these concepts be critically analysed to affect an original consideration of legal certainty. However, this could only be tested by a state under a dispute or a debate within the General Assembly. The next section will build on treaty law and consider international space law and how COSPAR and planetary protection are enshrined. Understanding space law is imperative to understanding and developing the project. This helps with understanding the limitations and originality that are sought and provided by undergoing this project. At the same time, highlights and gaps in the literature will be evident to create a project foundation of certainty and essence to the questions of the future of space.

### ***2.2.2 International Space Law***

International space law is critical for the understanding of the project. Given the advancement of the emerging technologies including communication, private actors and natural disaster management, space has never played such a pivotal role within modern society.<sup>30</sup> The question of planetary protection and economic industrialisation of space is the new international space environment. For instance, under Article VI of the OST, the launching party remains under the supervision of the state. Private companies such as SpaceX are working with NASA in launching, orbiting and recovery missions in outer space. Given the relationship between NASA and the companies who they work with to provide mission elements, a level of scrutiny and legitimacy allow for the US as funding and supervising state to comfortably monitor and oversee all elements of the activities within the jurisdiction of the state.

According to Lits *et al.*, international space law represents the only sphere of law that reaches beyond the Earth's physical boundaries in protecting modern society.<sup>31</sup> An early indication, which is excluded from this thesis is the considerations of telecommunication and cyber laws that can be applied outside of international space laws. With most developed states showing interests in exploring outer space and harnessing its potential, it is vital to put international space law under scrutiny. Given that the OST was adopted in the 20<sup>th</sup> century when space exploration was not as developed as it is now, there are fears that the treaty could become

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<sup>30</sup> Cinelli C and Pogorzelska K, 'The Current International Legal Setting for the Protection of the Outer Space Environment: The Precautionary Principle Avant La Lettre' (2013) 22 Review of European, Comparative & International Environmental Law 186

<sup>31</sup> Lits M, Stepanov S and Tikhomirova A, 'International Space Law' (2017) 4 BRICS law journal 135

obsolete following the recent developments.<sup>32</sup> Gupta notes that one of the biggest challenges of international space law is to capture all the concerns related to environmental protection coherently and with effectiveness in space.<sup>33</sup>

Consequently, this implies that the current provisions of international space law may be acutely ineffectual, and therefore reforms are critical to that effect. The likes of article IX of the OST consider the fundamental approaches of backwards contamination, with minimal effect, and leaves the state to attempt to 'avoid' forward contamination with little guidance. This creates a conundrum to planetary protection and leaves forward contamination in a vulnerable legal state. Gupta's consideration shows that environmental protection fails to describe 21<sup>st</sup> century space activities, to which the OST's foundations are enhanced. Gupta's suggestions include the harmonisation of international environmental law and space law, among other things, to establish an international regime that focuses on satellite maintenance, removal, and servicing.<sup>34</sup> However, this does not provide any international legal certainty of planetary protection. Gupta's notion of using other international laws is not new, but without application following these ideas it is a debated point by legal academics. Laws created for Earth cannot represent space, but by focusing on smaller fractions of principles, lawyers can attempt to apply this to space. The rationale for the creation of the OST was the threat of nuclear war in space. Therefore, it is important to consider the foundations of international law such as state responsibility, the United Nations Charter, and other primary sources of international law.

Moreover, the OST allowance afforded to international law helps create new ideas while building on innovation and new concepts of space dwellers. Still, space evolves too fast for such a rationale, and the principles on Earth cannot transcend without a clear, concise pathway. Applying environmental, maritime, or even the United Nations Law of the Seas to space only creates questions and fails to answer debated areas on reform.

Brittingham argues that in the 21<sup>st</sup> Century, there is an increased rate of private commercial utilisation of space; a phenomenon that has led to the need for new space laws or the amendment of the current laws.<sup>35</sup> The principles of planetary protection and liability are firmly based within the state, and non-state actors play a pivotal part both now and in the future of

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<sup>32</sup> Gupta V, 'Critique of the International Law on Protection of the Outer Space Environment' (2016) 14 *Astropolitics* 20

<sup>33</sup> Gupta V, 'Critique of the International Law on Protection of the Outer Space Environment' (2016) 14 *Astropolitics* 20

<sup>34</sup> Gupta V, 'Critique of the International Law on Protection of the Outer Space Environment' (2016) 14 *Astropolitics* 20

<sup>35</sup> Brittingham BC, 'Does the world really need new space law?' (2010) 12 *Oregon review of international law* 31

space. Criticisms for and against will be discussed within the next section and what allowances international law plays when governing such actors and states. The OST will be further examined while considering what allowances are made for COSPAR and planetary protection.

### ***2.2.3 The Outer Space Treaty 1967***

The OST establishes a basic framework that includes the principles that govern individual state conduct in outer space exploration, including the need to undertake space exploration for all states' benefits. The foundations of space law come directly from the OST, which has generally been built on by other international organisations such as the UNCOPUOS and UNOOSA as well as states such as the US, China, and Russia in their space activities. Further sections will discuss the direct link to planetary protection and the OST article IX.<sup>36</sup>

Additionally, as individual states freely explore outer space, they should ensure that any space materials that are brought back to Earth do not cause any harm. All the provisions of this treaty leave the responsibilities of space protection to the state. This means that the state is responsible for national space activities, including those conducted by non-governmental or private entities.<sup>37</sup> Furthermore, the treaty sets out liability for damage caused by space objects.<sup>38</sup> The positive approach of the planetary protection policy focuses mainly on contamination from space exploration. Such notions are agreeable under article IX and further acknowledged by COSPAR's category V missions. However, this was not envisaged by the OST framers to provide a specific framework on how states should prevent cross-contamination.<sup>39</sup> Thus, most of the principles of the treaty are aimed at harmonising space exploration for global benefit. For example, the OST recognises the principle of non-appropriation (article II), and that the use of space is the province of all "Mankind" – Humankind (article I).

Nonetheless, states or private actors exploring outer space should adhere to the guidelines put forth by COSPAR. The divergence between states on Planetary Protection Policy is not a secret, and states are open with their disagreement or agreement.<sup>40</sup> The allowance of article IX of the OST makes such a primary link to the practices of COSPAR, and it is reasonable to be

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<sup>36</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI) Article IX

<sup>37</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI) Article VI

<sup>38</sup> Dembling PG and Arons D, *The Evolution of the Outer Space Treaty (1967)*

<sup>39</sup> Grush L, 'How an international treaty signed 50 years ago became the backbone for space law' (2017) 1-3

<sup>40</sup> National Aeronautics and Space Administration, *NASA Response to Planetary Protection Independent Review Board Recommendations (2019) DC 20546-0001* [planetary\\_protection\\_board\\_report\\_20191018.pdf \(nasa.gov\)](https://www.nasa.gov/pdf/20191018main-planetary-protection-board-report-20191018.pdf) accessed 18/05/23



considered current practice should it be followed by states. With the application and use of article 38 (1)(d) of the statute of the ICJ, which will be discussed later, contamination forward and backwards may already be accepted under such a principle and form international customary law. The evolution and understanding of the OST does not take away from its core principles but can be considered the best fit. It therefore could be argued that in legal terms, planetary protection policies create a balance between international inclusion, and developing considerations that allow for the rapid expansion of science and creative governance. In 2019 a NASA independent review board made up of private actors and the state, recommended the downgrading of COSPAR's category system favouring a less cautious system for industry, and a more burdensome system for the protection of all celestial bodies. The 2019 panel accepted the OST as its core foundation but challenged the scientific consensus of COSPAR and thus the potential norm of planetary protection. It is therefore important to consider planetary protection in stages. COSPAR and the international consensus, states and space agencies need to discover where planetary protection sits, what is accepted and what is challenged. Therefore, to better understand what is accepted and agreed upon by association, a literature screening and developing a fragmented approach to such a question will enable this project to analyse this while creating originality throughout.

COSPAR has created a recognisable and fact-based category system to better learn from the Universe while minimising the pollution that comes with space activities. The advancement of technology, scientific understanding and past lessons learnt from the international community and others create a proactive fact-based understanding when it comes to space exploration. COSPAR seems to be impartial and aims to provide up to date scientific guidance for the advancement of space missions while looking for the origins of life in space. Thus, as it is, the OST is flexible in its interpretation which is regarded as an advantage and a challenge at the same time. The advantage is that some of the articles are useful in addressing emerging challenges associated with planetary protection and other space activities, while others are not and cannot reasonably be used to address activities not fit for the OST. On the other hand, the flexibility makes space law a significant challenge because individual states can have varying open interpretations under the Vienna Convention.<sup>41</sup>

A big challenge for planetary protection in the 21<sup>st</sup> century is the increasing level of ambition among private companies moving beyond launching satellites into space. An example is

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<sup>41</sup> Grush L, 'How an international treaty signed 50 years ago became the backbone for space law' (2017) 1-3

SpaceX, which has demonstrated enormous success by challenging the monopolisation of travel to the international space station (ISS). Furthermore, SpaceX has conducted flights to the ISS at a marginal cost compared to states, and the company advanced their technology by landing its rockets to be reused again. This has never been done before by private companies. The application of planetary protection through private actors becomes difficult under COSPAR's Planetary Protection Policy, where there is currently no regulatory framework to create an overseer role or monitoring mechanism. Even with the aid of COSPAR's voluntary prescription under article IX of the OST, the legal enforceability of COSPAR to enforce their category system under article IX and enhance the treaty is a fascinating area that must be expanded. Without a proactive provision to create relations among international organisations and states, COSPAR fails to achieve a unified Planetary Protection Policy built upon trust and international cooperation. Article I of the UN Charter considers international cooperation and mutual benefit to both feature in the OST and COSPAR's mandate. It goes without saying that unless states, private individuals, science, and law become proactive regarding space activities, humanity could see another international environmental law disaster where no agreement can be sought. Without such a proactive space governance regime that can develop and create regional agreements, bilateral agreements and a form of soft law enforcement, understanding and cooperation seem minimal. Although the OST develops a foundation for many rival treaties, new space activities and advancement in technology has created a crossroad. The application and carryout of Planetary Protection Policy are determined by the state, which has no incentive to follow the lead and expertise of COSPAR.

The next section will discuss customary international law and how it may develop into helping enhance space governance through the OST, state practice and the likes of mutual acceptance for agreed terms such as forward contamination and recognised key areas of planetary protection.

#### ***2.2.4 Customary International Law***

This section will discuss soft law that can be considered for space governance and planetary protection. International space laws are characterised as 'hard' laws based on the legally binding treaty. Hard law is defined by the legally binding agreement to which states wish to be bound. However, soft law is sometimes difficult to see and more complicated to successfully define. Koh's<sup>42</sup> concept illustrated in his 1996 article on the legal transcendent and more

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<sup>42</sup> Koh HH and others, Why Do Nations Obey International Law? (The Yale Law Journal Company 1997) 2599-2659

recently by Reincke and Witte<sup>43</sup> advanced our understanding of soft law, the participation needed, key constitutional elements for transitional corporations and the final creation of an international norm. Soft law although vague and difficult will play a large aspect of the overall thesis in creating space governance, the development of national and international space law and the elemental future of COSPAR and what reform or transcendence is needed. The international elements will be considered in tandem to hard law, to consider the applicability and ability within space. Soft law, or the creation of potential legally binding instruments will by hypotheses to demonstrate what could be in the future. The notion of soft law is that of quasi-legal instruments like guidelines with no legal binding force. Moreover, key aspects will be discussed throughout, while being covered under such examples into what can be classed as soft law regarding planetary protection.

However, the efficacy of soft law in response to modern challenges such as handling space debris and military uses remains questionable.<sup>44</sup> According to Guzman and Meyer, there are four main reasons why states opt for soft laws on matters of space exploration: First, states rely on soft laws to foster coordination and generate compliance on the issues of outer space laws and planetary protection.<sup>45</sup> Secondly, states rely on soft laws based on the 'loss avoidance' theory. Under the international system, sanctions are a negative sum, resulting in mutual losses for all the involved states. Therefore, creating a treaty will ultimately involve international tension, unless stated otherwise. The third reason states choose soft law over hard law in international space law is explained by the 'delegation theory'.<sup>46</sup> Delegation theory in a broad sense is as such where the responsibility is passed to another entity with the view of achieving the best performance. Soft law offers some form of flexibility, especially when states are not certain whether the chosen rules will be applicable in the future. Unlike hard laws, soft laws are non-binding, and therefore, in case of legal changes in the future, these abilities are preferable. Lastly, the study considers customary law whereby state behaviours that emerge over time, and are maintained, are an accepted form of law.<sup>47</sup> Shaw writes that custom is not the best instrument to meet complex legal issues that arise in world affairs, but it may meet

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<sup>43</sup> Witte JM and Reincke HW, *Challenges to the International Legal System Interdependence, Globalization, and Sovereignty: The Role of Non-binding International Legal Accords* (Oxford University Press 2003) 12-17

<sup>44</sup> Marboe I, *Soft Law in Outer Space: The Function of Non-binding Norms in International Space Law* (V&R Academic 2012) 45

<sup>45</sup> Guzman AT and Meyer TL, 'International Soft Law' (2010) 2 *The journal of legal analysis* 171

<sup>46</sup> Guzman AT and Meyer TL, 'International Soft Law' (2010) 2 *The journal of legal analysis* 171

<sup>47</sup> Shaw MN, *International Law* (Cambridge University Press 2017) 133

those needs in certain situations.<sup>48</sup> The allowance of customary law is one of the pillars upon which international law is built.

The International Court of Justice (ICJ) has addressed this issue in such cases discussed below. Given the inclusion and acceptance of article 38,<sup>49</sup> which allows for three recognised areas in which soft law can be created. Such areas that whether general or, establishing rules expressly recognised by the state, international custom, as evidence of general practice, general principles of law are recognised. Many principles not created for space exist in the customary sphere and can be developed for space and help foster versatile space governance. The basis of state responsibility and practice, or even cooperation, outlines the ability to enhance article VI of the OST to give further information on fairness and transparency. The use of the ICJ or the permanent court of arbitration in ultra vires, as it is beyond the control of these courts. Without a treaty in which states agree to a dispute mechanism, this issue is weak. However, both courts may be asked to issue an advisory opinion that is not legal and can be ignored, such as the legal consequences of the separation of the Chagos Archipelago from Mauritius in 1965.<sup>50</sup> Unless such an incident occurred where clarification was needed, or a state wished to bring a claim, space law will continue to rely upon soft law to better match and develop space law. The appearance of soft law provides many avenues for the section above. Soft law can be a positive mechanism for space governance to be created on top of the OST principles. If states chose to follow the majority and create planetary protection principles, this might enhance space law and governance. However, this is far off. Soft law would have to be practised and follow the prescribed route of generality, duration, and acceptance unless instant custom was observed in a time of crisis.

These areas and definitions of international law will be referenced throughout the thesis to provide abstract evidence to demonstrate a number of hypothetical and critical areas. Additionally, the rationale of the principles of international space law, customary international law and individual legal concepts will be referenced throughout to allow recognisable further original consideration. The next section will consider the history of planetary protection to better understand COSPAR's Planetary Protection Policy's reasoning and issues. Moreover,

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<sup>48</sup> Borda AZ, 'A formal approach to article 38(1)(d) of the ICJ statute from the perspective of the international criminal courts and tribunals' (2013) 24 *European journal of international law* 649

<sup>49</sup> Kunz JL, 'The Nature of Customary International Law' (1953) 47 *The American journal of international law* 662

<sup>50</sup> Allen S, 'Legal Consequences of the Separation of the Chagos Archipelago from Mauritius in 1965 (I.C.J.)' (2019) 58 *International legal materials* 445

COSPAR will be discussed, and their guidelines, and how this empowers space governance and space law to provide accessible and unique space activities in the 21<sup>st</sup> Century.

### **2.3 COSPAR's Planetary Protection**

The Committee on Space Research (COSPAR) promotes research on an international scientific level. The Panel on Planetary Protection (PPP) is concerned with biological interchange in the conduct of solar system exploration and use, including: (1) possible effects of contamination of planets other than the Earth, and of planetary satellites within the solar system by terrestrial organisms; and (2) contamination of the Earth by materials returned from outer space carrying potential extraterrestrial organisms.<sup>51</sup> The panel on planetary protection allows the understanding of three core elements which are; provisions of cooperation and mutual assistance, the avoidance of harmful contamination of the solar system and the potential harmful backwards contamination to Earth. It is beyond this thesis to consider contamination as it should be. It will therefore be expanded on in future work on the legal implications of contamination and the practicality of such.

Committee on Space Research's (COSPAR) 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. These objectives are achieved through the organization of Scientific Assemblies, publications, and other means. The Panel on Planetary Protection (PPP) is concerned with biological interchange in the conduct of solar system exploration and use, including: (1) possible effects of contamination of planets other than the Earth, and of planetary satellites within the solar system by terrestrial organisms; and (2) contamination of the Earth by materials returned from outer space carrying potential extraterrestrial organisms. The primary objective of the Panel within COSPAR is to develop, maintain, and promulgate clearly delineated policies that provide specific requirements as to the standards that must be achieved to protect against the harmful effects of such contamination. These policies must be based upon the most current, peer-reviewed scientific knowledge, and should be based upon the

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<sup>51</sup> Committee on Space Research (COSPAR), [Committee on Space Research \(COSPAR\) » Panel on Planetary Protection \(PPP\) \(cnes.fr\)](https://www.cnes.fr/en/what-we-do/space-exploration/planetary-protection) accessed 20/04/23

principle that COSPAR planetary protection policies should enable the exploration and use of the solar system, not prohibit it.<sup>52</sup>

The issue of planetary protection must first consider and define what the concept of harmful contamination entails. Understanding this concept is crucial to locating how harmful contamination fits within the existing space governance and the OST. It is pertinent to have a detailed description of this concept, in line with the COSPAR guidelines, to align with future recommendations for space governance. Rummel suggests that the standard interpretation that has been widely supported is that 'harmful contamination' is any form of contamination that would cause a disturbance to the normal balance.<sup>53</sup> This, however, is only one definition and depending on the state or scientific opinion, this changes as to what they class as harmful. According to COSPAR, when carrying out scientific investigations of celestial bodies, possible extra-terrestrial life forms need not be jeopardised.<sup>54</sup>

*Article IX of the OST is the legal basis that underpins the recommendations of COSPAR.<sup>55</sup> Provisions for Planetary Protection Policy are also detailed in the Moon Agreement, precisely, Article 7 (1), with the central idea requiring State Parties to prevent disrupting the existing balance of the Moon environment.<sup>56</sup> COSPAR develops crucial recommendations pertaining to avoidance of interplanetary contamination; hence protection, following the best multidisciplinary scientific advice available at the time.<sup>57</sup> At this point, it should be noted that COSPAR does not create laws,<sup>58</sup> but makes recommendations on space activities.<sup>59</sup> Therefore, the use of COSPAR in the creation of customary principles by non-state parties would be an area of expansion where the literature gaps vary. There are no suggestions that an international or non-state party has created custom laws for space, which will be further considered as part of a more extensive debate within the thesis. COSPAR guidelines have a place within the future of space governance, considering their influences concerning the prevention of planetary*

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<sup>52</sup> Committee on Space Research (COSPAR) Committee on Space Research (COSPAR) » About (cnes.fr) accessed 20/04/23, Committee on Space Research (COSPAR) Committee on Space Research (COSPAR) » Panel on Planetary Protection (PPP) (cnes.fr) accessed 20/04/23

<sup>53</sup> Rummel JD, Race MS and Horneck G, 'Ethical considerations for planetary protection in space exploration: a workshop' (2012) 12 *Astrobiology* 1017

<sup>54</sup> NR Council and others, *Preventing the Forward Contamination of Mars* (National Academies Press 2006) 2

<sup>55</sup> NR Council and others, *Preventing the Forward Contamination of Mars* (National Academies Press 2006) 2

<sup>56</sup> , Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (34/68, 1979) *Article 7 (1)*

<sup>57</sup> Committee on Space Science (COSPAR), *Policy on Planetary Protection*, (2020) Accessed 15/12/20 *PPPolicyJune-2020\_Final\_Web.pdf* (cnes.fr)

<sup>58</sup> Freeland S, *The role of 'soft law' in public international law and its relevance to the International Legal Regulation of Outer Space* (2012) 23-28

<sup>59</sup> 'Statute of the Court | International Court of Justice' (2019) Article 38 (d)

contamination. Space agencies such as the European Space Agency (ESA), Japan Aerospace Exploration Agency (JAXA) and NASA will all be significantly considered in their approach to COSPAR and implementations of Planetary Protection Policy, the variants and the different approaches taken by states. The recommendations proposed are dependent on the specific space mission and the celestial body that the scientists explore. *The COSPAR Planetary Protection Policy* groups the missions into five categories, which were highlighted earlier, and are reviewed below in detail, for a better understanding of their implications on space law, governance, and future protections.

For Category I it is crucial to note that there is no warrant to protect such bodies. COSPAR policy does not have any requirements or guidelines to protect such bodies as they are not part of the central role of exploring and understanding the origin of human life or any chemical process related to life.<sup>60</sup> This category implies that a planetary protection requirement by the COSPAR policy is not warranted. There is no risk of forward contamination as these bodies are not part of the study of life's origin. In other words, space law and governance are inapplicable in such missions, but the science community should remain prepared if there needs to be protection laws. A blanket policy, as demonstrated in article IX, may work for all future space activities. The allowance of all or nothing provides a dangerous precedent. The category defined that there is no need to investigate as these bodies hold no evidence of life's origins. This approach must legally be questioned and under such a category cannot reflect preserving a space environment only when it provides a reason for being.

Category II presents an opportunity for future governance, which should be associated with relevant laws both domestically and internationally. COSPAR policy requires the scientific community only to ensure its simple documentation. Under this second category, there is a heightened level of planetary protection, with the central purpose of preventing forward contamination. Category III missions require a significant level of space governance, considering their high risk of contamination. Private firms that fail to adhere to the set COSPAR guidelines should be restricted from executing their outer space missions for purposes of preventing any biological or organic contamination of other planetary bodies. To this end, COSPAR guidelines could be considered to hold a relevant place in the future of space governance and planetary protection. However, this could create non-compliant states, who disagree with COSPAR and believe that their planetary protection is incorrect. The states'

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<sup>60</sup> Committee on Space Science (COSPAR), Policy on Planetary Protection, (2020) Accessed 15/12/20 [PPPolicyJune-2020\\_Final\\_Web.pdf \(cnes.fr\)](#)

sovereignty is observed and upheld under international law, to which creates and enhances the platform and importance of space governance.

The primary distinguishing factor of Category IV is that scientific opinion is linked with a significant contamination chance that is highly likely to contaminate future investigations. COSPAR policy places strict requirements for the Category IV missions; for instance, there should be detailed documentation. Debus noted that it is believed that numerous bacterial spores have been transferred from Earth to Mars using spacecraft, whereby even sterilising the spacecraft has been unsuccessful in preventing forward contamination.<sup>61</sup> With this knowledge, the need to enhance space governance and future protections cannot be overstated. One recommendation is using cleanrooms, which are environments with controlled degrees of contaminants, and utilised in decontamination procedures.<sup>62</sup> Category V missions, entail all Earth-return missions. It is evident that this category, if not well managed and controlled, could lead to massive backwards contamination if life were in existence on the target body. These missions are concerned with safeguarding the Earth, the Moon, and the terrestrial system, with the idea that the Moon requires protection from backward contamination to ensure freedom from planetary protection obligations on Earth Moon travel.<sup>63</sup> The significance of this category places a greater emphasis on the OST. Although other categories attempt to adopt regulations on forward contamination, category V draws directly from international law. It is accepted by all states that forward contamination is a possible concern. The differences occur when managing and classifying forward contamination in mission format. A further gap must discover the accepted format for forward contamination and whether it falls under state practice and/or customary law.

The above concepts will play an instrumental feature in all aspects of the project to understand the nature of the current space activities and the relationship between COSPAR, other international bodies, states and what the future looks like for space governance. The conscious development between COSPAR and the use of article IX of the OST reads to create soft law within the space community. The next section will consider, in brief, planetary protection and space governance as to their functionality. Moreover, it will consider at this early stage the considerations and gaps that will be explored throughout.

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<sup>61</sup> Debus A, 'Estimation and assessment of Mars contamination' (2005) 35 *Advances in space research* 1648

<sup>62</sup> Committee on Space Science (COSPAR), Policy on Planetary Protection, (2020) Accessed 15/12/20 [PPPolicyJune-2020\\_Final\\_Web.pdf \(cnes.fr\)](#)

<sup>63</sup> Committee on Space Science (COSPAR), Policy on Planetary Protection, (2020) Accessed 15/12/20 [PPPolicyJune-2020\\_Final\\_Web.pdf \(cnes.fr\)](#)



### ***2.3.1 COSPAR Planetary Protection Guidelines and Space Governance***

There is an apparent conflict between the goals and interests of the 21<sup>st</sup> Century exploiting planetary resources, whether it be planned sample missions or the plans and uses of celestial bodies. There should be a new and better strategy to settle the conflict to ensure that planetary protection and space governance is promoted. Almar argued in 2002 that planetary scientists within COSPAR need to survey and further evaluate the known planetary environments and establish their scientific value and uniqueness.<sup>64</sup> Since 2002, this has been widely applied to all space explorations which future demonstrates the sensitivity of planetary environments differs and whether a value or prediction is acceptable. Space governance needs to ensure the legal protection of the international scientific endeavours, within an international environment protection agreement or a treaty. These abstract areas are discussed in soft law policies, but not in the overall international legal structure. However, while a new treaty has been considered<sup>65</sup>, the cracks and divides seen in international environmental law could potentially apply to space. International space law offers a foundation and yet an intermediate stage for space within the wider legal sphere of international public law. The fundamental consideration should be that planetary protection, and the space environment, should be greatly focused on before new space activities occur. This should be closely linked to constructive space governance and a remit that considers science, technology, non-state actors and legal bodies.

COSPAR's Planetary Protection Policy is a successful tool that ensures that outer space does not suffer the dangers of harmful contamination. Similarly, the COSPAR Planetary Protection Policy helps prevent adverse alterations in the Earth's environment, all of which are robust goals of space governance. While COSPAR policy offers guidelines relevant to planetary protection, it should be noted that it cannot create law.<sup>66</sup> Nonetheless, there is a gap in the literature regarding the actual influence that COSPAR's guidelines have on space laws and customs. Moreover, there is a lack of collaboration between bodies charged with ensuring safe, pristine environments, a provision which would be fruitful in ensuring uniformity of laws in different states, hence universality of enforcement. The precedent and allowance of the WTO's dispute resolution mechanism have the potential and optimistic approach to mimic space

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<sup>64</sup> Almar I, 'What could COSPAR do to protect the planetary and space environment?' (2002) 30 *Advances in space research* 1577

<sup>65</sup> Ramin Skibba "it's Time for a New International Space Treaty", 2021 [It's Time for a New International Space Treaty | RealClearScience](#) accessed 23/11/22 2

<sup>66</sup> Cypser DA, 'INTERNATIONAL LAW AND POLICY OF EXTRATERRESTRIAL PLANETARY PROTECTION' (1993) 33 *Jurimetrics* 315

exploration. Charging a body to act would create an additional layer currently not known by states.

This further shows literature gaps in international laws as to application, development, and growth of the OST in real time. There is no enforcement to address conflicts from the unsustainable exploration of outer space by states and private companies. Moreover, international law, practice, and custom leaves space governance in an area in which some states will agree to non-binding agreements, and others will not. Not discounting international space law's sphere and the need for a unified reform of hard law, the acceptance of the OST being a foundational document that can be built upon may allow space governance to expand into the future. In principle, the terms that allowed the OST to be created are still valid. The shift of nuclear war is exchanged for a current threat of satellites, shuttles and new age technology which brings to the table the possibility of a disaster that rivals the reason that created the OST.

The extent to which states comply with Planetary Protection Policy and regulatory action, determines the sustainability of the continually changing legal regime for outer space.<sup>67</sup> Such actions can only be used to promote 'non-binding' or 'voluntary' agreements. The main challenge to this legal regime's sustainability is understood to be the shift from 'hard' law to 'soft' law as analysed earlier. Therefore, there is a need to ensure that space governance focuses on imposing strict consequences for entities and states that engage in detrimental space activities. Jim Bridenstine, the NASA Administrator from 2018 to 2020, argues the entire world needs to step up and emphasise the practicality of consequences of engaging in space contamination.<sup>68</sup> Even though there are calls to make the outer space regime more 'binding', there is a gap in the literature on how COSPAR's policy can be made more effective given the non-compliance and disagreements from the likes of NASA.

The space environment is fragile and without a proactive law, most sectors could be brought together either as an appendix to the Outer Space Treaty, or a new treaty that used the Outer Space Treaty and builds upon the articles. It would be counterproductive however to archive the OST for a new treaty. These foundations have continued since 1967 and are therefore relevant. Where updating is needed, such as a Planetary Protection Policy and active use of space, the law must produce legal authority to what the likes of COSPAR and space agencies are doing. From the review of current literature, there is a gap on whether space governance

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<sup>67</sup> Martinez LF, 'Legal regime sustainability in outer space: theory and practice' (2019) 2 Global Sustainability 26

<sup>68</sup> Urrutia DE, 'India's Anti-Satellite Missile Test Is a Big Deal. Here's Why.'<https://www.space.com/india-anti-satellite-test-significance.html> accessed 27/10/22 12

regulations will be binding in the future, considering the recommendation of a voluntary, non-binding forum.<sup>69</sup> The options for current space activities, and the issues that appear in the OST, create two questions that must be answered. Either a new international space treaty is developed to manage new space activities and issues that need to be addressed under current international law, or space governance should be given an increased mandate to continue to develop non-binding agreements for space development. As already discussed, soft law will positively affect space governance, but states can still refuse these actions in favour of their own ideas or that of another state. With the difference of opinion between the US and COSPAR over planetary protection, a framework should be agreed on what is accepted by all at this stage in space development. However, the similarities between space and the discussions around climate change can be pointed out. Overtime, the opinion and collaboration of states and international bodies and or organisations must develop to a central position to better adapt for space exploration. Given that environmental law struggles to meet an agreement on how best to address environmental disasters due to states favouring economic growth over mitigation, it seems that space may follow this route if not addressed.

COSPAR guidelines require the law so they can incorporate planetary protection with the proposals discussed above. The COSPAR guidelines and policies seem to be demanding and ethically cumbersome as they are associated with significant protection levels. Future plans by non-state actors provide an interesting time for space, lawyers, scientists, and engineers, however this also comes with anxiety. The law fails to provide adequate protection for celestial bodies and does not offer extensive foresight for backwards contamination. The enhancement of treaty law, unless unified by the international community, does not seem to be preferred. The divide between international philosophies and geopolitics continues to grow with differences in Planetary Protection Policy and space activities in general. However, the eagerness of lawyers, academics and so forth all remain optimistic and ready to promote space readiness for the future. It is the vision of the researcher to consider the primary option of an Outer Space Treaty part two. However, while being pragmatic, the realisation that the engagement of space governance through soft law, non-binding agreements and bilateral treaties seem to be the most preferred among the international community.

<sup>69</sup> NASA, 'The Global Exploration Strategy Framework: Executive Summary' [The Global Exploration Strategy: \(nasa.gov\)](https://www.nasa.gov/explorationstrategy/), accessed 14/02/22, 1-25

## **2.4 Conclusion**

Throughout this introduction, many gaps are present within the literature that has been discussed with the focus on COSPAR, planetary protection, space governance and space law. These gaps are original, and with the expectation of smaller pieces of work, this thesis is unique as it aims to bring together law, and non-governmental organisations as well as the state. By bringing these areas together the thesis aims at bringing a new legal perspective as well as considering what potential there is for a governance model. Moreover, the future of COSPAR will be mooted, to understand the legal ability of Planetary Protection Policy and the overall need for such a concept. It is accepted that space law will be considered as a foundation, but a narrow approach will be taken. Areas such as state responsibility, the Vienna Convention and the foundations of international law will also be necessary to set the scene and develop space governance, planetary protection and COSPAR. Questions will revolve around soft law, international law, space agencies and agreements made either bilaterally or multilaterally. Moving further afield, attempting to select leading space-faring states to consider Planetary Protection Policy will play a heavy focus on establishing an agreed norm and the points left. The role of COSPAR is highly respected. Whether under international law, COSPAR could create customary law, or balance through state practice, and all will be a consideration of this thesis. The consideration and development of what is the future of space governance and planetary protection will remain the running theme to which this project seeks to provide an original and innovative answer.

### 3 Chapter Three: The Foundations of Space

#### 3.1 Space Governance

To develop and answer the question on the future of space governance, a varied approach to the different aspects will be considered. The understanding and developing nature of the current governance model will be discussed to discover whether this is the best option for the future of a governance model. Space governance is derived from global governance which entails the management of an issue of international interest and relates to human activities within outer space, such as satellite installations and uses of space objects.<sup>70</sup> Nonetheless, global governance is comprehensive and thus is prone to varied descriptions and versions. As such, many individuals find it quite challenging to describe the term global governance. Critics argue that the term does not consider the real issues and tend to ignore the issues affecting countries in the southern hemisphere.<sup>71</sup><sup>72</sup><sup>73</sup> The current outlay of space governance affects the safety of space by analysing space debris issues which involve avoiding predictable collisions as well as orbital debris mitigation and remediation.<sup>74</sup> The various organisations available for international space governance ensure that the policies developed are effective by having representation from all member states. UNCOPUOS offers a number of committees to safeguard those considerations of the various international regulations, such that consistent space governance can be achieved. The current space governance outlay has also warranted five core space treaties which has enhanced the transition of the international space law community to adopt bilateral and multilateral agreements on space treaties.<sup>75</sup> Essentially, the space law treaties were first developed and signed between 1967 and 1979.<sup>76</sup> All major treaties were adopted and negotiated by UNCOPUOS, with the US and USSR taking the lead. One of the critical treaties was the 1967 Outer Space Treaty (OST) that contained norms and principles regarding space law.<sup>77</sup> After the formation of OST, other treaties followed, such as those

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<sup>70</sup> Wise RD, 'Is there a space for counterhegemonic participation? Civil society in the global governance of migration' (2018) 15 *Globalizations* 746

<sup>71</sup> Wise RD, 'Is there a space for counterhegemonic participation? Civil society in the global governance of migration' (2018) 15 *Globalizations* 746

<sup>72</sup> Gallagher NW, 'Space Governance and International Cooperation' (2010) 8 *Astropolitics* 256

<sup>73</sup> Javier Solana and Saz-Carranza A, 'Treating Global Governance Seriously' (2015) 75 *Public Administration Review* 776

<sup>74</sup> Libman A and Obydenkova AV, 'Global governance and Eurasian international organisations: lessons learned and future agenda' (2021) 33 *post-communist economies* 359

<sup>75</sup> Oltrogge DL and Christensen IA, 'Space governance in the new space era' (2020) 7 *Journal of space safety engineering* 432

<sup>76</sup> Oltrogge DL and Christensen IA, 'Space governance in the new space era' (2020) 7 *Journal of space safety engineering* 432

<sup>77</sup> United Nations. Office for Outer Space Affairs and United Nations. General Assembly, 2002. *United Nations Treaties and Principles on Outer Space*, [UNOOSA](#) [accessed 22/07/22]

focusing on space objects registration, astronauts rescue and agreement of usages of the Moon.<sup>78</sup> In this way, best practices by various industries in the UNCOPUOS member states can be voluntarily accepted, such that self-governance are favoured by space operators as well as the commercial industry. Moreover, space industry associations that know what works best for the various operators have also been formed with established norms and behaviours. The establish the expected behaviour, regulatory standards, and education to space operators such as the UK Space Industry Act 2018<sup>79</sup> and the NASA Act 1958 in the US.<sup>81</sup> Domestic space industry such as the European Space Agency assist in keeping pace with rapid innovations happening in the industry. As a result, stakeholders within the space industry seek to implement strategies that reduce the inconveniences that may be caused by the regulations formulated.<sup>82</sup>

Contrary to the previous four treaties, the fifth treaty was only accepted among 18 member states and is popularly known as the Moon Agreement of 1979.<sup>83</sup> The treaty was adopted by UNCOPUOS with consensus even though it is not binding upon all states because most countries could refuse to sign it claiming that they do not have resources to explore other planets and the moon. Whereas the Moon Agreement is employed for legal analysis, to develop future plans for robotic and human exploration of other planets and the Moon. The agreement also creates a sort of a paradoxical approach to legal understanding. Space is the final area to which resources are in abundance, and therefore major space actors were all nervous about legally binding their “intrinsic rights” to use such resources. Most importantly, four space law treaties are widely accepted across the board. The significant factors that are more likely to guide the processes of space governance include UNCOPUOS and the UNOOSA and their sub-committees.<sup>84</sup> In addition, the United Nations General Assembly (UNGA) declarations' principles regarding space issues and soft laws and instruments like the 2007 Space Debris Mitigation guidelines are intended to avoid issues of either collisions or injury in outer space. Furthermore, space governance focuses on different activities relating to the multilateral

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<sup>78</sup> Palmroth M and others, 'Toward Sustainable Use of Space: Economic, Technological, and Legal Perspectives' (2021) 57 Space policy 10-14, 28

<sup>79</sup> Space Industry Act 2018 [Space Industry Act 2018 \(legislation.gov.uk\)](https://www.legislation.gov.uk/ukpga/2018/12/section/1) [Accessed 17/11/22]

<sup>80</sup> Government U, 'The Space Industry Regulations 2020' (2020) 2020 No. [Accessed 19th November 2021]

<sup>81</sup> NASA, 'National Aeronautics and Space Act of 1958 (Unamended)' (2019) [Accessed 19th November 2021].

<sup>82</sup> Palmroth M and others, 'Toward Sustainable Use of Space: Economic, Technological, and Legal Perspectives' (2021) 57 Space policy 10-14,28

<sup>83</sup> Hansen-Magnusson H, Vetterlein A and Wiener A, 'The problem of non-compliance: knowledge gaps and moments of contestation in global governance' (2018) 23 Journal of international relations and development 636

<sup>84</sup> Yang L and others, 'Building a compound and collaborative governance framework to improve international space sustainability' (2021) Global Public Policy and Governance 11

forums, research institutions and authorities of the national governments that can disrupt the behaviours of the actors within outer space.<sup>85</sup> Space governance also considers the threats posed by the accumulation of debris in orbit and seeks to manage the issue through different organizations, including United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) and Inter-agency Space Debris Coordination Committee (IDAC). It is clear from an early perspective that the foundational element of space governance is cemented within the international community. In examining the dichotomy of UNCOPUOS and the powers it has, the major issues explored include the binding agreements, authority, and rationale for space governance. Further considerations and conclusions will seek to bring out the strengths and weaknesses of space governance and hint at what may be the possible issues. These hints and emphasised conclusions will be pulled together in the overall conclusion in a critical analysis of space and global governance. The following sections will discuss the committees on which UNCOPUOS mandates space.

### **3.2 Committee on the Peaceful Uses of Outer Space**

UNCOPUOS consists of two sub-committees: Scientific and Technical Subcommittees (STSC) and Legal Subcommittees, which were formed under the UN General Assembly (GA) Resolution guidelines.<sup>86</sup> The Scientific and Technical Sub-committees meet for two weeks on an annual basis to discuss critical issues relating to knowledge and device usage. Studies have revealed that the General Assembly was to develop measures that can address the new global legal problems, but the resulting processes were extremely political and thus unlikely to consider new space technologies.<sup>8788</sup> Seemingly, the establishment of UNCOPUOS was quite successful when considering the Soviet International law theory which stipulates that most of the guidelines are as a result of necessities.<sup>89</sup> A key premise of the theory is that society develops according to specific issues in which laws are made to connect and manage the social phenomena. In the context of international space, laws are required to ensure responsible usage and minimize pollution.<sup>90</sup> Essentially, UNCOPUOS has been instrumental in the development

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<sup>85</sup> Oltrogge DL and Christensen IA, 'Space governance in the new space era' (2020) 7 Journal of space safety engineering 432

<sup>86</sup> Martinez P, 'The UN COPUOS Guidelines for the Long-term Sustainability of Outer Space Activities' (2021) 8 Journal of Space Safety Engineering 98

<sup>87</sup> Zwart Md, 'Developing Effective Space Traffic Management to Promote Sustainable Uses of Outer Space' (2020) 3-9

<sup>88</sup> Bellamy AJ and Dunne T, The Oxford Handbook of the Responsibility to Protect (Oxford University Press 2016) 112

<sup>89</sup> Halunko V, 'Space Law: The Present and the Future' (2019) 3 Advanced Space Law 30

<sup>90</sup> 'Soviet theories of international law' (1953) 4 Soviet Studies 334

of international space guidelines. Among the outer space treaties that were negotiated, different sets of provisions were formed. The move shows the role that the UNCOPUOS plays in making sure that the interests of all the member states are considered.

Although the Committee has become fruitful in championing the legal matters that affect space operations and activities, there have been growing concerns to undertake reforms within the committees, as the UNCOPUOS lacks the political will to adhere to the legal matters relating to space explorations strictly.<sup>91</sup> On the other hand, the Committee is critical in balancing the inadequacies within the legal framework. It becomes challenging to realize the positive outcomes, as the Committee is not mandated to undertake the various space activities.<sup>92</sup> The advancements within the space industry, such as reducing political conflicts, reaffirm the commitment of the United Nations and its related space committees in advocating for the changes within the space laws.<sup>93</sup> Indeed, the concerns and issues provided by the different member states can be considered when the right strategies regarding the usage of outer space explorations are deeply considered. Essentially, the voting procedure of the UNCOPUOS has made it possible for the low-ranking member states to give their opinions on the space laws. The annual reports of the Committee reveal a decrease in attendance among the member states such as only 79 states being represented in the 2019 meeting instead of the 92 states who form part of the organization,<sup>94</sup> and thus ongoing discussions regarding the contemporary issues that affect the exploration of outer space have been limited. The move illustrates the need to reorganize the UNCOPUOS working procedures when it comes to outer space explorations.

### ***3.2.1 Scientific and technical committees***

Having been established on 13<sup>th</sup> December 1958, the United Nations Committee on Peaceful Uses of Outer Space considers various issues affecting the usage of outer space.<sup>95</sup> In line with the United Nations General Assembly Resolution 1348 (XIII), UNCOPUOS was established

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<sup>91</sup> Kopal V, 'TREATY ON PRINCIPLES GOVERNING THE ACTIVITIES OF STATES IN THE EXPLORATION AND USE OF OUTER SPACE, INCLUDING THE MOON AND OTHER CELESTIAL BODIES' (2008) United Nations Audiovisual Library of International Law 1-7

<sup>92</sup> DURKEE\* MJ, 'INTERSTITIAL SPACE LAW' [VOL. 97:423 424 WASHINGTON UNIVERSITY LAW REVIEW 425-271

<sup>93</sup> Benvenisti E, 'Upholding democracy amid the challenges of new technology: What role for the law of global governance?' (2018) 29 European journal of international law 671

<sup>94</sup> COPUOS. (2019). Report of the committee on the peaceful uses of outer space: Sixty-second session (12-21 June 2019). UN. [https://www.unoosa.org/res/oosadoc/data/documents/2019/a/a7420\\_0.html/V1906077.pdf](https://www.unoosa.org/res/oosadoc/data/documents/2019/a/a7420_0.html/V1906077.pdf) accessed 22/07/22

<sup>95</sup> Froehlich A, Seffinga V and Qiu R, 'Initial Mandates of the Committee on the Peaceful Uses of Outer Space (COPUOS) and the Conference on Disarmament (CD)', (Studies in Space Policy, Springer International Publishing 2019) 7-28



to prevent the involvement of rivalries within the new space field.<sup>96</sup> Besides, the guiding principle was that outer space needs to be used purposefully for peace. During the establishment of the ad hoc committee, there were only 18 members, and this was a major achievement as there were conflicts between the Soviet Union and the US. After forming an ad hoc committee, the UNGA passed the 1472 (XIV) resolution, thus ensuring the UNCOPUOS becomes a permanent organization within the United Nations, thus increasing the number of members to 24.<sup>97</sup> The purpose of the ad hoc committees was to analyse and come up with practical programs that ensure peace within outer spaces while at the same time, considering the UN provisions.

Moreover, the ad hoc committees assessed the numerous space-related activities and equally understand the emerging legal problems relating to outer space activities.<sup>98</sup> Given that UNCOPUOS was a component of UNGA, it was possible to understand the political dynamics and frameworks surrounding outer space activities. The number of members joining the UNCOPUOS has continued to rise steadily and thus becoming one of the UN's biggest committees. Reports and studies have highlighted that as of late December 2019, there were approximately 95 members, with Singapore, Dominican Republic and Rwanda joining the organization.<sup>99</sup> The rise in membership of UNCOPUOS shows the diversity, as countries without clear space programs have continued to join the organization. Moreover, countries with comprehensive space programs have also joined the organization, including Russia, India, and China. The increasing number of member states reveals a rise in discussion and interest from these members to form part of the discussions concerning outer space. The development of space through UNCOPUOS creates a need for other member states to join the international organization and for that reason, there are expectations that the growth will improve in the coming decades provided UNCOPUOS is within the global map.<sup>100</sup> It does emerge that governmental organisations such as the International Telecommunication Union and the World Meteorological Organisation have joined the Committee. These two bodies although referred

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<sup>96</sup> Petrovici G, 'Satellite Constellations and the Sustainable Use of Outer Space: Long-Term Sustainability Guidelines as an Incentive Towards more Responsible Behaviour in Outer Space', (Studies in Space Policy, Springer International Publishing 2021) 123–142

<sup>97</sup> Johnson-Freese J, 'Build on the outer space treaty' (2017) 550 Nature (London) 182

<sup>98</sup> Freeland S, 'Overview of Current International Space Law in the Context of Planetary Defence', Legal Aspects of Planetary Defence (Brill Nijhoff 2021) 18

<sup>99</sup> UNOOSA, (2021) 'Committee on the Peaceful Uses of Outer Space: Membership Evolution' <https://www.unoosa.org/oosa/en/ourwork/copuos/members/evolution.html> accessed 22/07/22

<sup>100</sup> Freeland S and Zhao Y, 'Rules of the "Space Road:" How Soft Law Principles Interact with Customary International Law for the Regulation of Space Activities' (2020) 44 J Space L 405

will be excluded from this thesis and will only be used as examples. Although necessary while understanding the wider view of outer space, they are limited to the view of the future of space governance and planetary protection.

UNCOPUOS has found it quite challenging to negotiate new treaties with the unwilling states, even though soft guidelines exist that ensure safety standards. UNCOPUOS is answerable to the UNGA special political and decolonization committee that is charged with ensuring successful discussions concerning the cooperative usage of outer space.<sup>101</sup> The yearly resolution that can happen without a single vote offers a framework for the committee to work effectively. All the decisions of UNCOPUOS are passed through a consensus. Although consensus involves considering stakeholders' input so that generated outcomes acknowledge the perspectives of all participants and meet the needs of the entire group, the process can be manipulated and stakeholders coerced into agreement.<sup>102</sup> Nevertheless, consensus enables cooperation among stakeholders thereby ensuring they can negotiate their demands, and at the same time make formal commitments concerning the operations within outer space. Moreover, within UNCOPUOS, a no-objection process of consensus is often employed whenever the chairman of the committee has noted that the discussions have taken a substantial form. The move is often contrary to the other existing United Nations bodies that do consider the number of votes when it comes to a decision-making process.<sup>103</sup>

Similarly, the Legal Subcommittee holds annual meetings to discuss the legal frameworks and issues linked to the usage of outer space. The Legal Subcommittees also assess the relevant applications made by the UN treaties within outer space. These two sub-committees made it possible for UNCOPUOS to be on the global map and equally gained status as one of the frameworks responsible for outer space's legal matters.<sup>104</sup> Most importantly, the committees concentrate on the relevant issues of space debris and weapon usage in general. Ideally, the formation of these conferences dictates how space weapons need to be utilized within outer space. With its origin tracing back to the 1960s, the UN Office for Outer Space Affairs

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<sup>101</sup> Di Pippo S and Journal of International A, "SPACE PROVIDES THE REQUIRED MAGNITUDE OF PERSPECTIVE. IT UNITES US TOWARDS COMMON GOALS" (2018) 71 Journal of International Affairs 116

<sup>102</sup> Price J and Cybulski J, 'Consensus Making in Requirements Negotiation: the communication perspective' (2005) 13 AJIS Australasian journal of information systems 1-6

<sup>103</sup> Baitukayeva D, Achilleas P and Baitukayeva A, 'International cooperation of states in outer space exploration' (2020) 90 KazNU BULLETIN International relations and international law series 45

<sup>104</sup> Yearbook of International Disaster Law; Volume 2 (Ringgold, Inc 2021)

considers all crucial issues raised by UNCOPUOS.<sup>105</sup> The issues involve the appointment of the secretariat and the implementation of all the decisions by the UNGA. The office equally ensures that the member states are empowered through capacity building concerning space technologies. All these processes are often undertaken through space application programs initiated by the UN. Essentially, countries' obligations to register their space objects are based on treaties and the GA Resolution 1962. The scientific and technical sub-committee cannot be underplayed since it plays a crucial part in promoting the involvement of the Committee on Space Research (COSPAR) and other space science organisations to participate in space law development and governance.

### ***3.2.2 Legal Subcommittee***

The legal subcommittee of UNCOPUOS is composed of many member state representatives that collaborate on policy development concerning outer space. The legal subcommittee has several working groups that facilitate the implementation of decisions passed. The first working group on the UN outer space treaties has the mandate to review and implement them, as well as address the obstacles to the treaties. The working group also reviews the universal acceptance of the treaties as well as promotes space law by collaborating with the UN Programme on Space Application.<sup>106</sup> The working group has worked over the years in applying the implementation of the "launching state" concept, as well as continuing the review and synthesis of responses related to the answers to the questions to the Moon Agreement. Among the issues of the Moon, the agreement includes its benefits, provisions, and principles, as well as states' liabilities to the UN treaties. The issue of liabilities is particularly important in space activities because high levels of risk inherent to space activities, and impact on health of the travellers. Following the death of Christa McAuliffe in the failed Nasa Challenger Mission, participants in space travelling programs sign waivers of liability to show that they understand the risks of injury and death and will not be compensated in case of their occurrence.<sup>107</sup> Private companies such as SpaceX have highlighted their intention to circumvent the private tort rights by mandating space travellers to sign waivers on liability outside of their host states' in which national legislation protects the wider community from liability.<sup>108</sup> The working group of the

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<sup>105</sup> Craven M, 'Other spaces': Constructing the legal architecture of a cold war commons and the scientific-technical imaginary of outer space' (2019) 30 *European journal of international law* 547

<sup>106</sup> Aganaba-Jeanty T, 'Introducing the Cosmopolitan Approaches to International Law (CAIL) lens to analyze governance issues as they affect emerging and aspirant space actors' (2016) 37 *Space policy* 3

<sup>107</sup> McSweeney C, 'The Colonization of Mars: What Legal Issues Will Arise out of a Multi-Planetary Existence?' – *Journal of High Technology Law* (2018) 1

<sup>108</sup> McSweeney C, 'The Colonization of Mars: What Legal Issues Will Arise out of a Multi-Planetary Existence?' – *Journal of High Technology Law* (2018) 1

legal subcommittee also addresses issues that relate to space object registration, ownership, and control as well as a jurisdiction to ensure that regulatory issues are comprehensively addressed.<sup>109</sup>

On the other hand, the second working group is mandated to handle the scope and definition of outer space issues. Specifically, working groups of UNCOPUOS are allocated different projects to execute and ensure the development of outer space legislation on key global issues.<sup>110</sup> For instance, there is a working group on the “Space2030” agenda that is focused on creating a comprehensive, long-term sustainable development plan for outer space activities. In the plan, the working group emphasizes global collaboration by both government and private entities involved in outer space operations, unlike previous regulations which mainly targeted public organizations.<sup>111</sup> The other working groups of UNCOPUOS focus on priority projects such as space cooperation for global health, a framework for space weather services and enhancing information exchange on space objects and events.<sup>112</sup> In this respect, it is realized that working groups play a crucial role in undertaking preliminary research and analysis that guide policy formulation by UNCOPUOS legal and technical subcommittee. Further, the working group on space resources assists in exchanging views that are related to legal models on exploration, exploitation, and use of outer space resources.

UNCOPUOS’ Legal Subcommittee meets annually to review and analyse legal issues and questions on outer space exploration. However, it has been noted that even under the UNCOPUOS, the legal subcommittee is sometimes side-lined during the development of the regulations. To become more effective in regulations’ development, the subcommittee should maintain coherence in developing norms in international space laws. Moreover, the legal subcommittee has played a fundamental role not only in the development, but also in the interpretation of laws regarding space activities to avoid conflict between countries. The legal subcommittee also addresses the problems of international law in a detailed and comprehensive manner by considering the international and space treaties as related to the subject matter. The subcommittee is expected to submit annual reports to UNCOPUOS on its work. UNCOPUOS in turn submits the general report to the general assembly of the UN. The reports are crucial in

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<sup>109</sup> McSweeney C, 'The Colonization of Mars: What Legal Issues Will Arise out of a Multi-Planetary Existence?' – Journal of High Technology Law' (2018) 1

<sup>110</sup> Space COPUOS, 'Working Group on the "Space2030" Agenda' (2020) <https://www.unoosa.org/oosa/en/ourwork/copuos/working-groups.html> Accessed 22/07/22

<sup>111</sup> Revised Zero draft of the “Space2030” Agenda and implementation plan (A/AC105/2019/CRP15, 2019)

<sup>112</sup> Space COPUOS, 'Working Group on the "Space2030" Agenda' (2020) <https://www.unoosa.org/oosa/en/ourwork/copuos/working-groups.html> Accessed 22/07/22

influencing the special resolutions as well as recommendations that are passed by the UN General Assembly.<sup>113</sup>

Although the legal subcommittee is required to work closely with the technical and scientific subcommittee to comprehensively develop outer space regulations, there have been complaints of a lack of cooperation. In this way, the two sub committees ensure that the resolutions passed, and policies developed are not only acceptable but realistic in addressing issues related to space governance. Special attention is also paid to the issue of international law that is involved in space exploration to improve the effectiveness of the policies recommended by the subcommittee. The subcommittee works to ensure that the rules formulated keep pace with the progress in space exploration.<sup>114</sup> The committee has also set up a special group that assists in the preparation of reference materials as well as rendering the legal assistance that the committee might require. The subcommittee has also prepared guidelines to regulate the various departments on the justification for having different UN secretariat departmental units to manage space exploration legal problems. The guidelines assist the subcommittee in coming up with various determinations on the jurisdictions as regards the termination of the various space governance issues. The legal sub-committee only makes recommendations and cannot afford legal treaties of decisions.

### **3.2.3 UNISPACE+50**

As part of the commemoration of the fiftieth anniversary of the United Nations Conference on the Exploration and Peaceful Uses of the Outer Space (UNISPACE), a summit UNISPACE+50 was held in Vienna in 2018.<sup>115</sup> UNISPACE+50<sup>116</sup> enabled members to reflect on the underlying issues concerning sustainable development.<sup>117</sup> The move implied that the UNCOPUOS activities were strengthened and thus increased international space cooperation. In other words, the UNISPACE+50 ensured that UNCOPUOS becomes an international organization in relation to outer space governance and related activities. Previously, all the conferences were reviewed to strengthen the existing structures of UNOOSA. Part of the conference resolution

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<sup>113</sup> Morss JR, *Good global governance: custom, the cosmopolitan and international law*, vol 3 (International journal of law in context, Cambridge University Press 2007) 59 - 71

<sup>114</sup> Chiu SW, 'Promoting international co-operation in the age of global space governance – A study on on-orbit servicing operations' (2019) 161 *Acta astronautica* 375

<sup>115</sup> Jakhu RS, Chen K-W and Goswami B, 'Threats to Peaceful Purposes of Outer Space: Politics and Law' (2020) 18 *Astropolitics* 22

<sup>116</sup> UNISPACE+50 DOI: <https://www.unoosa.org/oosa/en/ourwork/unispaceplus50/index.html> Accessed 22/07/22

<sup>117</sup> Kosciejew M, 'Public libraries and the UN 2030 Agenda for Sustainable Development' (2020) 46 *IFLA journal* 328

was an endorsement of the United Nations General Assembly (UNGA) Space2030 Agenda. Moreover, UNISPACE sought to improve the contributions of the space activities and tools that can effectively address the long-term outer space agendas.<sup>118</sup> In a bid to guide the operations of the UNISPACE+50, the UNCOPUOS made a decision on the following thematic priorities which included: ensuring the space activities meet the global health standards, increased information exchange among the space objects and related activities, increased partnership in innovativeness, decreased emissions in outer space and capacity building among the members' states.<sup>119</sup>

The UNISPACE+50 concluded with members pledging to commit their efforts and resources towards sustainable outer space usage, hence effectively showing the continuous developments that various member states can carry out in order to realistically bring thriving space governance. With the endorsement of UNISPACE+50, it can be inferred that momentum can be built on developing the Space2030 agenda through the combination of the various soft laws. The momentum is built through the support of the committee and member states in developing the Space2030 agenda, as well as its implementation plan. Moreover, UNISPACE+50 also strengthened global cooperation in space for mutual benefit and for the preservation of future generations. Moreover, the symposiums preceding the conferences such as the UNISPACE+50 also improved the understanding of previous and future trends on outer space activities, hence addressing the role played by space technology, science and cooperation from the various perspectives thus enabling such conferences to thrive. The conferences also enhance the willingness of member states to adopt the peaceful use of space through the resolutions agreed upon on the conclusions of the conference. In essence, UNISPACE+50 improved the governance of space by strengthening cooperation among the various member states.<sup>120121</sup> The international community also collaborated on the future of global space cooperation to optimize its benefit to all countries.<sup>122</sup> In this manner, the conference can be effective in addressing the acceptability of the laws formulated for the continued sustainable use of outer space.

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<sup>118</sup> Nguyen T and others, 'Space 2030: Space for the future, space for all' (2019) 14

<sup>119</sup> Agbedahin AV, 'Sustainable development, Education for Sustainable Development, and the 2030 Agenda for Sustainable Development: Emergence, efficacy, eminence, and future' (2019) 27 Sustainable development (Bradford, West Yorkshire, England) 669

<sup>120</sup> 'UNISPACE+50' <https://www.unoosa.org/oosa/en/ourwork/unispaceplus50/index.html> Accessed 22/07/2022

<sup>121</sup> UUNOfOS Affairs), 'UNISPACE+50 and its Thematic Priority "International Cooperation Towards Low-emission and Resilient Societies": Role of Space Research and Technology' (2008)

<sup>122</sup> UUNOfOS Affairs), 'UNISPACE+50 and its Thematic Priority "International Cooperation Towards Low-emission and Resilient Societies": Role of Space Research and Technology' (2008)

The ability of UNCOPUOS to develop and enhance space governance through a spectrum of non-inverted governance, is a unique aspect of space governance. The enhancement and development of space through governance, instead of laws and legally binding obligations on the state and actors, presents a more driving focused approach to approval-based populism in an area of fast change and challenge. The narrative of space challenges and change through science and technology has only enhanced the use of space through advancement, while suffering from a lack of accepted governance and or laws providing for the arranged activities above the OST. Although this argument will be considered more in Chapter four, it is important to consider the achievements of space governance and the foundation it presents. However, a challenge to space governance is whether this is best suited for the challenges space offers, and whether a more legal narrative and/or performance-based system is needed to regulate future activities which the following ideas will be considered in the coming sections.

### ***3.2.4 Space2030***

The operationalization of the priorities set by the UNISPACE+50 was possible following the establishment of the Space2030 Agenda which largely focused on pillars including diplomacy, accessibility, space society and economy.<sup>123</sup> Realization of the Space2030 Agenda required the creation of a draft that ensured that the outer space operations were in line with sustainable developments. The United Nations draft that stressed the need for Peaceful Uses of Outer Space was adopted by UNCOPUOS during the 61<sup>st</sup> session in June 2018.<sup>124</sup> Part of the recommendations of the meeting was the formation of the working groups that focused on the Space2030 Agenda. In the meantime, the leadership structure dictated that the chairperson's position came from the group representation, particularly from China with the vice-chairperson's position given to Italy and Romania.<sup>125</sup> The Space2030 Agenda tends to focus on the norms and principles that are often echoed within the UNCOPUOS provisions.<sup>126</sup> The majority of the work of Space2030 was undertaken in 2018 when UNOOSA and the UN Office for Partnerships and SpaceTrust co-hosted the event 'Space2030 Agenda'.<sup>127</sup> The necessary

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<sup>123</sup> Gugunskiy D, Chernykh I and Khairutdinov A, *Legal Models for Activities on the Exploration and Utilization of Space Resources: Towards the "Space-2030" Agenda* (Springer International Publishing) 657-664

<sup>124</sup> Galli A and Losch A, 'Beyond planetary protection: What is planetary sustainability and what are its implications for space research?' (2019) 23 *Life sciences in space research* 3

<sup>125</sup> Elaine F, 'CETA and Global Governance Law: What Kind of Model Agreement Is It Really in Law?' (2017) 2 *European Papers* 293

<sup>126</sup> Jakhu RS, Chen K-W and Goswami B, 'Threats to Peaceful Purposes of Outer Space: Politics and Law' (2020) 18 *Astropolitics* 22

<sup>127</sup> 'Space 2030 agenda: Space as a driver for peace' (2022) <https://www.unoosa.org/oosa/en/outreach/events/2018/spacetrust.html> Accessed 22/07/2022.

resolutions 73/6 of 2018 were adopted to make positive changes to the space operations that ensure sustainable developments.

Most importantly, the Space2030 Agenda has promoted collaborations among the member states, including NGOs and private sector entities. The increased collaboration has continued to guide the committees' activities and has ensured that the space activities do not disrupt the peace of the member states.<sup>128</sup> The agenda may align to the diversified space activities and be critical in addressing the problems relating to space and climate change.<sup>129</sup> The collaborations between the working groups of the Space2030 Agenda and UNCOPUOS committee can ensure that the initiatives that strengthen the space tools are handled effectively, and this encourages capacity building among the various member states.<sup>130</sup>

Space2030 can also be viewed as having the possibility to deliver peace as it presents an opportunity for the various member states to reflect on their contributions towards the sustainable space development agenda, and hence can effectively unify soft law. The principles implemented will also enhance global development and explore how collaborative work towards space sustainability can help in realizing the ambitions of space governance. Moreover, member states can also negotiate on the effective principles that enhances outer space's peaceful use to improve policies' acceptability and hence, the creation of fundamental policies in the 21<sup>st</sup> century.<sup>131</sup> Moreover, partnerships can also be developed among the various member states enhanced by Space2030 goals to ensure that the policies that are developed towards the governance of space are universally accepted. Setting goals such as the Space2030 also enhances the prioritization of policies that ensures that the goals are achieved within the timelines set out to keep pace with the innovations and technological growth in the field of space governance. Further, by ensuring that the benefits of space are brought to the Earth through the Space2030 program, policies that are in line with the future space development trends can be formulated by the various member states, hence effectively creating law through the unification of the various soft laws.<sup>132</sup>

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<sup>128</sup> Galli A and Losch A, 'Beyond planetary protection: What is planetary sustainability and what are its implications for space research?' (2019) 23 *Life sciences in space research* 3

<sup>129</sup> Halunko V, 'Space Law: The Present and the Future' (2019) 3 *Advanced Space Law* 30

<sup>130</sup> Jaehnichen T, 'The dynamics of economic action and the problems of its social embedding – Ethical challenges in view of the nascent commercial use of outer space' (2020) 76 *Hervormde theologiese studies* 1

<sup>131</sup> Eberlein B, 'Who Fills the Global Governance Gap? Rethinking the Roles of Business and Government in Global Governance' (2019) 40 *Organization studies* 1125

<sup>132</sup> Eberlein B, 'Who Fills the Global Governance Gap? Rethinking the Roles of Business and Government in Global Governance' (2019) 40 *Organization studies* 1125



UNCOPUOS can be argued to be an authority without influence, but this argument can be made of any international non-legally binding organisation. The argument is supported by Goguichvili et al. who note that *“Often slow to action, limited in authority, and bogged down by political deadlock, international bodies like UNCOPUOS which were established to advance space governance, are failing to further their mission.”*<sup>133</sup> A key challenge which UNCOPUOS has faced involves the entry of private entities in the outer space exploration programs, since unlike national space programs, they are not bound by international treaties such as the Outer Space Treaty.<sup>134</sup> However, the key characteristics of UNCOPUOS develops an historic approach that affords it’s recognition and a developmental aspect to space governance. The creation and engagement with states, NGOs, and space actors, and by openly discussing the space, their affluence, goals and how they understand and see space in the future is motivational and honest. The failure to advance global agreements on space governance through organizations such as UNCOPUOS has led to an increase in national space policies such as the US Artemis Accords that provide a safe and transparent framework for exploring outer space by both the public and private organizations in the country.<sup>135</sup> Regardless, international collaboration regarding outer space operations is still crucial. However, due to the cascading space debris aspect, newer states are finding it harder to access space, in a space-friendly environment in which their heavy investment satellites are safe from debris.<sup>136</sup> Such risk for an established state in space is minimal, but still apparent. The proactive and positive approach from UNCOPUOS enables states to choose, pick and consider guidance from UNCOPUOS and how they would like to engage and develop their own space governance regime for future generations. It is far from an understatement to argue the importance and necessity of UNCOPUOS for space. The researcher places the utmost importance and necessity on the ability of UNCOPUOS as an international body to regulate, but more importantly enhance the uses of space in a successive and pragmatic way for the future and generational enhancement of space activities. Some of the ways UNCOPOUS has formulated the enhancement of space will be discussed in the sections below.

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<sup>133</sup> Goguichvili S, 'The Global Legal Landscape of Space: Who Writes the Rules on the Final Frontier? | Wilson Center' (2021) 1

<sup>134</sup> Goguichvili S, 'The Global Legal Landscape of Space: Who Writes the Rules on the Final Frontier? | Wilson Center' (2021) 1

<sup>135</sup> NASA: Artemis Accords <https://www.nasa.gov/specials/artemis-accords/index.html> accessed 22/07/2022

<sup>136</sup> David L, Space Junk Removal Is Not Going Smoothly (2021) <https://www.scientificamerican.com/article/space-junk-removal-is-not-going-smoothly/> accessed 22/07/22

### **3.3 Foundations of International Law**

The overarching hypothesis is based on whether international law can effectively govern space. This section will consider how international law governs space related activities, the effectiveness of the law and the international community, before considering the hypothetical and designated areas of customary law, state practice and the responsibility of the state.

This section will begin to consider the basics of international law such as the United Nations Charter and how it twins together international politics with the will and insistence of peace, mutual assistance, and development. The rights of the Vienna Convention on the Law of Treaties (VCLT) as its first understanding of international law, the conundrum of its applicability and remit towards space activities. The development throughout will develop a legal foundation for space and future activities with planetary protection while demonstrating whether at an early international legal stage, space activities are equipped under the geopolitical pull of the United Nations Charter and the understanding of treaty interpretation. The thesis will then discuss the foundations of the OST and outline the legal framework and mandates of such a treaty. The OST will play a pivotal part in the understanding of the legalities of space, the grey areas and the areas of development created by the discussions of the legality of space governance.

Space law and the OST will further consider developing articles within the statute such as article three and how international law and practices within the community can strengthen the foundations of the OST and develop laws within reason. To do this, the statute of the International Courts of Justice Article 38 will be invoked to help to develop the consideration of planetary protection and the ability of international law to adapt and solve issues of the present. The introduction of this article will begin the discussion of customary international law and how this is highly debatable and contested. Nevertheless, recognising custom and state practice in space will allow the legal development and understanding of this abstract will attempt to make new norms. The projections of state practice, in addition to customary law, will further help to understand the nature of states and their rationale for space. The development of these areas is fascinating and will develop an understanding of pre-existing norms within and outside of international law. Although these will be touched upon, they will play a larger role in later chapters. The final remarks to this chapter will consider the laws and commitments and whether morally or ethically state responsibility within international law is a greater burden than individual interest. With the acceptance of state sovereignty and the power that wields this, development of the laws of responsibility from a legal, moral, and

ethical aspect. State responsibility and planetary protection play an integral part in space and to better understand both these questions they must be critically analysed and developed to understand how planetary protection operates within the international legal system, and where it fits within the international community.

### **3.3.1 United Nations Charter**

This is an important step in the understanding of international space law, and how it functions within international law. The foundation principles of the United Nations Charter enable states and drafters to have a firm and clear understanding of international principles, obligations, and state responsibility. Moreover, the Vienna Convention which will be discussed in the next section helps further develop this notion of international understanding. Created during the Second World War, the UN Charter creates a foundation of thought that states can focus on, develop, and use with a remit. Drafters use such principles while developing such statutes to further critically and develop such texts and offer states further rationale as to why there is the need for such a statute.

The UN Charter creates more than one voice to which international law can be heard, but it provides a road map of understanding, allowances and appreciation for individualism and allowances for individual states. Although vast, many individual principles are used and have enhanced international law.

For planetary protection at this stage, the UN Charter does not offer much in the way of understanding or application. However, it does offer an understanding of regional arrangements<sup>137</sup>, the use and introduction of the International Court of Justice<sup>138</sup> (ICJ) and the foundational principles which are:

*Article 1(1) Maintenance of international peace and security, Article 1(2) The development of friendly relations, principality of equality and self determination, Article 1(3) The achievement and stabilisation of international cooperation, freedom from discrimination and the willingness to solve issues., Article 1(4) The harmonisation of international actions for a common purpose., Article 2(1) The rights of sovereignty , Article 2(2) The principles of good faith, Article 2(3) To settle disputes by peaceful means, Article 2(4) Not to use the threat of*

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<sup>137</sup> United Nations Charter (1945), Chapter 8, articles 52-54, [Chapter VIII: Regional Arrangements \(Articles 52-54\) | United Nations](#)

<sup>138</sup> United Nations Charter (1945), Chapter 14, articles 92-96, [Chapter XIV: The International Court of Justice \(Articles 92-96\) | United Nations](#)

*force against the territorial integrity or political independence, Article 2(5) International community assistance and cooperation with the United Nations Mandates.*<sup>139</sup>

The importance of articles 1 and 2 above cannot be understated and can only be seen as a positive element through which all the international law is followed and grown from. As will be discussed below, these articles', planetary protection and space law can be understood relatively easily using a literal understanding. The notion of "collective measures for the prevention and the removal of threats..."<sup>140</sup> would give direct application to planetary protection and the need for such action. Even before the conversation begins on what planetary protection is, why is it important, and what is involved, international law through the foundational principles allows the protection of the planet. Planetary protection can perhaps be the poster "space" child for articles 1 and 2, which only leaves the interpretation, understanding and implementation throughout international space law. It is accepted that planetary protection is not a consideration within the UNC, but it does not have to be. These foundations apply to the international community, and therefore when practice changes, the regular norm should be challenged. As the international community is highly politically challenged by their representatives and constituents, states are bound to what is best for the state. As seen in the likes of the Kyoto Protocol,<sup>141</sup> states may have a vested interest in any given area, but should the burden become too great or create a negative effect on the state's economic burden, the state is pressured to act. This was the case when Canada withdrew from the Kyoto protocol, as it would not be possible for them to reach the targets within the protocol without paying a large unreadable economic burden on the state.<sup>142</sup> This is understandable, and yet frustrating for the international community. Nonetheless, it allows the likes of the UN General assembly some understanding of the motives within the current state's beliefs and values.

The UN Charter's principles form a foundational legal jurisprudence on why, and how, legal justification can be considered. The next section seeks to build on such principles and develop further legal understanding before delving into the application of international space law. The understanding nature and demonstration of these articles through international legal

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<sup>139</sup> United Nations Charter (1945), Chapter 2, articles 1-7, [Chapter I: Purposes and Principles \(Articles 1-2\) | United Nations](#)

<sup>140</sup> United Nations Charter (1945), Chapter 1, article 1(1) [Chapter I: Purposes and Principles \(Articles 1-2\) | United Nations](#)

<sup>141</sup> , KYOTO PROTOCOL TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (1997) <[https://unfccc.int/kyoto\\_protocol](https://unfccc.int/kyoto_protocol)>. Accessed 22/07/22

<sup>142</sup> BBC News, Canada pulls out of Kyoto accord (2011) <<https://www.bbc.co.uk/news/world-us-canada-16151310>>.

jurisprudence helps with the understanding and key political development within international space law and planetary protection.

### **3.3.2 Vienna Convention on the Law of Treaties (VCLT)**

The VCLT plays an integral part and stands as a creative and informative part of legal jurisprudence where space is concerned. This section will highlight what the VCLT can offer to space and planetary protection. One critical and early impression is made by the VCLT, which is that the OST and signatories accept the allowance and underpinning of the VCLT. As a younger statute, the VCLT caters for such instances where signatories may consider its approach and whether to add reservations or other forms of issue. Therefore, the suggestion is that article 28 of the VCLT which states:

*“Unless a different intention appears from the treaty or is otherwise established, its provisions do not bind a party in relation to any act or fact which took place or any situation which ceased to exist before the date of the entry into force of the treaty with respect to that party.”<sup>143</sup>*

Therefore, with such an impression and lack of literature arguing that space law does not comply with the VCLT, it is therefore assumed and firmly considered that the VCLT is widely accepted within space law and therefore plays a pivotal understanding and extension within space and the wider international legal community.<sup>144</sup>

The VCLT creates and builds on the importance and discussions stated above on the principles of the United Nations Charter. It advances the international legal system ever so slightly, to allow for creating diplomacy, progressive development, and promotion of the international legal system. This can firmly be seen in the likes of article 26, in which the term *Pacta Sunt Servanda*, is loosely interpreted as the treaty is binding to all. The key to this foundational legal principle is further enhanced in article 26, which brings together this interpretation, and the notion of international good faith. Before moving on to consider how the VCLT works and can be applied in space, we must first digest these early principles. Firstly, the VCLT is legally valid and can be considered a part of international space law, inclusive of the OST. Secondly, the binding of the VCLT is as binding on space law as the treaties, and thirdly the VCLT is a walkthrough of the general interpretation of a treaty, issues that may arise, understanding a treaty and development of the foundational principles of the UN Charter.

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<sup>143</sup> Vienna Convention on the Law of Treaties (1969), article 28

<sup>144</sup> 'Reservations to the Convention on Genocide' (1957) 18 International Law Reports 364

The VCLT notes that the principle of “jus cogens” norms and their habitability within international law. The best and easiest way to describe such characteristics can be found in Human Rights<sup>145</sup> and Genocide conventions<sup>146</sup>. Article 53 of the VCLT states:

*“A treaty is void if, at the time of its conclusion, it conflicts with a peremptory norm of general international law. For the purposes of the present Convention, a peremptory norm of general international law is a norm accepted and recognized by the international community of States as a whole as a norm from which no derogation is permitted and which can be modified only by a subsequent norm of general international law having the same character.”<sup>147</sup>*

It is not to say at this stage, or any, that a jus cogens norm will apply to space or planetary protection, but such a concept can be described at this early stage. The potential for the use of article III of the OST to factor in international law and responsibility, could allow the development of jus cogens in the wider understanding of space governance and responsibility. Does planetary protection reach such a standard that a new peremptory norm creates an overriding nature that multiple treaties must adapt or be deemed void? The questions can be considered below to better understand how these norms may develop and work in space, during space activities and for the future of space exploration.

The principles of the VCLT present a unique and overriding observation of international law and the theory around the understanding making of a treaty. It would be an understatement to consider these two sections definitive and descriptive, without the acknowledgement of their foundational principles and promotional developments. The following section will start and consider the main principles of state responsibility to better help the understanding of the questions and difficulties that arise when discussing planetary protection, its effectiveness and developing space law and governance within a future international framework. The importance of such provides a leverage or an understanding of the nature of states international obligations to others outside of their sovereignty.

### **3.3.3 State Responsibility**

State responsibility is a cornerstone to which the UNC created a multifunctional spectrum to allow states to remain sovereign, and to be held accountable when acting within the international community. Weaved within the 111 articles of the UNC, states manoeuvre their

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<sup>145</sup> Declaration of Human Rights’ <https://www.un.org/en/about-us/universal-declaration-of-human-rights>

<sup>146</sup> United Nations, ‘United Nations Office on Genocide Prevention and the Responsibility to Protect’ (Un.org2019) <<https://www.un.org/en/genocideprevention/genocide-convention.shtml>>.

<sup>147</sup> Vienna Convention on the Law of Treaties 1969

responsibilities and the legal expectations of international law. Moreover, the allowance of such responsibility has been built upon over the years by incorporating fine details from treaties and the likes of the ICJ and WTO. This section will examine the cross-over between state responsibility and state actions within outer space. To any given allowance, the use of article III of the OST creates a binding nature to examine the principal foundations of international law, to which state responsibility is a cornerstone. The section will further analyse the relationship of state responsibility in outer.

As is well discussed, the OST fails to offer any remedial action to the damaged party should the treaty become violated. With a lack of case law, international legal developments and terms of reference, a damaged party can conclude the following from the OST;

- I. States have absolute liability in space;*<sup>148</sup>
- II. States are encouraged to maintain peace, security, friendly relations and co-operation;*<sup>149</sup>

Therefore, for the development of outer space, article III must be allowed to grasp the foundations of international law and the community. Shaw<sup>150</sup> writes that state responsibility provides equality when one state commits an unlawful act against another, which could lead to reparation.<sup>151</sup> The pontification of reparation creates an internationally recognised development within international law and therefore within outer space. Shaw is therefore accepting that there is a universally accepted route for a state if a wrongful act occurs. It is not within the scope of this section to dissect the space activities, but just to acknowledge that state responsibility creates a route for reparation at the international level. The difficulty arises when state responsibility and the law of treaties conflicts. The positive approach of reparation under the core concept of article III of the OST is perhaps an optimistic view of the acceptance of the OST within the international community. The difficulty in creating such a hypothesis is that article III can, and should, apply, but this would be creating a precedent that would create future legal uncertainty. The understanding amounting to the inclusion of international law in space is highly topical and of academic optimism. The case of Rainbow Warrior Arbitration<sup>152</sup> which

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<sup>148</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI) Article VI

<sup>149</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI) Article X

<sup>150</sup> Shaw MN, *International Law* (Cambridge University Press 2017) 93

<sup>151</sup> Crawford J, *State Responsibility: The General Part* (Cambridge University Press 2013) 45, 215, 778

<sup>152</sup> Rainbow Warrior Arbitration 82 ILR, 499.

saw a dispute between France and New Zealand came around after a Greenpeace ship had sunk outside of sovereign waters. The legal consequences being such formed a customary approach from one state to compensate the other state for any damages caused within their sovereignty. The way the tribunal discusses reparation in such a manner plays very well for the OST as to the extension of sovereignty to their objects within space. The tribunal creates a notion to which it accepts that the law of treaties is relevant, but that the circumstances may preclude wrongfulness. Moreover, the notion that remedies for the breach belong to customary law, or for state responsibility to accept jurisdictional control over.

The acceptance from the tribunal creates a magnificent victory for international law, and the allowance to accept that the OST is well guarded. By such an allowance, should a breach occur within the OST, regardless of wrongfulness, reparation can be sought either by the understanding of the VCLT or by relying on state responsibility. Although there are no cases that have reached an arbitration or litigation level within space, the foundations of jurisdictional reparation cases are there. If we, for instance, consider Cosmos 954 which ended up with an impact on Canada, the notion of reparation becomes more intriguing. On the 24<sup>th</sup> of January 1978, the collision resulted in a large impact on Canada's sovereign land. The issue left Canada with a large, contaminated area to which a Soviet object had impeded its borders. To consider customary law within this case must be a certain reality. Without resorting to litigation and only through international diplomatic channels, The Soviet Union agreed to "compensate" Canada for the removal and disposal of their object.<sup>153</sup> The OST or subsequent treaties offer no form of acceptance for compensation but do create an absolute burden. Nevertheless, the two states agreed on actions outside of OST and with no need for official judicial action. This may have been minor, but the creation and use of such procedures create a form of custom in which state responsibility is responsible for the reparations or at least the repayment of the cost of the damage.

Mosler claims that state responsibility hinges on basic function; firstly, the existence of international obligations to the community and other states, and secondly there is a breach of some kind to create a loss or damage.<sup>154</sup> This would therefore be a critical point to make that state responsibility, together with the law of treaties, can be acknowledged no matter the

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<sup>153</sup> '3-2-2-1 Settlement of Claim between Canada and the Union of Soviet Socialist Republics for Damage Caused by "Cosmos 954" (Released on April 2, 1981)' (www.jaxa.jp) [https://www.jaxa.jp/library/space\\_law/chapter\\_3/3-2-2-1\\_e.html](https://www.jaxa.jp/library/space_law/chapter_3/3-2-2-1_e.html)

<sup>154</sup> de Waart PJIM, H. Mosler, *The International Society as a Legal Community*, Alphen aan den Rijn, Sijthoff & Noordhoff, 1980, XIX + 327 pp. Dfl. 55, vol 28 (Netherlands international law review, 1981) 55



jurisdiction or physical location. The foundations of international law underpin the core elements of treaties and therefore must be transcribed into a treaty, whether it is accepted in the treaty or not. Whether this is a factor within customary law or a preparatory norm, international law creates a binding successive allowance for the foundational elements of international law to be accepted within a treaty. The foundations of law should, and must, be a factor within any academic or practical argument for an understanding of international laws and thus the communities' features. With the introduction of international space law, the following sections will bridge together the foundations of international law and the political nature of space law. This section will consider the treaties of relevance to this paper while attempting to understand the nature of the treaty and the application to planetary protection. With direct reference, everything that has been discussed above will function as a reference and be applicable throughout this section and subsequent chapters henceforth.

### **3.4 International Space Law**

According to Philip De Man, international space law is often seen as lacunal because it fails to capture detailed regulations for specific space exploration activities.<sup>155</sup> However, the various UN treaties are natured in a way that is intended to control every activity of public and private entities concerning space exploration.<sup>156</sup> In the same line of thought, Joel Dennerley noted that international space law is based on the principles of international cooperation concerning activities, which have so far been fostered effectively.<sup>157</sup> De Man raised concerns that less powerful countries feel "disadvantaged" or "undermined" with this level of efficiency regarding international cooperation.<sup>158</sup> The position of later chapters considers international law and governance to follow a more reserved view under article III, and space more widely. This is due to the complexity and agreement parameters. Were human rights developed with the consideration of space? Or even Environmental law? With a degree of certainty, some principles may cross the aisle, but to be fully implementing them would be difficult. That said, the principles of treaty interpretation and principles within the UN Charter could be seen as applicable references, which article III could consider with some legal certainty. It may be justified to consider that states are silently advocating for the shift from the international level

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<sup>155</sup> De Man P, 'State practice, domestic legislation and the interpretation of fundamental principles of international space law' (2017) 42 Space policy 92

<sup>156</sup> De Man P, 'State practice, domestic legislation and the interpretation of fundamental principles of international space law' (2017) 42 Space policy 92

<sup>157</sup> Dennerley JA, 'Emerging space nations and the development of international regulatory regimes' (2016) 35 Space policy 27

<sup>158</sup> De Man P, 'State practice, domestic legislation and the interpretation of fundamental principles of international space law' (2017) 42 Space policy 92

law making to the national level, hence trying to undermine international efforts for personal benefits. As such this can be seen as more transparent where the likes of NASA and the USA formulate Planetary Protection Policy and domestic commercialisation laws for the development of the state. Marina Lits noted that international space law is more effective than national level space law because outer space regulation best fits the international platform.<sup>159</sup> After all, today's world is hugely dependent on space activities, such as cloud computing, satellite communication and GPS. To regulate these at a national level is understandable and should be carried out to allow the state to effectively manage such actors within their sovereignty, but international regulation allows for clear international direction so that a more harmonised system can be carried out within different states. Therefore, shifting from international space law to national outer space laws is likely to affect such activities, which cannot only affect impoverished countries but also even the most economically powerful nations. Kobzar and Danylenko noted that the main argument behind the shift is that international space law does not account for recent technological dynamics and developments in space exploration activities.<sup>160</sup> Hence, states are preferring to come up with national space laws to govern their space activities and state sovereignty.

Ram Jakhu notes that despite sixty years of development, international space law is still poorly formulated, despite the high international cooperation that has been noted by other scholars.<sup>161</sup> Thus, there is a need to formulate strategies that can improve the effectiveness of international cooperation concerning the governance of celestial bodies. Such advancement should take place at the pace at which technological advancement takes place, to discourage countries from shifting from the international level to national level law making. International space law offers five different treaties which are The Outer Space Treaty 1967,<sup>162</sup> The Rescue Agreement,<sup>163</sup> The Liability Convention,<sup>164</sup> The Registration Convention,<sup>165</sup> and the Moon Agreement.<sup>166</sup> With limited scope, only the Outer Space Treaty will be considered within this

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<sup>159</sup> Lits M, 'International Space Law' (2017) 4 BRICS Law Journal 135

<sup>160</sup> Kobzar O and Danylenko A, 'International and National Provisions of Space Law Regulating the Use of Outer Space' (2019) 3 Advanced space law (Online) 48

<sup>161</sup> Jakhu RS, Sixty Years of Development of International Space Law (2016) 12

<sup>162</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI)

<sup>163</sup> [Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, resolution 2345 \(XXII\)](#)

<sup>164</sup> [Convention on International Liability for Damage Caused by Space Objects, resolution 2777 \(XXVI\)](#)

<sup>165</sup> [Convention on Registration of Objects Launched into Outer Space, resolution 3235 \(XXIX\)](#)

<sup>166</sup> [Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, resolution 34/68](#)

chapter. Moreover, these treaties will be subjected to critical analysis from within, to understand their inner articles and how they can enhance or legally challenge the status of planetary protection.

### ***3.4.1 The Outer Space Treaty 1967 (OST)***

The foundations of international space law and all space activities are governed by the OST.<sup>167</sup> This foundational treaty holds collective instruments from states to uphold the rights, needs, and allowances of space. Throughout this section, the idea of how international space law can play a role and be adapted throughout the use of article III and developed international law will be illustrative for the future of outer space and the presence of international law.

Article X is pivotal to start and states:

*“Article X In order to promote international cooperation in the exploration and use of outer space, including the Moon and other celestial bodies, in conformity with the purposes of this Treaty ....”*<sup>168</sup>

The principals of cooperation, equality, good faith (opportunity to observe...) and state sovereignty (determined by agreement...) commands significance attention after the fact. These key defining principles are within the UN Charter and VCLT. The principal nature of article X is foundationally important to distinguish the nature of the OST and the conformity within international law. Although this article does not aid the answer much, we find it a repeating the principles of jurisprudence and theory. Such rationale, therefore, allows some key questions to be discussed such as, does the OST function within international law or just based in space? Did the drafters focus on the unity of Earth, or was it purely for space activities? And what were the aims and goals of the OST? These questions, which are very much similar, present a unique perspective on the understanding of international law and theory. The OST was not originally designed not a singular treaty branched off from international law within its own cluster, but a functional arm relative to time. Given the OST's age, its function to govern space remains and its core principles remain the same. Peace, cooperation, sovereignty, and the protection of harm all stems from the foundational principles. The ability to conclude this round circle event and provide a clear route presents a definitive feature to which this chapter can be

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<sup>167</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (General Assembly resolution 2222 (XXI))

<sup>168</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI)

referenced throughout. When a question is asked, the positive answer will first refer to the foundational principles of international law, then the legal rules of the OST, followed by any jus cogens norms that may have been presented. The construction of this section therefore allowed a lot of questions to be answered, without the need to be asked.

The needs and consideration for liability and dispute resolution become concurrent. Article VII states:

*“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.”<sup>169</sup>*

Article VII, therefore, holds the launching state absolutely liable for their activities, regardless of cost, ownership, actions, or compliance. Article VI presents a particular linked theme that focuses on private actors. This article focuses on the responsibilities and states:

*“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...”<sup>170</sup>*

Such a notion in domestic law is that the state is liable for a national actor, to which the state has potentially no direct or little proximity while remaining liable for their actions. This makes space complex and unique, but plainly simple. Wherever the object is launched from, the ownership of that state, and therefore liability, remains an absolute liability until that object is removed from space. Although this seems particularly clear, the notion of a person suing a state, a state suing a state, or another private actor suing a state presents a moral hazard, and as such would create political unease. The difficulty begins with international law itself, which only allows a state to use it, except for international human rights. Moreover, if a satellite falls out of the sky, a reasonable person will sue the owner of the satellite as it would be easier than dealing with the state. The question that therefore begins to present itself, is does the OST offer

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<sup>169</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI)

<sup>170</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI)

individuals real recourse for disputes and whether individuals are even a factor? Rightly, international law is aimed at states, agreed by states and therefore with certain exceptions, only states may operate within its circumference.

This thesis will lead onto chapter four which will be pivotal to considering the application of planetary protection, its legal status within international law, and the needs of the Committee of Space Research (COSPAR). At this stage, the suggestion is that COSPAR as an international non-governmental agency that acts in the interest of space and planetary protection, by creating recommendations, with the science community, on how best to protect space and Earth. By somewhat adopting article IX as their legally justifying objective, COSPAR considers article IX to focus on a particular area of space. Article IX states:

*“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 cooperation 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 extra-terrestrial matter and, where necessary, shall adopt appropriate measures for this purpose...”*<sup>171</sup>

Article IX remains pivotal as to consider and critically analyse into deducible sections. It can be deducted from the wording that article IX creates a podium for the foundation principles of international law to be considered and to create a substantial discussion among states about the importance of the space environment. The vast expanse of article IX leaves a grey area within international development and for humanity to wonder to what extent article IX can be pushed, and how it can be enhanced to become more effective, descriptive, cooperative, and proactive. Unfortunately, article IX uses language such as “avoid harmful contamination”, “shall adopt appropriate measures” and “in the peaceful exploration”, creating recognised legal uncertainty within space. Albeit these terms are ambiguous and offer little clarity, they do point to the foundations of the UN Charter and VCLT. The difficulty scholars and lawyers get into, is that vague and uncertain terms offer very little legal clarity. Without judicial precedents or case

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<sup>171</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI)

law, description is as good as described. Without clear clarity, it is up to states, scholars, and private actors to interpret the OST, and thus enables them to understand the law as they can. This creates legal uncertainty, to which clarity is needed, in a wider context. The creative and logical thinking of such would allow a conventional and prudent lawyer to self-refer to this article as a foundational one toward the goals and applicable nature of planetary protection. Nevertheless, article IX does not mention any legal steer toward such a principle, yet subtly pinpoints the environmental need for the protection of space and Earth. Planetary Protection Policy will be further described, analysed, and challenged in chapter four.

By leaving the question open, a notion of potential legal uncertainty has developed. Therefore, article III of the OST can be invited to somewhat conclude this section. Article III plays an ever-growing advancing and potentially open reached liberal view of space law and governance. Whether it could be a saviour of space or just a hindrance it is yet to be determined. Throughout the next two sections and chapters, article III will be heavily referenced in a positive view and will be disused to what space may look like if article III is used using a literal legal view. For reference article III states:

*“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 cooperation and understanding.”*<sup>172</sup>

Scholars have discussed article III since its inception. The likes of Carns,<sup>173</sup> Bhat<sup>174</sup> and others have argued that article III can assume many forms of a function where the OST is silent or does not offer legal certainty. These assumptions are fair and question whether article III bridges the gaps that the OST leaves to the state to interpret. Therefore, legal, vague areas could theoretically be fostered out to other areas of international law to develop rationale cross legal allowances to fill up the gaps that international space law intentionally leaves. International environmental law, international human rights, United Nations Law of the Seas, and Maritime law, among others, that hold direct correlation with outer space or have developed principles such as due regard and transboundary harm could be considered under the doctrine of similarity

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<sup>172</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI)

<sup>173</sup> Marc GC, 'CONSENT NOT REQUIRED: MAKING THE CASE THAT CONSENT IS NOT REQUIRED UNDER CUSTOMARY INTERNATIONAL LAW FOR REMOVAL OF OUTER SPACE DEBRIS SMALLER THAN 10CM<sup>sup 2</sup>' (2017) 77 The Air Force Law Review 173

<sup>174</sup> Bhat B S, 'Application of environmental law principles for the protection of the outer space environment: a feasibility study' (2014) 39 Annals of air and space law 323

which will be considered in a later chapter. This can all be seen as a positive development through article III and allows for a loose application of the acceptance of similarity throughout outer space governance. However, critics of such a school of thought ask where does this end? What if something is accepted internationally, such as human rights, but was never adapted for space. Firstly, humans cannot directly live in space without a distinct habitat, therefore do they have rights in space? Space is for all of humankind, so in this case, human rights may apply, but cannot be enacted. The critical question here is whether other areas of law supplement vagueness, for clarity, even if it cannot apply, or does the issue need to be tested, challenged, and then adapted? The hypothetical questions and fascinating subjects that create a simple argument of interpretation, critical analysis and application. Without testing the OST, using such principles within international law, humanity and space users will ever so eagerly bumble along the space route following the minimal allowance that international legal theory offers. This is the true test and power of article III. Scholars can argue that just about every “reasonable” principle in international law can be transcribed into the OST to offer “reasonable” certainty and clarity. Moreover, this can create a paradox in which the ethical nature of space is questioned. Can, and should, article III and other areas of contestable international law be used to prove reasonable or challenge within reason? But what is reasonable? Is it the reasonable person test found littered in common law? The reasonable academic? Or the potentially reasonable lifeform! In this way, article III offers so much hope, and allowances for the adaption and imaginative elements of space. The real test will come when these principles are applied and tested in space. The following sections will consider the approach of principles and agreements throughout international space law. Moreover, a broad introduction will be offered to the reader to form a view and opinion to the legal applicability of such principles.

The final application that should be considered is the regulation and the applicable nature of the OST in a broad context of international law. Therefore, it would be easily justified to conclude that international space law supplies a durable foundation that allows growth and expansion without the need to consult international law outside of such a scope. Thus, the foundation of space law has been created, and its function ends there. The likes of Abbey<sup>175</sup> and Su<sup>176</sup> all lean to the amendment that the OST is here, and that international space law has stalled. However,

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<sup>175</sup> Abbey GW, Reprint of: International cooperation and the continuing exploration of space-recommendation for the new administration (Elsevier 2021) 111-112

<sup>176</sup> Xu F and Su J, 'New elements in the Hague space resources governance working group's building Blocks' (2020) 53 Space Policy 10-13, 86

the fragmentation and political governance of international law indirectly created a self-contained approach to space law. It is directly relevant that article III of the OST attacks the stigma of such considerations. A positive system and thus forwarded process could be considered to understand the OST to be as *lex specialis* to international law, given the relationship of fragmentation.<sup>177</sup> Article III discusses the principle that international law should be followed throughout. Moreover, such a positive action may relate to all future doctrines to critically challenge and adapt the OST principles. As in an earlier question, the OST could be recognised as a self-contained treaty within a body of international law. The Permanent Court of International Justice discussed in the Wimbledon Case 1923 that:

*“The provisions relation to the Kiel Canal and the Treaty of Versailles are self-contained; if they had to be supplemented and interpreted by the aid of those referring to the inland navigable waterway of Germany in the previous sections... they would lose their raison detre... the idea which underlies Article 380 and the following articles of the Treaty of Versailles is not to be sought by drawing an analogy from these provisions but rather by arguing a contrary, a method of argument which excludes them”.*<sup>178</sup>

Further discussions in the case of the Tehran Hostages<sup>179</sup> and the Tadic Case<sup>180</sup> where, although the concepts are not required to this thesis, the judgments do begin to develop an understanding of different elements of a self-contained treaty regime. It would be reasonable to consider the OST one of such treaties, as within the OST the functions, although consider the wider aspect of international law, allow for an automatic self-governing regime to exist through the binding relationship the OST has with the international community. Moreover, the International Law Commission in 1947<sup>181</sup> established that the UN General Assembly created such a mandate for the development of international law and had previously dealt with the nature of self-contained branches of international law between the relationships of state responsibility, peace, security, and the development of self-containment. The cases and provisions discussed above do not specify space at an early stage but apply distinct qualifying factors. Such creative elements can be addressed in article III of the OST as this directly applies to the intentional approach in

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<sup>177</sup> Koskenniemi M, 'Fragmentation of international law: difficulties arising from the diversification and expansion of international law: Report of the study group of the international law commission' (2014) 17

<sup>178</sup> S.S Wimbledon PCIJ Series A No.1, p. 15, pp.23 et seq

<sup>179</sup> United States of America V. Iran ICJ Reports 1980, p.3, p.14

<sup>180</sup> Prosecutor v Dusko Tadic, International Criminal Tribunal for the Former Yugoslavia, IT-94-I-I, para11

<sup>181</sup> United Nations General Assembly [UNGA]; International Law Commission [ILC], 'United Nations General Assembly Resolution 174 (II) Establishment of an International Law Commission (with annex), (A/RES/174 (II)), OXIO 34' (1947)



which international law may apply. Unfortunately, the OST does not give latitude to concrete, specific mechanisms in which this can be done. However, when closely considering the potential fragmentation elements of article IX, such an adaption may provide for the development of a doctrine of similarity within all areas of international law.

### ***3.4.2 Principles and Agreements***

UNCOPUS lists five declarations and legal principles for carrying out activities within space. These declarations are the "Declaration of Legal Principles",<sup>182</sup> the "Broadcasting Principles",<sup>183</sup> the "Remote Sensing Principles",<sup>184</sup> the "Nuclear Power Sources Principles",<sup>185</sup> and the "Benefits Declaration",<sup>186</sup>. These principles must be seen beyond the legal foundations and potentially as a pretext international law and a functional understanding of the political nature at the time of treaty ratification.

These principles are regularly updated with more of a state orientated focus on the development of international relations through a more topical international relations element. For example, the development of the compendium on mechanisms adopted in relation to non-legally binding United Nations instruments on outer space<sup>187</sup> created and furthered the relationship of Japan and the wider space community for the "benefit of the international community". Whether this can be seen as a monopoly of space and influence, the precursors of the international community can be seen. These principles are subsequent to the OST and in theory, offer a mandate to which the OST offers. This may suggest more subservience and grandeur to international space law, but they may serve as political documents which the international community cites.

However, these principles have created a precedent outside of the general treaty system, even before the treaty was a consideration. UNCOPUOS has continued to assert themselves in space and has developed agreements with states and the wider international community. For example, in 2013 UNCOPUOS published recommendations on national legislation relevant to the

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<sup>182</sup> Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space XVIII

<sup>183</sup> Principle Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting 37/92

<sup>184</sup> Principles relating to remote sensing of the Earth from Space (41/65, 1986)

<sup>185</sup> Principles Relevant to the Use of Nuclear Power Sources in Outer Space (47/68, 1992)

<sup>186</sup> 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 (A/RES/51/122, 1997)

<sup>187</sup> , Compendium on mechanisms adopted in relation to non-legally binding United Nations instruments on outer space (A/AC105/C2/2019/CRP16, 2019)

peaceful exploration and use of outer space.<sup>188</sup> Within such consideration, UNCOPUOS seems to have developed and transmuted the creation and fundamental acknowledgement that the development of space law is through domestic law rather than through international development. Such actions were created throughout the OST by developing state obligations within their sovereignty. However, these obligations held the burden on other states and therefore can fragment domestic law in situ of state responsibility. The implication of the creation of domestic law supplements the practice of space activities throughout the international community. UNCOPUOS considers such resolution under the application of international cooperation, peace and security as a foundational aspect as considered in the sections.

### **3.4.3 International Space Development**

Since the inception of the OST and the other space treaties, the international community has been more reluctant to work on, or agree to, a new space treaty. This must be observed in the lack of willingness surrounding the Moon Treaty. With the rise of commercialisation whether launching, space tourism, satellite development or scientific missions, states have adopted self-management through space agencies and domestic acts. The productivity of such acts has seen a rise in acknowledgement and productivity at state level to address a range of issues that remain silent within the OST and in international law.

This section will begin to consider non-legally binding agreements and domestic acts in a wider context. The Artemis accords will be brought to light to understand the geopolitical nature of space and the willingness of states over the OST. A wider space application and how such devices can be used for future space development and exploration would require the international community to consider not only themselves, but the wider community.

### **3.4.4 The Artemis Accords**

The Artemis Accords are aimed to become the beginning of a discussion for new space, to which the state intended to create a new opportunity to express its ideas and principled nature under the OST and international law.<sup>189</sup> The accords<sup>190</sup> set out a set of principles aimed at

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<sup>188</sup> General Assembly, 'Recommendations on national legislation relevant to the peaceful exploration and use of outer space' (2013) A/RES/68/74

<sup>189</sup> Rachel N, 'Artemis accords: A new path forward for space lawmaking?' (2021) 42 *Adelaide law review* 569 1-12

<sup>190</sup> NASA, 'NASA: Artemis Accords' <https://www.nasa.gov/specials/artemis-accords/index.html>

facilitating international collaboration on sustainable human exploration.<sup>191</sup> Moreover, this could also be seen as a way that advances the OST to strategically incorporated elements that the OST missed. The accords focus on peaceful purposes; transparency; interoperability; emergency assistance; release of scientific data; preserving the outer space heritage; space resources; deconfliction of space activities and orbital debris. The accords, therefore, attempt to amalgamate all the space treaties into one document that fulfils the obligations of the already ratified states.

It is difficult to grasp what the writers of the accords wished to gain from the accords that the space treaties did not already set out. The accords lean more into the remits of exploitation but offers very little in the way of legal certainty above the OST. The non-legal approach of the accords relies upon geopolitical acceptance and on the basis that states are in their infancy when considering space resources. Throughout the accords, positive notions of a “new era of exploration”, “establishing a continuous human presence aboard the international space station” and building upon a legacy are all concepts in the accords.<sup>192</sup> What the accords did add was the importance of space commercialisation, the positive nature of scientific endeavours, the increased attention on space security and the protection of the state’s domestic and space “property”.<sup>193</sup> The accords consider the notion of cultural heritage, sites of importance and the application of space resources. The difficult nature that the accords find themselves, is at the point of acceptance and implementation, which would result in their effectiveness. There is a total of eighteen signatories, in which states are not directly involved, and the focus is that of space agencies and ministers of the state governance. The signatories do not reflect the entire space faring states and are focused on space resources and the procurement of such. What the accords do is open space laws up by applying this to the signatories with a wide appreciation. Unfortunately, the accords fail to consider the notification of planetary protection other than affirming the OST and principles thereafter. They do openly accept article IX, the principles for environmental protection and acknowledge the need to not cause harm, but they do not consider COSPAR’s Planetary Protection Policy. The consideration and favour for NASA’s Planetary Protection Policy weaken the international view and as such creates a fragmented system of uncertainty. However, the importance of the accords in a geopolitical sense is critical

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<sup>191</sup> Deplano R, 'THE ARTEMIS ACCORDS: EVOLUTION OR REVOLUTION IN INTERNATIONAL SPACE LAW?' (2021) 70 The International and comparative law quarterly 799 1-2

<sup>192</sup> NASA, 'NASA: Artemis Accords' <https://www.nasa.gov/specials/artemis-accords/index.html>

<sup>193</sup> US Commercial Space Launch Competitiveness Act, Public Law 114-90 (25 November 2015); Law of 20 July 2017

at such a time. The movement and development of space activities, development and commercialisation create a vacuum where space activities create a potentially hazardous concept. The need and push for peace and cooperation<sup>194</sup> is the utmost concept to such that international legal theory offers very little in progressing such a relationship without an alternative agenda. The accords do develop the progress of space resources above their time, and offer a degree of state intention, without prejudicing the state as the Moon agreement seemed to suggest.

### **3.5 Sources of International Law**

The curricular viewpoint of international law divides itself into a multitude of different sources. Within this section, the basic viewpoint of what kinds of sources are considered within international law and what can be used will be considered. Since the inception of the international community, scholars have sought to identify the gears that move the clock of international law. As such, the likes of Degan<sup>195</sup> and Brownlie<sup>196</sup> et al. have studied countless documents to arrive at the basic sources in which international law functions. Albeit these arguments have created further instruments that will be considered below and hold strong natural descriptions for scholars and others to understand the sources of international law.

#### **3.5.1 Hard Law**

Hard law is in general the simpler route of international law. The creation of hard law can be described as a treaty for something that is intended to bind the parties invited.<sup>197</sup> As a clear example, the OST can be seen in the formation of hard law that is reflected and accepted within the international community. Hard law is the simpler legal obligation to understand. Albeit the creation of hard law can sometimes be shaped without the writing and agreement of a treaty and thus depends on the mannerism and behaviour of the state. Moreover, the Statute of the ICJ, article 38 states<sup>198</sup>:

*The Court, whose function is to decide in accordance with international law such disputes as are submitted to it, shall apply:*

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<sup>194</sup> L Lebedev and A Romanov, *Rendezvous in Space: Soyuz-Apollo* (Central Books 1979) 275

<sup>195</sup> Müllerson R, 'Sources of International Law. By V. D. Degan. [Dordrecht: Martinus Nijhoff. 1997. 564 pp. ISBN 90-411-0421-6.]', *International and Comparative Law Quarterly*, vol 47 (2008/01/17 edn, Cambridge University Press 1998) 564

<sup>196</sup> Crawford J and Brownlie I, *Brownlie's Principles of Public International Law* (Oxford University Press 2019) 665

<sup>197</sup> McDougal MS and Reisman WM, *the prescribing function in world constitutive process: how international law is made*, vol 6 (Yale studies in world public order, Yale University, School of Law 1980)

<sup>198</sup> STATUTE OF THE INTERNATIONAL COURT OF JUSTICE, Article 38(2)

1. *international conventions, whether general or particular, establishing rules expressly recognized by the contesting states;*
2. *international custom, as evidence of a general practice accepted as law;*
3. *the general principles of law recognized by civilized nations;*
4. *subject to the provisions of Article 59, judicial decisions and the teachings of the most highly qualified publicists of the various nations, as subsidiary means for the determination of rules of law.*

In theory, the principle of hard law is relatively easy to understand and find. More interesting is the nature to which hard law binds legally and political parties to the agreement. Although such a statement can be proven wrong through history and international jurisprudence, the sentiment is that treaty law creates such a relationship through its execution. Space law through hard law has created a sturdy foundation and allows for progress to be challenged without the need for a new treaty. The realisation of hard law is that it is black and white, with grey bits in the middle. But is that the function and positive enforcement of hard law? By appearing to be silent on certain areas does this allow progress within the treaty in the form of soft law?

Thus, the creation of international law can be created in four ways, providing that certain evidence and a variety of characteristics are met. The following sections will discuss article 38(2) and how elements of international law are created.

### **3.5.2 Soft Law**

Soft law is the creation of law without a treaty, or by complementing the behaviour of a state as discussed above. Shelton<sup>199</sup> considers the role of non-binding norms within the area of international law. From the developing factor, the notion of soft law may lack sufficient normativity to create definite rights and/or obligations.<sup>200</sup> Charney, considers the creation of soft law can be as little as a state's acceptance of a decorative application, regardless of rectification or implementation with a state's domestic law.<sup>201</sup> The opinion and application throughout the Lotus case<sup>202</sup> which was focused on the jurisdiction of persons on the high seas

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<sup>199</sup> Edith Brown Weiss and Shelton D, 'Conclusions: Understanding Compliance with Soft Law', (Oxford University Press 2003) 26

<sup>200</sup> Weiss BE and Shelton D, 'Conclusions: Understanding Compliance with Soft Law', (Oxford University Press 2003) 19-22

<sup>201</sup> Charney JJ, 'Universal International Law' (1993) 87 American Journal of International Law 529

<sup>202</sup> Lotus Case PCIJ, Series A, No 10 (International Courts of Justice)

present a foundational concept of international customary law and state sovereignty. Article 38(1) of the ICJ when applied with the Lotus case, reiterated that the application of custom was an expectation and commitment from states to act under international law.<sup>203</sup> Moreover, the magnificent nature of soft law creates a developing transition for concepts and actions to be acknowledged and binding upon states. Agreements, declarations, and guidance are as such.<sup>204</sup> These documents are key to certain areas that generally offer good practice and are understood to be non-legally binding in nature. The likes of the European Space Agency (ESA) and the Committee on Space Research (COSPAR) are just two organisations that produce and develop areas of space policy that are not intended to be legally binding but to offer a policy view on how space activities should be carried out. From early intervention, the notion of non-governmental actors creating such policy for an international area is not unheard of and creates an interesting application for states when either applying to follow such policies or aiding in the creation of such. With the basic understanding of hard and soft law considered, the following sections will set out incremental sources to which international law is balanced and how the development of the international community progressively develops above the general norm of a written treaty.

The international community does not agree to certain terms and removes them from a treaty. If international environmental law is considered, states do not wish to sign up for an agreement that binds them economically. This could be a standing point from the understanding of the Kyoto Protocol<sup>205</sup> to where Canada deemed the protocol too expressive to carry out, and in which they could not meet the obligations. Nevertheless, the transparency and creative nature of soft law develop over time as a number of instruments. Whether these are guidelines, best practices, or in accepting the terms of the treaty and attempting to understand it better, it is how soft law is created. In the following sections, soft law and many of its forms will be discussed to understand the motive around such international instruments and how in reality these rules can become legal.

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<sup>203</sup> Brownlie I, *The Rights of Peoples in Modern International Law. The Rights of Peoples*. Ed. by J. Crawford (Oxford: Clarendon Press 1988)

<sup>204</sup> Weil P, "Towards Relative Normativity in International Law?" (1983) 77 *The American journal of international law* 413

<sup>205</sup> KYOTO PROTOCOL TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (1997)

### ***3.5.3 International Courts of Justice (ICJ)***

This section will concern itself with the reflection of the ICJ and its international character. With application to the OST, the ICJ has no functionality as the OST lists no route for international litigation or dispute management. The application of notice of the ICJ therefore must follow that state consent is sought. As there are no direct agreements with the OST on consent, simple interpretations would be at this stage that no direct international court could hear a dispute without prior consent. The overreaching importance of this section, therefore, is to consider international law to which the ICJ has placed its weight. With an introduction to customary law, state practice and others, the importance of this section will be relied upon throughout. This section is therefore foundational to all other sections and chapters. This section aims at allowing for the full dichotomy of international law to be considered throughout.

The ICJ could perhaps be considered in its working as “the” world court. With the impetus of the international community, the ICJ vision and its creation was something different from what it has turned out to be. With its cousin, the permanent court of arbitration, both bodies were to allow the community a fair and rational example of international litigation.<sup>206</sup> However, the community seemed resistant to the application of a dispute settlement mechanism in most treaties. For example, the OST and many environmental treaties<sup>207</sup> fail to concede this ability to any governing body. Even when the ICJ is allotted to an area, the state must concede its jurisdiction to agree to the ICJ’s procedure. Many scholars such as Elias,<sup>208</sup> pointed to the institutions and advice-givers more than the courts. This, although a somewhat heavy-handed approach, affords itself to the likes of the UK occupation of the Chagos Islands<sup>209</sup> where an advisory opinion occurred. Although not legally binding, an advisory opinion can hold great political weight and provide international pressure. Nevertheless, they are not legally binding and, in this case, failed to change anything.

However, a more positive question to ask, would be whether the ICJ would be suited for space? Its dynamic may be the best place to consider such extra-terrestrial matters and could join with the permanent court for matters of arbitration. Such areas may only be hypothetical, but to ask

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<sup>206</sup> STATUTE OF THE INTERNATIONAL COURT OF JUSTICE, <https://www.icj-cij.org/en/history> accessed 22/07/2022

<sup>207</sup> , PARIS AGREEMENT (2015) <https://www.un.org/en/climatechange/paris-agreement> accessed 22/07/22

<sup>208</sup> Oellers F, Elias, Taslim O.: The International Court of Justice and some Contemporary Problems (Book Review) (W. de Gruyter 1985) 589

<sup>209</sup> ICJ Justice, ' The separation of the Chagos Archipelago from Mauritius in 1965' (2017) resolution 71/292 (A/71/L.73)

for an advisory opinion on the matter of space could only be seen as positive from an academic view. From a state view, this may be heavily criticised and an issue that could be seen as an attack. Nevertheless, the rapid expansion of space and the need for governance are here. Now, more than ever, the action in space needs to become proactive instead of reactive. The worrying issue is that until something serious occurs in space, we will be stuck in a hypothetical development stage. The replication and use of other areas of international law is perhaps the strongest form of understanding space scholars have. With creative thinking allowing for the development of international law, space governance through soft law is potentially unlimited and unchallenged. As seen and discussed in chapter one, space governance has rapidly outgrown space law with such an advancement developing with a retrospective nature to the law. And yet the ICJ still holds its most powerful and coveted approach in the form of article 38 of the ICJ.<sup>210</sup> Article 38 will be discussed in detail below and will help with the understanding, development, and analysis of international law as a potential breakthrough for space law and governance.

#### ***3.5.4 Customary Law***

In the previous subsection, consistent practice of “soft law” by states could slowly evolve to become customary international law, which, in turn, can quickly become a legally binding obligation. The notion of soft law relates directly to non-legally binding agreements or a host of regulations to which states agree to follow or recognise that is functional, but choose not to be legally bound by such.<sup>211</sup> This process seems perfect in evading the lack of political will that might emanate, especially when nations are uncertain and indecisive on the possible impact of the proposed legally binding obligation.<sup>212</sup> This section aims to understand customary international law and how under the terms of reference of article 38 international law can create a norm without hard law, such as a treaty. Two elements must be stratified to consider the notion of custom within international law, firstly the actual behaviour of the state must be considered. The ICJ in the *Malta Case*, formally known as the *continental shelf judgement* reflects that actual practice and *opinio juris* should be able to be articulated clearly for customary law to be established. The ICJ went further to which a physiological factor was able to be identified, such that the state acknowledged it and in such acted in a certain way. Although

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<sup>210</sup> STATUTE OF THE INTERNATIONAL COURT OF JUSTICE 1945

<sup>211</sup> Villiger ME, *Customary international law and treaties: a study of their interactions and interrelations*, with special consideration of the 1969 Vienna Convention on the Law of Treaties, vol 7 (Brill 1985) 10

<sup>212</sup> Kunz JL, 'The Nature of Customary International Law' (1953) 47 *The American journal of international law* 662



somewhat cryptic the ICJ creates a legal international test that provides that *opinio juris* and *opinio juris sive necessitatis* are functional factor of custom.<sup>213</sup>

According to Jed Odermatt,<sup>214</sup> consistent practice can result in the development of new rules of customary international law, but of great significance is the extent to which various forms of practice can yield the anticipated rules.<sup>215</sup> For instance, if states arrive at non-binding mutual agreements concerning the outer space environmental protection guidelines and recommendations, what remains uncertain is to what extent they will contribute to the anticipated new customary international law rules. Here substance is created, as international space law has created hard laws and non-binding agreements such as debris mitigation guidelines. Rebecca Crootof noted that in most cases, legally binding obligations and treaties are passed into law without necessarily undergoing the process of “soft-law” to “customary international law” to “hard-law.”<sup>216</sup> Instead, legally binding obligations could also become customary international law in instances of bilateralism and multilateralism if practised *consistently* and *flawlessly*.<sup>217</sup> For example, according to Abigail Pershing, the non-appropriation provision of the OST has slowly become a customary international law over the years, without any consent from the state parties to the treaty.<sup>218</sup> Many terms within the OST have either been accepted, with or without action. Moreover, we find principles from international environmental law, maritime and the law of the seas, developing terms within the OST such as due regards, transboundary harm, and the precautionary principle. In fact, if the OST is dissected, such fundamental terms and principles are littered and used in areas of international law unrelated to space. The main legal implication of this finding is that international law experts should look for ways of improving the quick transition of “soft law” provisions currently guiding practice in space exploration to become customary international

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<sup>213</sup> Mullerson R, *The Interplay of Objective and Subjective Elements in Customary Law in International Law: Theory and Practice: Essays in Honour of Eric Suy* (K. Wellens (ed.), The Hague (Martinus Nijhoff Publishers 1998) 3-6

<sup>214</sup> Odermatt J, *THE DEVELOPMENT OF CUSTOMARY INTERNATIONAL LAW BY INTERNATIONAL ORGANIZATIONS*, vol 66 (The International and comparative law quarterly, Cambridge University Press 2017) 491 - 511

<sup>215</sup> Odermatt J, *THE DEVELOPMENT OF CUSTOMARY INTERNATIONAL LAW BY INTERNATIONAL ORGANIZATIONS*, vol 66 (The International and comparative law quarterly, Cambridge University Press 2017) 491 - 511

<sup>216</sup> Crootof R, 'Change without consent: how customary international law modifies treaties' (2016) 41 *The Yale journal of international law* 237

<sup>217</sup> Nancy W. Gallagher and Zhao Y, 'Rules of the "Space Road": How Soft Law Principles Interact with Customary International Law for the Regulation of Space Activities' (2020) 44 *J Space L* 405

<sup>218</sup> Pershing AD, 'Interpreting the Outer Space Treaty's Non-Appropriation Principle: Customary International Law from 1967 to Today' (2019) 44 *The Yale journal of international law* 149

law. Afterwards, customary law can quickly become legally binding—for example, OST Art. VI obliges states to be liable for damage caused by their space objects on another launching state's space objects, but only when it is identified as their fault or the fault of the persons for which it is responsible.<sup>219</sup> In this case, this legal obligation can be interpreted as customary international law regulating space exploration activities by launching states. In the context of outer space environmental damage, states could also be held liable, which can quickly become customary international law.<sup>220</sup> However, as indicated earlier, most states are slowly moving away from these binding obligations, probably because of the uncertainty associated with space exploration ventures or any other reasons that have not been explored in prior research.

Many issues need to be addressed in future research. For example, the speediness of transition from “soft-law” to “hard-law” as the customary international law as a mediator needs to be determined. The creation and development of custom law has been questioned over the years, as to its creative element. Can customary law be instant? Or does it develop over time? Some realisation stems from case law such as the Anglo-Norwegian Fisheries Case.<sup>221</sup> Secondly, the extent to which the customary international law can help to transition “soft-law” into “hard-law” obligations also needs to be determined. In this case, longitudinal studies might be required to track various non-binding obligations and how fast and to what extent they transitioned to binding obligations. Also, as stated earlier, for non-binding obligations to transition into customary international law, they need to be practised *collectively* and *consistently* in a multilateral environment. Therefore, research should also determine how the stability of “soft law” obligations can be improved to guarantee consistent and collective observations by states in that mutual agreement. Thus, it is apparent that the legal environment governing space exploration activities by states is far from being clear, which requires the international community to engage in meaningful discussions to boost understanding between states to improve mutuality and collectively. Can custom be seen as the new responsibility for space? Or is it a notion of unrealistic approaches that are used to cater to an area which is developing? For one thing, custom creates a number of questions that challenges the concept of what international law is and how can progress be made from the deep silences within a treaty and throughout international law.

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<sup>219</sup> Gorove S, 'The Outer Space Treaty' (1967) 23 Bulletin of the atomic scientists 44

<sup>220</sup> Lihua Yang, Zhuan Du and Cheng C, 'Building a compound and collaborative governance framework to improve international space sustainability' (2021) Global Public Policy and Governance 14

<sup>221</sup> Anglo-Norwegian Fisheries Case ICJ Reports, 1951, 116

### 3.5.5 State Practice

The allowance of state practice once again is considered within article 38 of the Statute of the ICJ. But unlike customary law, state practice can, and does, offer familiar, yet different elements beyond behaviour. As discussed above, the behaviour of the state can form elements within customary international law, but state practice goes further. The notion of such consideration looks at legislation,<sup>222</sup> the decision by domestic courts<sup>223</sup> and other activities within which are taken out in the wake of political statements, activities within the international community and how the state acts when considering treaty law. Therefore, the material sources needed to understand and demonstrate how state practice could be classed as actions within the state in which evidence can be obtained.<sup>224</sup>

The ICJ went one step further in the reparations case<sup>225</sup> when they state that the state or body must have an international personality to be able to create state practice. Here we show that the UN General Assembly can create state practice without being a state. The illusion can therefore be transcribed theoretically into the international community to allow for international organs to function and allow them to create state practice. Without pushing this case too far, it could be stated that an early option of this thesis would be to recommend that the likes of the World Trade Organisation, World Health Organisation and those who are under the umbrella of the UN can create state practice given their status and closeness to the UN General assembly. These international organs offer legitimacy, accountability and a structure for disputes and negotiation. Further extension may develop in the future to activist groups such as COSPAR and others, who act within the international community for the best interest of science and space activities but are not associated directly with the UN.

Opinio juris is another form that allows state practice to be recognised. Moreover, this considers how the state views its own behaviour in such a subjective and more controversial way. Therefore, opinio juris creates a natural flow for the state to consider their activity, belief and what they consider to be their legal obligations under a form of opinio juris. The International Law Commission (ILC) committee puts it as such “the practice in question must

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<sup>222</sup> Congo v. Belgium, ICJ Reports, 2002, 128 IRL 3, 23-4

<sup>223</sup> Kammerhofer J and de Hoogh A, 'All Things to All People? The International Court of Justice and its Commentators' (2007) 18 European Journal of International Law 971

<sup>224</sup> , Yearbook of the International Law Commission 1957, Vol. II, 1957)

<sup>225</sup> Reparations case, ICJ Reports, 1949, 16AD 174;

be undertaken with a sense of legal right or obligation”.<sup>226</sup> Moreover, this was the expressed point by the permanent court of arbitration in the Lotus Case.<sup>227</sup> The North Sea Continental Shelf Case both show that obligation of practice by the state is merely “*practice*” is the belief that the state is as such reasonable. Should the international community provide legal instruments then the state may abstain from such instruments. These cases provide a way in which even if the state was carrying out an action, the state must believe it to be internationally recognised, to which the behaviour of the state must conform as such, and these actions must be willingly carried out over a period of time. These ideas of recognition are distinctly vague to allow for legal application through legal uncertainty. Whether a state supplies belief, actions and carries out these actions over a long-sustained period, the state may still reject the approach taken under Lotus.

State practice can be subjective when attempting to discover whether state practice has been carried out over a sustainable amount of time. Understanding a state’s belief and subjective relationship to which they are carrying out a certain model of practice is perhaps the weakness and tentative area of state practice and how to establish it. But not confronting, testing, and determining what a state is doing would create a principle that may not advance the international legal understanding. Unlike customary law, state practice and *opinio juris* are difficult and elusive, but by doing so create a very satisfying and testing argument. Through much debate and critical analysis can the state be challenged to understand their beliefs and behaviour. As seen within the United Kingdom, judicial review tests public bodies using essential ingredients. Without challenging the international community, state practice becomes weaker, and the need to establish different and innovative norms remains relevant. The challenge against state practice will be against the uses of space. With the possibility and overall acknowledgement that the likes of the OST have become customary international law, and the emergency of greater space autonomy.

### 3.6 Summary

The pleasant approach to international law and governance paints a developing picture that suffers from literature “greyness” and ambiguities that does not allow for a clear and concise answer to the question of the future of space governance. The picturesque view of space law creates a foundation for states, actors, and activities to be carried out within an area of ultimate

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<sup>226</sup> 'ILC Drafting Committee on the identification of Customary International Law' (2015) A/CN.4/L.869

<sup>227</sup> Lotus Case PCIJ, Series A, No 10, 1927, 18 AD,153

possibilities. It is therefore the responsibility of this research to consider space and its functionalism throughout the areas of governance and planetary protection while considering their future. International law through the foundations of the UN Charter, state responsibility and the Vienna Convention provides for a substantive and qualified area for the OST and article III to draw the distinction. For this purpose, international space law may be a factor within the international community to which other foundational principles can be transcribed within reasoning. The principles of due regard, process and to some extent the precautionary principle can be used within the region of space, with a wide approach of similarity. The importance of the open approach space law offers, creates a form of interpretation. Given this allowance, article III creates a literal view of international law as a grown and developing concept. As discussed above, the view of article III must be somewhat questioned and applied in a limited view as to a legal doctrine of similarity based on the preserved views of rationality and the reasonable international state. Applying areas that hold no correlation would simply be rejected based on consideration. As such, this creates more of a burden upon space governance and UNCOPUOS. As the body is functioning in a highly geopolitical centre-focused area, the legitimacy must be questioned. Whether the current model is the best governance model will be discussed in the next chapter. However, the functionalism and development of UNCOPUOS have been stifled by the unwillingness to reform treaty law and thus the mandate of UNCOPUOS. A future consideration is to whether UNCOPUOS could be altered through another global governance system, such as through the OST. Such a consideration may enlighten and help to consider the research question of what the future of space governance as a single consideration is. The next chapter will consider different governance models to consider the future of space governance, and whether the current space model is the best for such a situation.

## **4 Chapter Four: The Future of Space Governance: The World of Global Governance:**

### **4.1 Introduction**

The nature of space governance as discussed in Chapter Two, is critical in understanding the nature of such a model, but also the needs within space. The stagnant approach of UNCOPUOS as towards treaty law and developing opinions based on international legal principles has already been discussed in Chapter Two and will be further analysed in Chapter Six. Therefore, chapter four will consider adaptive governance towards space and to what accountability may be offered to develop additional legal certainty above the understanding of UNCOPUOS. This chapter seeks to consider what the future may be, with little consideration of past considerations toward to a governance model. As legal certainty is minimal, international relations and or politics will be considered to this approach. Legal considerations and doctrine will be the primary area of consideration to ask what the future of space governance is, and what potentials are already out there. Moreover, additional adaptive governance concepts such a resources, values and human environmental interactions will consider whether a natural forming adaptive governance model is representative. Manageable concepts of the global commons and the social purpose will conclude the chapter and create an approach to allow the future of space governance to be analysed in Chapter Five.

### **4.2 The Global Governance System**

Globalization, appears to be a link that exists between good governance, democracy, and the law, thus suggesting that national law plays a role in systems formulated for global governance.<sup>228</sup> While considering in depth global governance, there must be a consideration and understanding of what deglobalization is and whether this may form an early issue. Ripsman's 2021 article considers such an approach as a global transcendence from the typical global approach after the pandemic.<sup>229</sup> His view creates a performance-based parody to which an international barrier to liberal commercialisation should be balanced while considering any governance practices and international development. His understanding of global governance and the issues are well versed, but the issue of such remains fragmented like other considerations delivered by the likes of Doyle<sup>230</sup> as to space. The considerations by Doyle and

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<sup>228</sup> Morss JR, *Good global governance: custom, the cosmopolitan and international law*, vol 3 (International journal of law in context, Cambridge University Press 2007) 3-4

<sup>229</sup> Ripsman NM, 'Globalization, deglobalization and Great Power politics' (2021) 97 *International affairs* (London) 13-17

<sup>230</sup> Michael W. Doyle, *Ways of war and peace: realism, liberalism, and socialism* (New York: Norton, 1997), pp. 230–50; Robert O. Keohane, 'International liberalism revisited', in John Dunn, ed., *The economic limits to modern politics* (Cambridge: Cambridge University Press, 1990), pp. 186–7

Ripsman will be limited as to references due to their topics being areas of deglobalisation and therefore out of the current scope of this thesis. Moreover, this thesis will consider the established global governance system prior to the pandemic and based on a functional international legal system.

The global governance system relies on customary international law, reliance, state practice as well as the solid considerations and understanding of treaty law. There is an emergence of universal consensus on matters that are of global concern. The governance of space, among the international treaties form part of the global governance system that has been established by UNCOPUOS. The OST was developed and implemented by the UN legal subcommittee in 1966 and declared the legal principles that govern the activities of the various states on outer space exploration and use.<sup>231</sup> Among the principles that were contained in the treaty is carrying out outer space exploration for global benefit while avoiding harmful activities on celestial bodies.<sup>232</sup>

The global governance system concept can also be inferred from the setting up of formal organizations with at least one member state from each of the five continents. The organizations enhance international relations and are viewed as arenas where international politics occur.<sup>233</sup> The understanding of the global governance system is crucial in enhancing the understanding of the process of rulemaking and rule taking. In essence, the global governance system should be understood from the point that as new markets arise due to globalization which corporations stand to benefit from, the corporations lose the capacity to regulate their conducts of cross-border business for the public good.<sup>234</sup> The following chapters will consider the considerations and adaptable approach of adaptive governance throughout the notions of social purpose and accountability. Such a narrative is not new in the space sector, but within the legal understanding of the concept nature, it is original. Applying adaptive governance in space, which will be discussed next, must be seen as a developing and logical step towards to common sense approach to governance of space. Giving the limited arguments to deglobalization and the typical assault on the global governance regimes, the importance of legal certainty and

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<sup>231</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI)

<sup>232</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI)

<sup>233</sup> Solana J and Saz-Carranza A, 'Treating Global Governance Seriously' (2015) 75 Public Administration Review 776

<sup>234</sup> Eberlein B, 'Who Fills the Global Governance Gap? Rethinking the Roles of Business and Government in Global Governance' (2019) 40 Organization studies 1125

adaptiveness will be critically analysed to develop the hypothesis on what is the future of space governance.

### **4.3 Applying adaptive governance to space**

Generally, adaptive, or responsive governance is normally used for environmental governance since it provides a suitable ground for built in systems with complexities and uncertainties. With reference to space governance, adaptive governance can be applied using selected criteria, including enough information as regards the interaction between humans and the environment, resources and dialogue among the various resource users and the various institutions.<sup>235</sup> Resource dialogue is a key aspect in ensuring that the various actors are aware of their roles in the management of shared resources for the benefit of all the players. For global governance, collaboration is critical in ensuring that global commons benefit all parties. The incorporation of elements of adaptive governance into matters of space, is prompted by the fact that the commercial space sector has experienced an escalation in competition among the nations that have an interest in governing the resource. For instance, policymakers in the U.S, as well as other global giants, have all sought dominion of the global space economy.<sup>236</sup> Besides, there has been an increased involvement by private organizations such as Blue Origin and SpaceX which have accelerated innovation in outer space exploration by creating better equipment and machinery for deep space flight.<sup>237</sup> In this regard, the space governance discussion has expanded to not only environmental issues, such as space debris, but also human habitation on celestial bodies.<sup>238</sup> Future projections depict that domination of the space economy by a few nations will not be possible, instead there is only the possibility of partnerships between the public and private research bodies. Specifically, the partnership is expected to bring to realization the collaboration of nations at the international standards, for purposes of promoting the sustainability of outer space.<sup>239</sup> In that respect, the functionality of adaptive governance is brought to light. The mentioned concepts are put to practice in the demonstration of inherent opportunities and challenges to the global community in terms of space governance.

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<sup>235</sup> Salmeri A, Developing and Managing Moon and Mars Settlements in Accordance with International Space Law (International Astronautical Federation 2020) 2-7

<sup>236</sup> Daniel L. Oltrogge IAC, 'Space governance in the new space era' (2020) Journal of Space Safety Engineering 432-438

<sup>237</sup> Joshua F and Stacey H, 'On the legality of mars colonisation' (2019) 40 Adelaide law review 841

<sup>238</sup> Joshua F and Stacey H, 'On the legality of mars colonisation' (2019) 40 Adelaide law review 841

<sup>239</sup> Daniel L. Oltrogge IAC, 'Space governance in the new space era' (2020) Journal of Space Safety Engineering 432-438



#### ***4.3.1 Adequate information about the resource***

In adaptive governance of space, there is a need for adequate information about space itself, to understand the various aspects of policies, regulations and controls required. Such, information has been provided by space studies that have increased acquaintance with outer space in terms of the space environment and celestial bodies which are known, and that still need exploration.<sup>240</sup> In that respect, adaptive governance, whereby the collaboration among exploring countries is encouraged, leads to improved information dissemination to humans about the space environment. The collaboration for knowing and understanding the environment beyond the Earth's atmosphere is facilitated by the telescopes and satellites orbiting bodies in outer space, and relay of information about the features of space. Despite the presence of such technology exploring space, it is argued that knowledge about space is not fully understood yet. Therefore, there is a need to gather more information about space to compensate for the volume of knowledge that is still lacking. According to the US National Space Policy, the information gathering process should be collaborative to allow adequate expansion for detailed exploration.<sup>241</sup><sup>242</sup> In other words, the technologies and advanced equipment invented and used by various world powers for accessing matters of space, should be committed to a common task for a general understanding. That means that rivalry in space exploration and utilization should be abandoned, and a common ground established as a centralized data collection, analysis, and distribution centre for the entire globe. Essentially, it is implied that there is a need for the collaboration of space actors in improving the ability of individual states to effectively explore space. The collaboration is pointed out as having the ability to improve the knowledge available to humans about space, and as such can inform on the governance approaches to be adopted. For the U.S. National Space Policy, three of its goals are focused on international space collaboration. These goals include the collection and sharing of space information domestically and internationally, expanding international space cooperation and enhancing space-based observation of the Earth and the solar system.<sup>243</sup> The availability of information is critical in aiding space governance whereby other nations tend to benefit from the knowledge dispensed for purposes of policy development. Therefore, the U.S

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<sup>240</sup> Weeden BC and Chow T, 'Taking a common-pool resources approach to space sustainability: A framework and potential policies' (2012) 28 Space policy 166

<sup>241</sup> US National Space Policy 85 FR 81755 (2020) [Federal Register :: The National Space Policy](#) Accessed 23/11/22

<sup>242</sup> Salmeri A and Villegas MC, A Social License to Operate for Lunar Resources Activities: Towards a Fair and Sustainable Era of Space Exploration (International Astronautical Federation 2020) 2-7

<sup>243</sup> Yang L and others, 'Building a compound and collaborative governance framework to improve international space sustainability' (2021) Global Public Policy and Governance 5

is committed to bridging the gap of information inadequacy thus acting as an example to the world on how adaptive governance of space should be executed. With reference to the Trump administration, Space Policy Directive 3<sup>244</sup> asserts that improvement of data is required for a well-managed space operating environment.<sup>245</sup> Essentially, the said improvements relate to the coordination of collected data by space stations and then comparing notes with all that wish to use them in the pursuit of interest. In that respect, one of the key goals of adaptive space governance is to enhance data sharing, so that all humanity is sufficiently supplied with details about the outer space environment.

Evidence shows that low Earth orbit (LEO) exhibits a contradicting characteristic in that there is a considerable amount of information about that area.<sup>246</sup> The implication is that there has been growing interest in LEO and has seen a rise in the number of satellites from nations. This has facilitated collaboration and coordination since the information related to the area has become a subject of international focus. Therefore, there are high chances of learning from related policies adopted by various countries on LEO, and the presence of satellites in the expanse.<sup>247</sup> Nonetheless, for adaptive governance, there is a need for more information to learn about LEO with respect to the removal of obsolete objects from the area. Notably, many actors utilize the space just above the Earth's atmosphere to an extent that it is overcrowded. Therefore, technical information about satellites from different nations is crucial for the establishment of proper space management policies.<sup>248</sup> Generally, adaptive governance relies on the availability of information, and this is what is desired from a space governance perspective.

#### ***4.3.2 The human-environment interactions***

The environment in the space perspective refers to the surroundings and surfaces of asteroids, moons, and other planets. In the modern times, there has been an influx of government institutions and industries that are concerned with the environmental conditions of outer space

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<sup>244</sup> Space Policy Directive-3, National Space Traffic Management Policy, Presidential Memoranda, June 18<sup>th</sup> 2018 [Space Policy Directive-3, National Space Traffic Management Policy - United States Department of State](#) [accessed 17/11/22]

<sup>245</sup> Yang L and others, 'Building a compound and collaborative governance framework to improve international space sustainability' (2021) *Global Public Policy and Governance* 4-5

<sup>246</sup> Morin JF and Richard B, 'Astro-Environmentalism: Towards a Polycentric Governance of Space Debris', *Global policy*, vol 12 (Wiley Subscription Services, Inc 2021) 19

<sup>247</sup> Morin JF and Richard B, 'Astro-Environmentalism: Towards a Polycentric Governance of Space Debris', *Global policy*, vol 12 (Wiley Subscription Services, Inc 2021) 19

<sup>248</sup> Christensen I and others, 'NEW POLICIES NEEDED TO ADVANCE SPACE MINING' (2019) 35 *Issues in science and technology* 26

bodies.<sup>249</sup> This implies that there has been recent increase in the interest to enhance the protection and safety of the space environment which can be attributed to the need to develop sustainable practices for space exploration through global space governance. Essentially, there is increasing interest in human interaction with the elements of outer space such as an understanding of components has become vital. In that respect, it can be observed that humans are making efforts to adapt space life to Earth with a bid to improve production and living standards. In essence, human interaction with space environments is a criterion of adaptive governance whereby people tend to get direct benefits from the outer surrounding and hence motivated to institute management policies for future gains. This points to the various attempts over the years to enhance the use of space for improving the knowledge available to humans, which can enhance the level of space activities that various nation states carry out in space. Nevertheless, there is little understanding in terms of policy guiding the extraction of components from space and transporting them to Earth. In a more general sense, the removal of space resources should be classified under export-import docket. Evidently, this presents a massive challenge because without cooperation and collaboration of nations, it is unclear who should grant permission and to whom the taxes should be paid. In the present times, pressure is mounted on the private sector exploring space and extracting resources to be accountable to government agencies yet there are no guidelines and policies that govern or permit particular entities to collect levies on materials obtained from space.<sup>250</sup> In essence, it means that despite the need to regulate activities in space such as materials and samples collection, not much stride has been made towards the development of relevant governing policies. As such, the limited policy development is a pointer to the fact that much work remains to be done in enhancing global space governance as concerns legal policy formulation. Additionally, there is little regulation for exploiting the space resources which means that the aspect of sustainability has not been well understood in respect to the resources. This calls for adaptive governance on matters of outer space so that policy for interacting with the environments may be fully developed and understood. Such a collaboration will also be useful in taming the practices of rogue commercial bodies that normally exploit the space without regard for local human environmental impacts.

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<sup>249</sup> Leshinsky, R. (2021). Situating real estate law for the new outer-space economy. *Journal of Property, Planning and Environmental Law*. 152-164

<sup>250</sup> Salmeri, A. (2019). Houston, We Have a Law. A Model for National Regulation of Space Resources Activities. In *Proceedings of the 70th International Astronautical Congress 2018*. International Astronautical Federation 12

Although resource extraction from space encourages human-environment interactions, there is an imminent challenge of both social and psychological dimensions.<sup>251</sup> Specifically, the process of learning space and gathering the right resources involves artificial intelligence and humans which creates human-machine teams. Due to the different information processing capacities between humans and machines, a challenge of socialization arises hence problem with space governance<sup>252</sup>. The views may be interpreted to mean that for global space governance, the perceived impact is that effective space governance can only be achieved if growth in technology keeps pace with the increasing human activity in space. Essentially, it is challenging to administer programs related to space since the machines would act autonomously whereas the humans involved would need to think and reason on how to execute the implementations. Evidence shows that space environment is hostile and can negatively affect human health due to repeated exposure.<sup>253</sup> Consequently, adaptive governance presents the best platform for collaboration and drawing the policies that would regulate the space activities touching on human-environment interaction to protect lives in an international scale even as the pursuit for space life escalates. In as much as space exploration is a subject of national interest, the same is a vital subject of international concern and so cooperative governance globally is necessary. Generally, all the new knowledge that has been acquired over the years in various federations in terms of research, innovation, and development should be brought to perspective and common understanding on a global platform.

#### **4.3.3 Values**

The value of space has received different perceptions since the inception of the visitations in the early days. For instance, the period of the Cold War saw space dominance valued as military power of the respective nations.<sup>254</sup> Specifically, the U.S competed with Russia on military capabilities in the outer space. Although the valuation of space as military strength already ended, the prominence is still regarded as important across the globe whereby the respective nations rely on the technology in space to advance intelligence. The evidence can be noted in the recent establishment of United States Space Force as well as the ASAT demonstrations by

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<sup>251</sup> Doldirina, C. (2018). Regulating'the province of mankind'[Space Legislation]. *Engineering & Technology*, 13(1), 63

<sup>252</sup> Doldirina, C. (2018). Regulating'the province of mankind'[Space Legislation]. *Engineering & Technology*, 13(1), 63

<sup>253</sup> Gallagher, N. (2013). International cooperation and space governance strategy: Nancy Gallagher. In *Space Strategy in the 21st Century* Routledge. 62-86

<sup>254</sup> Herd, G. P., & Kriendler, J. (Eds.). (2013). *Understanding NATO in the 21st century: Alliance strategies, security, and global governance*. Routledge. 16

Russia, India, China, and U.S.<sup>255</sup> The illustration is a pointer that despite the recent developments in the exploration of space, space activities are still used by states to test and demonstrate the military prowess. Therefore, military capabilities of space expressed by various nations is a value regarded as central by many companies that are also strategizing space security presence. In adaptive governance the coordination of the security efforts of space is necessary to obtain the right view of managing the whole area to the interest of every nation involved. In the meantime, the outer space is also valued as a deposit of unexplored resources where human interference has not reached. In that respect, there are numerous plans attempting to postulate the future of space activity and exploration. Due to the state of none-exploitation or under-exploitation of space resources, there are diverse views on the next steps to assume for advancing the quests.<sup>256</sup> Essentially, space exploration is growing towards the area of obtaining valued mineral deposits and as such, regulations developed are geared towards considering space as also having a key value in mineral deposits. For instance, the US launched the Artemis program under NASA in Trump's administration with the aim of revisiting the moon and also sending people to further explore the planet Mars.<sup>257</sup> According to the president's administration, the moon is the top priority of the program whereas the congress holds that Mars should be prioritized.<sup>258</sup> Evidently, there is conflict about the value of outer space even at national level. In that light, it can be perceived that the international arena of space exploration attaches a range of value to space which brings about challenges in space governance. This calls for adaptive governance whereby the different values, incentives, and goals towards space can be integrated towards a common objective. For effective integration, there should be policy guidance which defines how national policy marries international policy of space values. In other words, state policy of space value should have a linking point to the international spectrum so that there is no total overhaul of a country's interest and belief about outer space. In the US, that national policy outlines specific principles that relates to international space policy.<sup>259</sup> The principles include; recognition that all nations can use space

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<sup>255</sup> Herd, G. P., & Kriendler, J. (Eds.). (2013). *Understanding NATO in the 21st century: Alliance strategies, security, and global governance*. Routledge. 16

<sup>256</sup> Mouat, C. M., Techera, E. J. E., Notebaert, L., Blake, M., & Barker, R. (2021). (Un) earthly governance: beyond functional frameworks to flourishing spacescapes. *Journal of Property, Planning and Environmental Law*. 12,45

<sup>257</sup> Deplano, R. (2021). The Artemis Accords: Evolution or Revolution in International Space Law? *International & Comparative Law Quarterly*, 11. 1-3

<sup>258</sup> New Space Policy Directive Calls for Human Expansion Across Solar System (2017) [President Signs New Space Policy Directive | NASA](#) accessed 18/05/23

<sup>259</sup> Sokolova, O., & Madi, M. (2020). Space Sector Resilience and Ways to its Governance. In *Space Debris Peril: Pathways to Opportunities* (pp. 185). CRC Press. 167, 221

and perform explorations based on international law in a peaceful manner, acting responsibility for the outer space to prevent misperceptions, upholding competitive commercial space activities for progress of space activities, and that there cannot be claim of sovereignty of space bodies according to the international law.

Apart from the national principles that features international space governance interests, the adaptive governance now encourages the intervention of global bodies such as the UN on matters of space governance.<sup>260</sup> As such, it is implied that the governance of space is a collaborative effort which calls for the involvement of organizations that have a global appeal in terms of the representation of global interests. Generally, the UN has the responsibility of setting space values that are considered by the member states. For instance, there are key treaties fostered by the UN concerning the safety of space.<sup>261</sup> This includes the directive that weaponization of the outer space is prohibited. The significance of such treaties is that activities of individual nations alongside the private companies therein engaged in space exploration are constrained for the benefit of all members. At the same time, the UN utilizes the provisions of international standards to set technical standards for space so that overall sustainability is achieved.

#### ***4.3.4 Inclusive dialog between resource users***

Adaptive governance of space requires that there be unity among all the users of space resources including those that exist both within the various nations' states and globally. Essentially, the national scenario is defined by the private and government sectors that are active actors in the affairs of outer space.<sup>262</sup> As such, there is need that private and government actors in various nations set out their interests in their space exploration activities in order come up with regulatory frameworks that can legally regulate the various interests of the various actors. On the other hand, the international level consists of all the private and governmental bodies across the globe.<sup>263</sup> In that respect, outer space exploration has attracted many stakeholders which calls for dialog on how the resources in the area are to be utilized in a peaceful manner. The current regulation is made possible by the UNCOPUOS which is under

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<sup>260</sup> Herd, G. P., & Kriendler, J. (Eds.). (2013). *Understanding NATO in the 21st century: Alliance strategies, security and global governance*. Routledge. 113

<sup>261</sup> Herd, G. P., & Kriendler, J. (Eds.). (2013). *Understanding NATO in the 21st century: Alliance strategies, security and global governance*. Routledge. 113

<sup>262</sup> Tepper, E. (2020). The Big Bang of space governance: towards decentralized regulation of space activities. 485

<sup>263</sup> Tepper, E. (2020). The Big Bang of space governance: towards decentralized regulation of space activities. 485

the guidelines of the UN Office for Outer Space Affairs (UNOOSA).<sup>264</sup> This implies a close collaboration and dialogue even among the various UN bodies to come up with effective space governance by setting unified policies. Specifically, UNCOPUOS provides the common ground for collaboration for the nations and commercial actors who are involved in space exploration to dialog and share experiences and ideas pertaining to the space issues. Consequently, the international space community gets the opportunity to address important topics affecting resource exploitation and usage in the context of space. According to Weeden and Chow,<sup>265</sup> one key subject of discussion has always been related to the effectiveness of the international treaties on space exploration and resource utilization. Specifically, nations have raised concerns about the treaties as they are considered obsolete based on the times of their conception which is in the 1960s and 1970s.<sup>266</sup> The view of the author implies the recent development towards coming up with modern policies that can assist in effectively governing the modern space exploration activities. This has an implied impact of enhancing the development of better policies concerned with space governance. During such periods, the current commercial space players argue that there were few actors involved in activities compared to the current times. At the same time, the motives of space exploration have changed significantly hence the need for dialog and subsequent update of international treaties associated. From the perspective of Weeden and Chow,<sup>267</sup> a global forum should be created where nations can collaborate and express their views on space activities and recommend the best and appropriate governance measures. Thus, the views point to the need for involvement of all space actors in delivering the expected level of policy preparedness in policy development through dialogue. Such is the significance of adaptive governance whereby the international bodies and nations have a conference to discuss crucial matters affecting the environment which in this case is the utilization of the outer space for various activities. Although inclusive dialog is significant, countries such as China, Russia, and the US that are considered space powers are noted to have some national policies that can act as barriers to the

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<sup>264</sup> Tepper, E. (2019). Polycentric Governance in Global Affairs: The Case of Space Governance. *Available at SSRN 3400217* 137

<sup>265</sup> Weeden, B. C., & Chow, T. (2012). Taking a common-pool resources approach to space sustainability: A framework and potential policies. *Space Policy*, 28(3), 167.

<sup>266</sup> Weeden, B. C., & Chow, T. (2012). Taking a common-pool resources approach to space sustainability: A framework and potential policies. *Space Policy*, 28(3), 167

<sup>267</sup> Weeden, B. C., & Chow, T. (2012). Taking a common-pool resources approach to space sustainability: A framework and potential policies. *Space Policy*, 28(3), 167

forum discussions on matters of space at the international level.<sup>268</sup> The views point to the lack of uniformity in legislations that may also hamper the development of inclusive policies since some countries have legislations that may possibly bar them from participating in global dialogue as regards the use of space. For instance, in the case of US, collaboration with a nation such as China is only permitted after the FBI have established that national security is not threatened.<sup>269</sup> Additionally, the Congress must be privy to US collaborating with other nations on space related issues. The implication is that while other countries are open and ready for space resource usage dialogs, the space powers have personal interests to protect which can stall the procedures of the international space community.

In the US, such restrictions to adaptive space governance are presented in the Wolf Amendment which is so far considered a major hindrance to involvement with the rest of space-faring community.<sup>270</sup> Other than legal barriers among nations, evidence shows that communication barriers also exist at the national level between the governments and private actors in space affairs.<sup>271</sup> The implication is that adaptive governance in some cases is not accomplished between the industries in a nation which results in underutilization of space resources. For instance, astronomers felt frustrated when SpaceX decided to launch many satellites into space because this obstructed the astronomers' work.<sup>272</sup> Such absence of inclusive dialog leading to personalized decisions is experienced at a greater scale at the international level where countries compete to dominate the space resource. The views presented hence imply that the global space is considered to varied levels of value for the benefit of human exploration. Different states may attach different values to space depending on their interests. As such, regulations are formed to ensure that whatever value space contains for the various actors, the actor's responsibility utilize space to avoid harm to others.

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<sup>268</sup> Salmeri, A. (2019). Houston, We Have a Law. A Model for National Regulation of Space Resources Activities. In *Proceedings of the 70th International Astronautical Congress 2018*. International Astronautical Federation. 4-6

<sup>269</sup> Salmeri, A. (2019). Houston, We Have a Law. A Model for National Regulation of Space Resources Activities. In *Proceedings of the 70th International Astronautical Congress 2018*. International Astronautical Federation. 4-6

<sup>270</sup> Salmeri, A. (2019). Houston, We Have a Law. A Model for National Regulation of Space Resources Activities. In *Proceedings of the 70th International Astronautical Congress 2018*. International Astronautical Federation. 4-6

<sup>271</sup> Rhimbassen, M. L., & Rapp, L. (2021). New space property age: at the crossroads of space commons, commodities, and competition. *Journal of Property, Planning and Environmental Law*. 88-106

<sup>272</sup> Wall M. (2020). SpaceX's Starlink Satellites Will Soon Get Glare-Reducing "Sunshades," Elon Musk Says, Space.Com. <https://www.space.com/spacexstarlink-satellites-sunshades.html>.



#### ***4.3.5 Complex, redundant and layered institutions***

The complexity of space governance is brought about by the increased number of states actively involved in space exploration. Contrary to the beginning of space exploration, currently there are many nations, involved in space activities globally.<sup>273</sup> As such, there are numerous governance guidelines and institutions concerned and developing domestic or multilateral governance practices for space activities. At the same time, multiple commercial entities, and institutions, at both global and national levels, have become interested in space exploration which makes it difficult to govern using the old policy and guidelines.<sup>274</sup> Most importantly, space governance is suppressed by the fact that every national space agency has a specific structure of governance, distinct missions, and different laws. Therefore, the complexity of space governance on the international platform increases. Besides the national tragedy of unique governance, evidence shows that the international stage is also plagued by a number of international agencies with varied laws for environmental protection and space governance.<sup>275</sup> Such international bodies include UNOOSA, ITU (International Telecommunications Unions) and UNCOPUOS all of whose perceptions of space practices, and therefore governing laws, differ.<sup>276</sup> In some cases, there is redundancy felt in line with the numerous institutions since some of the laws are similar and space is for all. In other words, the presence of multiple space governing bodies, especially at the international level, confuses the nations about which particular entity is superior or reliable.<sup>277</sup> Some nations and commercial entities may find ways to get away with offensive activities by siding with lenient international agencies, or those that offer greater incentives for such activities. As space activities increase, and institutions also increase, there is a need for improved management of the related data collected at various stages to tackle the challenges of complexity and redundancy. This calls for adaptive governance of space activities whereby data is shared, and a common analysis is performed for a standardized conclusion. With the presence of adaptive governance, one can hold all the related institutions accountable for their actions and impose

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<sup>273</sup> Morin JF and Richard B, 'Astro-Environmentalism: Towards a Polycentric Governance of Space Debris', Global policy, vol 12 (Wiley Subscription Services, Inc 2021)

<sup>274</sup> Christensen I and others, 'NEW POLICIES NEEDED TO ADVANCE SPACE MINING' (2019) 35 Issues in science and technology 26

<sup>275</sup> Matjaž V, 'ON THE PRACTICES OF RISK RE-NORMALISATION: 'KNOWING' THE KNOWN UNKNOWN IN PUBLIC DISCOURSE ON OUTER SPACE EXPLORATION', Teorija in praksa, vol 56 (University of Ljubljana, Faculty of Social Sciences 2019)

<sup>276</sup> Matjaž V, 'ON THE PRACTICES OF RISK RE-NORMALISATION: 'KNOWING' THE KNOWN UNKNOWN IN PUBLIC DISCOURSE ON OUTER SPACE EXPLORATION', Teorija in praksa, vol 56 (University of Ljubljana, Faculty of Social Sciences 2019)

<sup>277</sup> Sinclair MR, 'To Fight to Save in Space: A Legal Argument that a Space Coast Guard Is Increasingly Necessary for Effective Twenty-First Century Space Governance' (2018) Air and Space Law

penalties where applicable. In the broader sense, adaptive governance is the way to bring states' governance practice into a centralized domain whereby policies can be spelt out with the participation of every nation and institution.<sup>278</sup> Consequently, adaptive space governance promises standardized approaches to value space, explore space resources and agree on the use of such resource and overriding aims for future development. Overall, the interest is the wellbeing of humans that are involved in space activities in addition to the overreaching interests of the global commons. With the understanding of commercialisation and common theories on capitalisms, another consideration must be that of economics and development through financial and exploitative gain.

#### ***4.4 Manageable governance concepts.***

Governance is mostly considered as the structures and processes set up to ensure transparency, rule of law, responsiveness, and accountability as well as inclusiveness, broad-based participation, and empowerment.<sup>279</sup> One of the key governance concepts that can be applied in global governance is the representation of the norms, values, and the management of public affairs in a transparent, responsive, and participatory manner. In this manner, the vision and development need of the various countries will be taken into consideration to ensure that the vision and development goals of these countries contribute to the achievement of global governance goals.<sup>280</sup> As such, global governance applies governance concepts that enhance the collaboration of the various actors to achieve a common goal for the well-being of the various states. The achievement of the goals must ensure that consensus is built and as such, space governance must be regulated in a way that promotes individual state interests without compromising the joint international interest of enhancing sustainability. Implementation of decisions is as such carried out within the context of the mission and strategic goal through operational decisions and policies and keeps governance bodies informed and educated. Further, the views given by Pattberg posit that the various governance concepts currently in place for the governance of space are contested and have brought a divergence of approaches that are currently applied.<sup>281</sup> In essence, this information furthers that there are currently no definite and uncontested concepts of global space governance. The perceived impact of this on

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<sup>278</sup> Sinclair MR, 'To Fight to Save in Space: A Legal Argument that a Space Coast Guard Is Increasingly Necessary for Effective Twenty-First Century Space Governance' (2018) *Air and Space Law*

<sup>279</sup> Brinkerhoff DW, 'Accountability and good governance: concepts and issues' (2017) *International development governance* 269

<sup>280</sup> Brinkerhoff DW, 'Accountability and good governance: concepts and issues' (2017) *International development governance* 269

<sup>281</sup> Pattberg P, *Global governance: Reconstructing a contested social science concept* (2006) 3-5

global space governance is that the policies set in place may not realize their intended purposes. In a similar manner, Burnay and Chaisse also indicated that the legal frameworks that seek to govern global commons remain unexplored and as such, do not clearly set out the concepts of global space governance.<sup>282</sup> Hence, the views point out a limited scope in currently determining the manageable concepts of global governance.

#### **4.4.1 Global commons**

Global commons governance is carried out in the interest of specific aspects of environmental governance and as such, the stewardship of global commons can only be ensured through global governance.<sup>283</sup> Global commons<sup>284</sup> are defined by international law as mainly high seas, the atmosphere, Antarctica, and outer space. The OST distinguishes a slight abstract to which the common resources are governed based on the principle of non-appropriation and apply to the outer space context since misuse of outer space resources can directly affect all countries. The idea is particularly illustrated in the Cosmos 954 Soviet satellite that spiralled out of control and crashed to Earth in 1978, landing in North-western Canada and spreading radioactive debris on the crash site.<sup>285</sup> The incident revealed the need for collaboration in outer space management because accidents can adversely affect any country. In the view of Ranganathan, the advancement in technology and science in the recent past as well as the increased demand for resources has led to an increase in activities in the global commons, thus facilitating the need to come up with effective regulatory frameworks and normative principles to preserve resources and ensure the sustainability of human activities.<sup>286</sup> The views presented indicate that, due to technological advancements, there has been growing interest in global commons which has led to increased activities, thus the need for regulations to ensure that the enhanced activities are not harmful to sustainability. The impact in space governance is that there has been a rise of various regulatory bodies that aims to ensure the safe exploration of space. In governing the global commons, the normative principle that all political communities are territorially segmented, and hence common goods need to be achieved together, is used. In essence, we can infer that in governing global commons, all political territories act together to check their activities for the common good. The international community has hence come up

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<sup>282</sup> Burnay, M., & Chaisse, J. (2020). Global Commons as an Emerging Arena of Contestation of Global Governance Structures and Norms. *International Community Law Review*, 22(5), 538.

<sup>283</sup> Lehmann M, 'Regulation, global governance and private international law: squaring the triangle' (2020) 16 *Journal of private international law* 1

<sup>284</sup> Ranganathan S, 'Global Commons' (2016) 27 *European journal of international law* 693

<sup>285</sup> Wall, M. (2019). The biggest spacecraft ever to fall uncontrolled from space. Available: <https://www.space.com/13049-6-biggest-spacecraft-falls-space.html>

<sup>286</sup> Ranganathan, S. (2016). Global commons. *European journal of international law*, 27(3), 693

with treaties and conventions that assist in the governance of global commons, both for the well-being of humans as well as for sustainable development. The treaties include the United Nations Convention on the Law of the Sea of 1982 which governs the activities on the high seas.<sup>287</sup> The Antarctic Treaty System ensures the protection of the flora and fauna of Antarctica, while the OST has also been formulated.<sup>288</sup> However, according to Cumbers, several gaps and challenges still exist with the key one being the complex and fractured nature of the frameworks that cover global commons.<sup>289</sup> The current frameworks for the governance of space are not comprehensive enough to clearly bring out effective space governance outcomes for the benefit of all space actors. In a manner to support the challenges in global governance, Brinkerhoff further demonstrated that traditional treaties of global commons governance do not consider the impacts of human activities, comprehensively leaving numerous activities without standards and rules. Hence, this points to the need to explore other global governance routes.<sup>290</sup> This would offer an early indication that traditional treaties are not effective in modern global governance since they leave out a considerable level of modern knowledge on space activities.

Global commons must not be understated or underestimated at any opportunity. Given that the term applies within the space treaties and scholars, such as Bhat,<sup>291</sup> have attempted to make the direct link with International environmental law, the global commons can present a new basis for space governance in the future.<sup>292</sup> In essence, the views imply that global commons must be considered as key in coming up with an improved basis for the governance of space which can lead to the creation of improved global space governance policies. The impact is that due to the interests of each party in the utilization of global commons, policies that effectively address space governance for the common good can be formulated through dialogue among the various space actors. In the context of space exploration and travelling, there have been agreed guidelines on how to deal with crimes committed by individuals while in outer space. Unlike the land grabs and disputes of the past, the present issues are centred around sustainability and how to maximise the potential for Earth. Future scientific missions, technology development and regional and international non-state actors are beginning to

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<sup>287</sup> Hassan D and Soininen N, 'United Nations Convention on the Law of the Sea as a framework for marine spatial planning', *Transboundary Marine Spatial Planning and International Law* (Routledge 2015) 23

<sup>288</sup> Garcia D, 'Global commons law: norms to safeguard the planet and humanity's heritage' (2021) 35 *International relations* (London) 422

<sup>289</sup> Cumbers A, 'Constructing a global common in, against and beyond the state' (2015) 19 *Space & polity* 62

<sup>290</sup> Brinkerhoff DW, 'Accountability and good governance: concepts and issues' (2017) *International development governance* 269

<sup>291</sup> Bhat B S, 'Application of environmental law principles for the protection of the outer space environment: a feasibility study' (2014) 39 *Annals of air and space law* 323

<sup>292</sup> Bhatt S, *International Environmental Law* (APH Publishing Corporation 2007) 54

develop such areas using their own knowledge and expertise within the area of space. The rationale of such activities creates a possible form for space governance which features states, acknowledges them, and advises them on best practices. This presents a global achievement or hindrance for global space governance will be elaborated upon.

#### **4.4.2 Individual rights and non-state actors**

Individual rights and non-state actors conform to the normative principle that their entitlement is absolute and independent of being members of a state. By freely committing to human rights protection globally, the international community imposes upon their individuals the need to exercise human rights due diligence.<sup>293</sup> The concept implies that member states come up with agreements which ensure that governance models are settled and aims at the protection and improvement of human rights. The four types of human violations that the UN General Assembly explicitly recognize the need for protection by the international community include protections against violations of the criminal law of crimes against humanity, genocide, ethnic cleansing, and war crimes.<sup>294</sup> On the other hand, the rise of non-state actors means that they are playing a more active part in the process of designing and constructing global governance institutional framework. In the view of Kassoti, the increase in functional requirement for private acceptance and expertise in global governance regulations has increased the actions of non-state actors.<sup>295</sup> An indication would suggest that non-state actors are necessary for complementing the other space authorities and ensuring that the interests of private space actors are also taken into consideration when formulating the governing policies. On the other hand, Erman attributed the increased involvement of non-state actors to counteract unjust actions of international regulatory practices in global governance.<sup>296</sup> The involvement of non-state actors and state actors in global governance has been noticed to have equal rights in most international bodies' policy formulation frameworks.<sup>297</sup> The regulations formed have in common, the level of refrain from international foundation statutes. For instance, NGOs, with certain expertise, maintain advisory status within the global governance status to ensure that the regulations formulated effectively address the issue at hand for the global benefit, and are based on

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<sup>293</sup> Erman E, 'A Function-Sensitive Approach to the Political Legitimacy of Global Governance' (2020) 50 British journal of political science 1001

<sup>294</sup> Erman E, 'A Function-Sensitive Approach to the Political Legitimacy of Global Governance' (2020) 50 British journal of political science 1001

<sup>295</sup> Kassoti E, 'The Constitutionalization of International Law and the Challenge of Non-State Actors' 11 Vienna online journal on international constitutional law: ICL-Journal (2017) 177

<sup>296</sup> Erman E, 'A Function-Sensitive Approach to the Political Legitimacy of Global Governance' (2020) 50 British journal of political science 1001

<sup>297</sup> Erman E, 'A Function-Sensitive Approach to the Political Legitimacy of Global Governance' (2020) 50 British journal of political science 1001

evidence drawn from past experiences and scientific research. Hence, it can be argued that from the available evidence, the norm-setting in global governance has a strong functional requirement for the integration of non-state actors. Therefore, the concept of non-state actors has been presented as assisting in ensuring that space policies are based on expert advice and that the regulations formulated address the needs of the various space players.

#### ***4.4.3 The pressures, influences and constraints placed on developing countries.***

The third normative principle of global governance is based on the idea that the state authority is absolute and hence, moots the international authority possibility. As a concept, global governance is considered an exercise of authority and agreed to norms across national borders.<sup>298</sup> In essence, this implies that the contemporary system is based on both the idea of greater global authority levels, as well as the contestation of the said authority. Global governance institutions are several and diverse and as argued by Zurn, stretch to include both the large intergovernmental organizations such as the United Nations, to private authorities that exercise authority beyond a nation state. On its part, space governance is based on several concepts including codes of conduct in space, safety concepts, procedures and standards, regulations and international treaties and other agreements.<sup>299</sup> As such, it means that space governance is done through the guidance of various authorities agreed upon to enable international action in the regulation of activities related to space. Moreover, it also implies that space governance seeks to integrate space actors with the aim of negotiating responses that seek to address the problems that affect the various space actors. In the argument of Cooper and Pouliot, developing countries are faced with the pressures to conform to the expectations of world giants since they may not have the outright capacity to moot their authority.<sup>300</sup> In essence, the arguments imply that developing states sometimes must adhere to space governance regulations and policies that they do not agree with but have no power to overturn. However, according to Wang, in the increasingly connected world where there is no central actor, there is a need for the ordered rule and collective action of all the world states.<sup>301</sup> However, in achieving this, global governance provides the rule through institutions and processes seeking to manage global problems. The problem is that these institutions may not fully represent the interests of developing countries due to competition which form established

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<sup>298</sup> Fioretos O and Tallberg J, 'Politics and theory of global governance' (2021) 13 International Theory 99

<sup>299</sup> Hofmann M and Blount PJ, Innovation in Outer Space: International and African Legal Perspective: 5th & 6th Luxembourg Workshops on Space and Satellite Communication Law (Nomos Verlag 2018) 289

<sup>300</sup> Cooper AF and Pouliot V, 'How much is global governance changing? The G20 as international practice' (2015) 50 Cooperation and conflict 334

<sup>301</sup> Wang H, 'New Multilateral Development Banks: Opportunities and Challenges for Global Governance' (2017) 8 Global policy 113

economies, thus making developing countries vulnerable.<sup>302</sup> The research implies that there is a need to gain global support through the establishment of norms that represent the interest of all, or a majority of space actors through concerted agreements. Since the policies made transcend national and regional borders and involve many countries, developing countries may have constraints placed on them to adopt these policies. The constraints may be linked to funding and aid cuts for failure to comply, thus threatening the ability of citizens to express their interests and sovereign rights. From the foregoing, it is evident that there is no one size fits all as far as global governance routes are concerned. To deliver equality to all states and achieve maximum support for global governance, there is a need to pick and mix the various global governance routes to achieve the best outcome. In essence, there should be global acceptance of the policies that are adopted by global rule makers, and acceptance by global rule takers for the overall well-being of all the players.

#### **4.5 Accountability and Legitimizing Problems**

Problems related to accountability and legitimation are also bound to be experienced in space governance global structure. The problem is that unlike in traditional institutions the international system compliments national paradigm in a dominant manner, whereby the current international institutions are a form of political denationalization expression. The current international institutions are viewed as being more intrusive into the affairs of national societies, unlike the traditional ones.<sup>303</sup> The main accountability and legitimacy problems of global governance that will be explored in the current context include pluralist accountability, legal narrative, social purpose, and the congestion of global governance. These ideas and application to space governance present a new and qualified assessment on how such applications and present problems can be applied, but also progress space governance progressively and in a narrow form. Moreover, according to Zurn, unlike the traditional institutions that were viewed as an international complement, the current international institutions are viewed as an expression of political denationalization.<sup>304</sup> As such, it can be viewed that the current international institutions undermine the principle of consensus as well as international cooperation. For global space governance, the implied impact is that the regulations formulated may have been politicized, and as such may experience potential

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<sup>302</sup> Wang H, 'New Multilateral Development Banks: Opportunities and Challenges for Global Governance' (2017) 8 Global policy 113

<sup>303</sup> Cooper AF and Pouliot V, 'How much is global governance changing? The G20 as international practice' (2015) 50 Cooperation and conflict 334

<sup>304</sup> Zuern M, 'Contested Global Governance' 9 Global policy (2018) 138

resistance from some nations. As such, there is a need to address the accountability and legitimating problems of international institutions.

#### ***4.5.1 Pluralist accountability***

Pluralist accountability in global governance refers to the challenges created to international law, both in terms of politics as well as the domestic law principles which get extended to the global arena where public power is exercised in global governance.<sup>305</sup> The problem created is a contestation issue as regards to whom the accountability of global governance is given. In the view of Koenig-Archibugi,<sup>306</sup> a competition for primacy between the national, cosmopolitan, and international constituencies usually arise as the result of a level of the disorderly interplay of accountability mechanisms between the different levels, and the different regimes of the governance structure. To imply that there is a significant level of disagreement on the global stage as regards the accountability of global governance policies would be a modest consideration giving the geopolitical nature of the global commons. For global space governance, this may have the impact of a lack of agreement with regulations emanating from global governance institutions. In offering a similar view, Muttakin, Mihret and Khan also argue that the pluralist structure that emerges from the global governance structure is often hinged on pragmatic accommodation as opposed to clear decisions.<sup>307</sup> Pluralist accountability is concerned with ensuring that the interests of the various space actors are represented. The resulting impact on space governance is that, while all interests may be represented, necessary steps are not taken to evaluate the interests in terms of their benefits against potential harms. The result is that the concept strongly contrasts with coherence ideals, modern constitutionalism unity as well as domestic administrative law. The views offered thus imply that even as global governance of space is implemented, a pluralist problem associated with a governing body holds the greatest regulatory power, as well as to whom the various governance bodies are accountable to. Clear policies regarding the use of space may also not be formulated hence leading to contrasting with domestic laws. However, as demonstrated by Deloffre, pluralism prevents friction that may arise and identifies the rights of every global member to

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<sup>305</sup> Restrepo Amariles D, 'Legal indicators, global law and legal pluralism: an introduction' 47 *Journal of legal pluralism and unofficial law* (2015) 9

<sup>306</sup> Koenig-Archibugi M, 'Chapter 19: Global Governance The Handbook of Globalisation, Second Edition', (Edward Elgar Publishing 2011) 394

<sup>307</sup> Muttakin MB, Mihret DG and Khan A, 'Corporate political connection and corporate social responsibility disclosures: A neo-pluralist hypothesis and empirical evidence', *ACCOUNTING AUDITING & ACCOUNTABILITY JOURNAL*, vol 31 (Emerald Group Publishing 2018) 331



participate in decision making.<sup>308</sup> The challenge of mirroring divergent views, however, will eventually arise among the various political orders. Hence, it is implied that there is a considerable need for all global space actors to collaborate in coming up with policies that reflect the overall interest of most nations, to effectively legitimize space regulation powers of bodies that are charged with the role. By allowing and encouraging participation, space governance gains support in the creation of positive political acts as well as productivity throughout international law.

#### **4.5.2 Legal Narrative**

The main legal narratives in global governance can be broken into ‘the fragmentation of international law’, ‘international legal pluralism’, ‘the constitutionalisation of international law’ and ‘global administrative law’.<sup>309</sup> In detailing the legal narratives, Peters explained that global administrative law (GAL) seeks at mapping out the competence of the various international institutions in order to lessen the effect of international bureaucracies in international legal order formation beyond individual state consents.<sup>310</sup> In essence, it is implied that GAL is concerned with ensuring that the various international institutions that are charged with global governance formulate laws that reflect the global needs and interests. The implied impact for global space governance is that GAL enhances the ability of space laws formulated to represent the interests of all nations on the globe. However, according to Pankakoski and Vihma, GAL is concerned with the policies of each of the small components that make up the bigger globe rather than the bigger picture. The stories of the smaller divisions are often about the inquiry into the legitimacy and accountability of international organizations, thus the core GAL normative claim. By contrast, the constitutionalisation of international law considers that international legal order exists beyond the individual states and has a foundational set of norms as well as a backbone.<sup>311</sup> Tzevelekos and Lixinski further argue that power are in fact exercised at the international level with consideration of the contents of the basic norms.<sup>312</sup> This implies that constitutionalisation of the international law narrative goes beyond ensuring that laws are

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<sup>308</sup> Zarnegar Deloffre M, *Global accountability communities: NGO self-regulation in the humanitarian sector*, vol 42 (Review of international studies, Cambridge University Press 2016) 724 - 747

<sup>309</sup> Pankakoski T and Vihma A, 'Fragmentation in International Law and Global Governance' 12 *Contributions to the history of concepts* (2017) 22

<sup>310</sup> Peters A, 'The refinement of international law: From fragmentation to regime interaction and politicization', *International journal of constitutional law*, vol 15 (Oxford Univ Press 2017) 699-670

<sup>311</sup> Tzevelekos VP and Lixinski L, 'From the internationalisation of national constitutions to the “constitutionalisation” of international law: the role of human rights', *Fragmentation vs the Constitutionalisation of International Law* (Routledge 2016) 88

<sup>312</sup> Tzevelekos VP and Lixinski L, 'From the internationalisation of national constitutions to the “constitutionalisation” of international law: the role of human rights', *Fragmentation vs the Constitutionalisation of International Law* (Routledge 2016) 88

formulated to address the interests of all states, but also to ensure that the norms and key legal frameworks of the individual states are incorporated into laws. However, as explained by Habermas, the main challenge of the narrative is the disagreement as regards the foundational set of norms that hinges on this narrative.<sup>313</sup> In essence, it may be argued that while GAL is faced with the problem of disintegration of the various divisions, the constitutionalisation of international law fails to agree on the norms that make up international law. On the other hand, international legal pluralism is both narrative and counter narrative. According to Swenson, the legal order is dedicated to critiquing the hegemonic tendencies of the international legal order. This can therefore be considered that such narrative views form international legal orders as simply reproductions of western understanding of international law and is imposing them on the rest of the globe for the sake of an illusory unity.<sup>314</sup> In essence, the international legal order questions the level of agreement with powers in the regulation of space. As such, the narrative seeks to ensure that global governance policies are fair to all nations that subscribe to them. In a similar instance, Habermas also assumes that there exists a global society which is not only pluralistic but also unequal.<sup>315</sup> In essence, this may imply that the global society may not equally gain the benefits that come with global exploration. This may be argued to be due to the fact that various states are differently endowed with different capacities to explore space, just as not all states have their interests equally represented in global governance policies formulated. Finally, the fragmentation of international law is considered as a mostly counter narrative to unification projects. The points raised could therefore form an acknowledgement that eastern states have already objected to most notions of space governance and under the concept of international constitutionalisation the presentation of space becomes a highlighted and symbolic realism.

#### ***4.5.3 Social purpose***

Corporate Social Responsibility (CSR) in global governance aims at integrating social and environmental concerns in interactions. In essence, the social purpose in space governance ensures that the use of space leads to benefit stakeholders without harming the environment.<sup>316</sup> According to Bair and Palpacuer, global governance is concerned with addressing the activities of global governments to ensure that such activities are not harmful to the wellbeing of other

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<sup>313</sup> Habermas J, 'Plea for a constitutionalization of international law' (2014) 40 Philosophy & Social Criticism 5

<sup>314</sup> Swenson G, 'Corrigendum to "Legal Pluralism in Theory and Practice"' (2018) 20 International Studies Review 342

<sup>315</sup> Habermas J, 'Plea for a constitutionalization of international law' (2014) 40 Philosophy & Social Criticism 5

<sup>316</sup> Zuern M, 'Contested Global Governance' (2018) 9 Global policy 138

international players.<sup>317</sup> The views imply that space governance is concerned with ensuring that environmental conservation is a key concept in the regulations formulated to enhance the interest of all states. Among the social purpose of global governance include the elimination of environmental and human rights abuses and corruption. Similarly, Eberlein explained that ethical and social problems that corporations face in their pursuit of business have made CSR at the forefront of global governance.<sup>318</sup> The need for CSR is towards ensuring that states do not only benefit from space activities, but also contribute to the overall wellbeing of other space actors. The impact is that global space governance regulations formulated, set out the roles and responsibilities of state actors in enhancing the safety of space and sustainability of their activities. The social purpose of global governance is as such concerned with regulating corporate behaviour to make corporations carry out their commercial activities in the interest of multi-stakeholders. The social purpose hence looks at the impact that corporate activities have on the developmental, economic, social, and political aspects of society.

The presentation of social purpose is especially interesting in space activities and space governance. Given that Blue Origin and SpaceX have both carried out missions, One Web which is partially owned by the UK government and satellite providers are carrying out tasks for a profitable social purpose, and so the concept remains an interesting social and governance issue to consider. Whether a company bids for a project from a state or whether a company perceives an activity in space to be for the benefit of humanity is more of a business opportunity, rather than a legal question. The importance of social purpose could be dissected into whether the international, or even domestic, populous is gaining a purpose from the space activity, and if so, is this form of global governance a perceived factor in all government structures that are carried out. To create global governance, a structure that fails to have a social purpose outside of a dictatorship seems counterintuitive to the international community and democratic civilisation.

#### **4.6 Behavioural, decline and theoretical concepts**

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<sup>317</sup> Bair J and Palpacuer F, 'CSR beyond the corporation: contested governance in global value chains' (2015) 15 *Global networks* (Oxford) 1

<sup>318</sup> Eberlein B, 'Who Fills the Global Governance Gap? Rethinking the Roles of Business and Government in Global Governance' (2019) 40 *Organization studies* 11, 25

#### ***4.6.1 The accountability concept in global governance***

The concept of global governance faces a mismatch between decision-makers and decision-takers as one of the main difficulties.<sup>319</sup> As a result, there exists a deficit in accountability. In the view of Buntaine, the key problem with accountability in global governance is the fact that decision-makers are not obliged to be accountable to all decision-takers.<sup>320</sup> This implies that decision-makers may come up with regulations that only reflect their interests without considering the common interest of the majority. For global space governance, the perceived impact is that developments in the regulation of space may be limited as decision-takers may not willingly contribute to the development of relevant regulation policies. In essence, we can argue that to achieve inclusive accountability on a global stage, a single agent in space governance that will be charged with accountability to all the citizens as a single principle should be formulated. In a similar manner, Reinsberg and Westerwinter also argued that the key question in global governance is whether it is sound to assume that global institution members in representing their states should be accountable to all decision-takers while also maintaining their accountability to their individual countries.<sup>321</sup> The views are an indication that a key point of departure in global governance is whether global institution members are expected to still consider the needs of other nations, other than just that of their individual nation. Essentially, it is prudent to assume that state representatives in global institutions, such as the UN, are charged with the responsibility of advancing the rights and interests of their individual citizens as much as possible under the concept of accountability in global governance.<sup>322</sup> The problem of accountability in global governance arises due to the fact that all states' representatives act for the interests of their citizens without consideration of the interests of other countries, and hence contestations may arise. As such, regulations from international institutions, such as the WTO, are based on pure contracts and the representative of states in international bodies should hence balance between advancing the interests of their individual states while promoting the common good of all the states. Such concepts will be considered more in this chapter, as it defines a moment where governance outside of a state, or

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<sup>319</sup> Lafont C, 'Accountability and global governance: challenging the state-centric conception of human rights' (2010) 3 *Ethics & global politics* 193

<sup>320</sup> Buntaine MT, 'Accountability in Global Governance: Civil Society Claims for Environmental Performance at the World Bank' (2015) 59 *International studies quarterly* 99

<sup>321</sup> Reinsberg B and Westerwinter O, 'The global governance of international development: Documenting the rise of multi-stakeholder partnerships and identifying underlying theoretical explanations' (2019) 16 *Review of International Organizations* 59

<sup>322</sup> Libman A and Obydenkova AV, 'Global governance and Eurasian international organisations: lessons learned and future agenda' (2021) 33 *post-communist economies* 359

even that of state delegations in an international setting, should be able to be positively challenged.

The effect on space governance is critical. As discussed earlier, the influence of UNCOPUOS has remained political and presents a state-orientated communication, instead of the black letter legal treaties that bind states or hold them to account. Space could better develop state cooperation and dialogue through a multipurpose and sustainable area of interaction governance. The concerning but highly exciting approach of private actors in space presents the development of above the state of competition and sustainability. We have already seen Blue Origin and SpaceX's potential raise disputes with NASA over contracts and other smaller companies worrying about competition laws from developing states. This next section will consider this nature of governance and the flaws, adaptability, and consideration that future space will need to consider.

#### ***4.6.2 Competition and vulnerability***

Competition always arises among states regarding which forms of regulations to adopt, and to whom global organizations should be answerable. In the event of this competition, some states become vulnerable to being forced to adopt laws without effective prior representation of their interests.<sup>323</sup> The views imply that developing states may sometimes have to subscribe to global governance laws that limit their ability to develop and increase their space activities. Space governance has the perceived impact of limiting the effectiveness of individual space governance laws. The principle of non-interference in other state matters also means that some states may be vulnerable to the harmful activities of some states. The pressure put on states to issue laws that enhances the common global good poses the subsequent risk of legislating merely to please one party, while disregarding other members and societal interest. According to Parlar, status and status-seeking behaviour leads to the scramble by countries to acquire higher ascribed status to be close to the major powers.<sup>324</sup> In essence, it implies that states seek to improve their influence in space governance by improving their status. Space governance may adopt benefit through concerted efforts, from various countries, to improve the acceptability of laws and regulations of space governance. In a similar manner, Stephen posited that status competition leads to the formulation of status-centred policies by states which are

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<sup>323</sup> Lehmann M, 'Regulation, global governance and private international law: squaring the triangle' (2020) 16 *Journal of private international law* 1

<sup>324</sup> Parlar Dal E, 'Status competition and rising powers in global governance: an introduction', *Contemporary politics*, vol 25 (Routledge 2019) 499-511

viewed as enhancing their international roles and identity.<sup>325</sup> The views may point to the existing power scramble by states to ensure that their interests are represented in the global space regulation policies, without necessarily considering the interests of other nations. The perceived impact is that existing space laws may be skewed to represent only the interests of a few states.

#### ***4.6.3 Challenges to global governance by states as sovereign nations***

Various challenges are experienced by global governance structures caused by sovereign states. According to Jang, McSparren and Rashchupkina, it is presumed that sovereign states hold power which is exercised as the people who control the state deem fit.<sup>326</sup> The views of the researcher imply that the state power in global governance is exercised as per the rules and regulations of the state which are based on the laws of the various state nations. In reference, therefore, we may deem it that sovereign states pose to global governance the challenge of recognition, as the states are deemed to have their own laws and regulations which are obeyed by the citizens.<sup>327</sup> As such, there exists no overarching power that can dictate to them what to do. However, the impact on space governance is that individual countries may carry out activities in space without due consideration of the potential harm that such activities may cause to other states since they act only in their interests. In similar views, Falk posited that the process of formulation of global governance rules and regulations may face resistance from sovereign states as not all states may agree with the policies.<sup>328</sup> In order to realize some form of agreement with global governance policies, McKeon proposed that the system be dominated by a hegemon in the form of a single state powerful enough to influence world politics to a significant degree.<sup>329</sup> However, the price of maintaining hegemony is very high, partly to the fact that a hegemon may not still be all powerful. In essence, the views imply that hegemony is a significant challenge to global governance as not all states willingly subscribe to the powers and control of the hegemony. Therefore, there may be a rise in contestations of the global space governance policies created. A further problem to global governance by sovereign states is also stated by Shih who argued that states are either struggling for a balance of power, or hegemony,

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<sup>325</sup> Stephen MD, 'Emerging Powers and Emerging Trends in Global Governance' (2017) 23 Global governance 483

<sup>326</sup> Jang J, McSparren J and Rashchupkina Y, 'Global governance: present and future' 2 Palgrave communications (2016) 2-4

<sup>327</sup> Dean M and Larsson OL, 'Sovereignty and sovereign powers in global governmentality', *The Globality of Governmentality* (Routledge 2021) 9

<sup>328</sup> Falk R, *Religion, and humane global governance* (Springer 2016) 2

<sup>329</sup> McKeon N, 'Transforming Global Governance in the Post-2015 Era: Towards an Equitable and Sustainable World', *Globalizations*, vol 14 (Routledge 2017) 3-7

to ensure that no hegemon arises.<sup>330</sup> The research implied that states tend to avoid hegemony by gaining considerable status in the global arena hence putting them at a pedestal to have a considerable say in global governance. The impact is the space laws are formulated by only the blessings of the powerful states or hegemonies. Intuitionists emphasize the consideration of how political and economic institutions act in the process of facilitating, blocking, or shaping societal interests. With state sovereignty playing a large part in the international community, space would seem to be independently weak in comparison to some greater political areas such as trade and conflict. Space governance, however, through the ability to suggest and work with states has created a dialogue that other areas of the international community have failed to do. Through such a mechanism, state sovereignty is considered at the utmost development stage and can be tailored into agreements in a form of a give and take scenario. The problems highlighted for global governance have a perceived impact of limiting the acceptance of the powers within space governance.

#### ***4.6.4 Positive adaptable uses of state behaviour***

In the domestic domain, political legitimacy has been primarily theorized but in the global context, political legitimacy is considered in terms of what it may mean in global politics. In the views of Foot and Walter, in cases where domestic or global interests converge with globally accepted norms, normative convergence may be applied to advance global interests.<sup>331</sup> However, it could be argued that since the most powerful states are also the ones that set these norms, as well as the associated global rules, where the norms reflect the interests of the most powerful states, the states should be inclined to behave more consistently with them.<sup>332</sup> The views imply that the most powerful states tend to come up with global governance laws that are inclined to their interests. Further, from the views of Stelmakh-Drescher, it was observed that the positive uses of state behaviour in state government should be formulated towards ensuring that capacity building is achieved through mechanisms that enhance the strengthening of the infrastructure of national space, as well as increasing awareness among the decision makers, as regard to the benefits of space technology on addressing space issues.<sup>333</sup> The views

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<sup>330</sup> Shih C-y, 'Transcending hegemonic international relations theorization: Nothingness, re-worlding, and balance of relationship', vol 1 (1 edn, Routledge 2018) 1-27

<sup>331</sup> Foot R and Walter A, 'Global norms and major state behaviour: The cases of China and the United States' (2013) 19 European journal of international relations 329

<sup>332</sup> Foot R and Walter A, 'Global norms and major state behaviour: The cases of China and the United States' (2013) 19 European journal of international relations 329

<sup>333</sup> STELMAKH OS, 'GLOBAL SPACE GOVERNANCE FOR ENSURING RESPONSIBLE USE OF OUTER SPACE, ITS SUSTAINABILITY AND ENVIRONMENTAL SECURITY: LEGAL PERSPECTIVE' (2015) 3

point out the importance of ensuring that state behaviour in global space governance identifies the important function that space technology plays and improves its development.

#### **4.7 Summary**

The future of space governance must be a consideration within the future of space. To not consider applying analytics to space governance would be negligible and unrealistic given the rapid development and advancement of all space applications. It must be accepted that current space governance models are working and developing core concepts in the space sector, but can this model work in the future or will a new governance model be needed? Adaptable governance and the social legal constructs of space all are featured within state and international consideration. Future generations and ideas of commercialisation of space, may all develop strong and developing drivers for a governance model without the legal certainty lawyers crave for within a unique international area.

The tragedy of the commons must also not be understated to understand any governance model that may be relied upon. The concept of the commons<sup>334</sup> is not new, but the applications towards space governance and an adaptable approach is. The widely held idea is such that the approach of space law, space property rights, economic goods, resources, and commodities and an equal and give and take approach is adopted while carrying out activities within outer space. Most authors write about the commons within an international environmental law or degrading setting, to where damage is or can occur. The likes of space debris and forward contamination are just some of these areas that are considered. But as such, this chapter considers the approach of the commons as an area that governance structures should be able to consider under a global, if not space governance, mandate. It therefore must be asked whether there is an overriding social benefit or approach to space as a future generation concept. Chapter four goes some way to discuss the potential of a legal narrative and social purpose for space while carrying out activities but fails to consider the commercialisation and the potential of appropriation of resources of the benefit of private actors. Although this is beyond this thesis, future work will consider private elements of private international law, and none state actors as agents of the state and under a social idea of humanity.

As discussed above there are a number of different models and ideas available for space, whether this is adapting the current model to the future, or whether other forms of global

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<sup>334</sup> Maria Lucas Rhimbassen and Rapp L, 'New space property age: at the crossroads of space commons, commodities and competition' (2021) 13 *Journal of property, planning and environmental law* 88



governance would be a better option giving the geopolitical setting space resides in, or whether a new adaptive structure is required. The presence of UNCOPUOS within the international community does reflect the motives for space but fails to overcome the domestic geopolitical nature of space activities. The legitimacy and legal certainty of the United Nations and committees have been hindered by progress from states, and space is no exception. The failure of the Moon Agreement demonstrated that space has become a potential free for all and states wish to exploit this area. It is a rational thought that the global commons must be protected, and this is in the first examination of UNCOPUOS. To test their resolve and understanding of the geopolitical nature of space, UNCOPUOS must create a functional area of debate, due process, and international mediation. As the likes of the ICJ have shown, to truly create a commitment, consent must be able to be given and taken. Therefore, such an operation of gaining consent from states could be given to incentivise some form of mediation body. The creation and advancement of legal certainty is another issue that involves social purpose and an advanced legal narrative. Moreover, to retain an individual perspective for space, the committees of space, both legal and science, must be allowed to develop their mandate through the core concept of international legal growth. The accountability of UNCOPUOS could further be advanced by considering their physical locality and allowing for greater involvement within the international community. With the allowance of groups such as COSPAR, private industry and the global South, the betterment of space governance could create more of an adaptable approach for the sustainable approach of future governance. The next chapter will consider COSPAR and the future of planetary protection.

## **5 Chapter Five: Past, Present and Future of the Committee on Space Research, Astrobiology and Planetary Protection Policy.**

This chapter will focus on COSPAR and their Planetary Protection Policy. The chapter will consider the approach of the organisation as a whole and to what legal extent their application extends to. Therefore, a full comprehension of COSPAR and their abilities will be contemplated in the wider aspects of international law and governance. Key concepts, as discussed below, will consider the rationale behind the Planetary Protection Policy, and will help discover the critical area that COSPAR seeks to protect. The overriding consideration of this chapter will focus on the future of COSPARs planetary protection policy and the developing nature of astrobiology. This chapter will develop an understanding of what is astrobiology and what a planetary protection policy looks like. As such the first part of this chapter will look at the definition of astrobiology but will not focus so much on the critical analyse of such, as this is beyond the remit of the thesis. However, it will allow a map of discovery to be able to understand the need for COSPAR and ultimately their planetary protection policy. Throughout, the normative question will remain what the future of COSPAR and their planetary protection policy is.

### **5.1 Astrobiology and Scientific Certainty**

#### ***5.1.1 Astrobiology Science Road Map***

The field of astrobiology is concerned with finding and investigating how life begins and evolves, and whether there is life on other planets beyond Earth.<sup>335</sup> The development of astrobiology began in 1998 following on from the 1960 exobiology and the Apollo missions. Astrobiology was further considered by several multidisciplinary conferences on the scientific study of outer space.<sup>336</sup> In essence, it is generally acknowledged that astrobiology is multidisciplinary and interdisciplinary, encourages planetary protection and stewardship, recognises broad societal endeavours and interests and has a strong emphasis on public education and outreach. In recent years, various scientists have made a consideration of the possibility of discovering extra-terrestrial life during space missions and the future of life. Specifically, Rummel and others investigated the ethical needs that should be considered in the

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<sup>335</sup> Race M and others, 'Astrobiology and Society: Building an Interdisciplinary Research Community' (2012) 12 *Astrobiology* 958

<sup>336</sup> Race M and others, 'Astrobiology and Society: Building an Interdisciplinary Research Community' (2012) 12 *Astrobiology* 958

search for life in space.<sup>337</sup> In the same context, Martins and others also studied the Earth as an astrobiology tool. These authors recommended the need to create more opportunities for studies in environments across the solar system, to gain an understanding of the beginning of life and the potential for extra-terrestrial life.<sup>338</sup> As such, the field of astrobiology has received considerable attention from various researchers thus pointing to its vast development and attention. The role that the Earth plays as a tool for aiding scientists conducting studies on the origin of life, and the possibility of the existence of life outside Earth, should be continually emphasised. Moreover, the protection of the Earth and other planetary bodies should also be considered as a means of encouraging astrobiology.

The development of a roadmap for astrobiology was developed in 2009 by 43 invitees who held a 2-day interdisciplinary workshop in California at the SETI institute in Mountain View. The workshop aimed at developing a draft roadmap to guide the identification of key issues in astrobiology and the accepted procedures.<sup>339</sup> In this respect, astrobiology has been developed over the years through the concerted effort of scientists, from a range of disciplines, concerned with the discovery of life and the various forms of life. Among the roadmaps that have been developed for the study of astrobiology, include exploring the various societal issues that relate to how forms of life and their complex physiology is structured. In summary, the goals of astrobiology are concerned with discovering the origin and evolution of life, distribution, importance, life meaning, the relationship of humans with its natural environment and life, relationships of humans with other life and environments and the future of life for both humans and other forms of life.<sup>340</sup> In essence, astrobiology is important in the discovery of life and its relationship with the various factors on Earth and in space. The roadmaps for astrobiology will generally assist in encouraging scientific exploration of space and accelerating the study of potential terrestrial life in outer space. The philosophy and ethics of astrobiology are focused on the examination of life definition and the varied and indeterminate understanding of life, as well as how much it is valued.<sup>341</sup> As illustrated, the study of life and its origin is concerned

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<sup>337</sup> Rummel JD, Race MS and Horneck G, 'Ethical considerations for planetary protection in space exploration: a workshop' (2012) 12 *Astrobiology* 10-17

<sup>338</sup> Martins Z and others, 'Earth as a Tool for Astrobiology: A European Perspective' (2017) 209 *Space science reviews* 43

<sup>339</sup> Race M and others, 'Astrobiology and Society: Building an Interdisciplinary Research Community' (2012) 12 *Astrobiology* 958 3

<sup>340</sup> Race M and others, 'Astrobiology and Society: Building an Interdisciplinary Research Community' (2012) 12 *Astrobiology* 958 3

<sup>341</sup> Race M and others, 'Astrobiology and Society: Building an Interdisciplinary Research Community' (2012) 12 *Astrobiology* 958 3

with more than just the discovery of the origin of life but also how it is perceived by humans. As such, the societal view of astrobiology is an important aspect to consider in this analysis.

The views on astrobiology can be related to the views posited by Cottin et al., who indicated that astrobiology is concerned with the extra-terrestrial life search, even though the field encompasses much more than just this.<sup>342</sup> Astrobiology also seeks to observe the various steps and conditions necessary for the emergence of life on planet Earth. Such knowledge will be crucial in determining the possibility of life existing on other planetary bodies. These views are important in understanding that living conditions on Earth can be used to determine the possibility of life existing on other planets. Cottin and others argue that up to this date, it cannot be conclusively said that Earth's life is unique and thus there exists no other life form in the universe.<sup>343</sup> This is a pointer that there has not been enough exploration of space to conclusively state that no other form of life exists apart from that found on Earth. The aspect of the limits of life has also been investigated to fully understand the extent to which astrobiology can be applied in the understanding of extra-terrestrial life. Cottin and others explained that the limiting environmental factors for life include pH, temperature, salinity, and radiation. However, it is not just limited by these conditions.<sup>344</sup> For example, according to Clarke and others, the lower limit for life can be stated as the lowest temperatures at which verification of cytosol occur, thus minimising cell activities.<sup>345</sup> The definition of these limits is important in setting out the limits beyond, or above, which life would not be expected on other planets. Thus, the knowledge will guide scientists on where their astrobiology investigations should be focused. The argument is consistent with those offered by Cottin and others. In their analysis, the exploration of extreme environments has been key in inspiring and driving scientific research.<sup>346</sup> As such, it is evident that the search for outer space life forms is aided by the studies of the extremities of life on Earth.

Recent cases that can be pointed to back up our claim include the Martian atmosphere in which methane gas has been found, which points to the need to carry out studies to consider the

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<sup>342</sup> Cottin H and others, 'Astrobiology and the Possibility of Life on Earth and Elsewhere...' (2017) 209 Space Science Reviews 1 35

<sup>343</sup> Cottin H and others, 'Astrobiology and the Possibility of Life on Earth and Elsewhere...' (2017) 209 Space Science Reviews 1 34-35

<sup>344</sup> Cottin H and others, 'Astrobiology and the Possibility of Life on Earth and Elsewhere...' (2017) 209 Space Science Reviews 1 35

<sup>345</sup> Clarke A and others, 'A Low Temperature Limit for Life on Earth' (2013) 8 PLoS one e66207

<sup>346</sup> Cottin H and others, 'Astrobiology and the Possibility of Life on Earth and Elsewhere...' (2017) 209 Space Science Reviews 1 35

presence of possible organic compounds on the planet.<sup>347</sup> The discovery increases the need to further study astrobiology on the planet. In this instance, it can be pointed out that research for the existence of life outside Earth has been an active endeavour for which collaborative actions have enhanced the possibility of scientific explorations. However, a variety of several other factors have to be considered in these explorations, thus pointing out that more than just one factor is considered during astrobiology research. Currently, the views indicate that astrobiology is mostly concerned with the Martian life search, as well as the investigation of the origin of life on Earth. To effectively search for life beyond the Earth, an understanding of life, its nature, and the environments in which it can survive are crucial.<sup>348</sup> The understanding of life has pointed out that among the gases that point to the possibility of the existence of life include the products of oxygenic photosynthesis as observed on Earth. Hence, the search for life in outer space (celestial bodies) may be concerned with searching for oxygen as the initial step in astrobiology. Other gases include methane and nitrous oxide, which may also be considered in further studies.<sup>349</sup> Therefore, the search for life beyond Earth is guided by the observations of the conditions of life on Earth. Various pointers of the potential of existence for life are determined to develop conclusive findings. During the whole process of astrobiology, it is important to appreciate the importance of considering the safety procedures to enhance planetary protection activities. For this reason, COSPAR collaborates with the various bodies and individuals carrying out astrobiology, either directly or through their state governments, to promote planetary protection during these activities. Collaboration efforts are important in ensuring that ethical considerations are considered both during astrobiology as well as in planetary control procedures.

The increased interest in outer space exploration in recent decades, particularly by private investors, is due to the creation of policies which ensure legal certainty. In November 2015, the US enacted the US Commercial Space Launch Competitiveness Act 2015,<sup>350</sup> which helps to minimise domestic legal uncertainty and states that citizens who explored outer space and mined asteroids, or other resources, would have the property rights.<sup>351</sup> There have been

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<sup>347</sup> Webster CR and others, 'Mars methane detection and variability at Gale crater' (2015) 347 Science 415

<sup>348</sup> Plaxco KW and Gross M, *Astrobiology: An Introduction* (Johns Hopkins University Press 2021) 4-5

<sup>349</sup> Cottin H and others, 'Astrobiology and the Possibility of Life on Earth and Elsewhere...' 209 *Space Science Reviews* 1 (2017) 2

<sup>350</sup> H.R.2262 - U.S. Commercial Space Launch Competitiveness Act 2015, 114th Congress (2015-2016) [H.R.2262 - 114th Congress \(2015-2016\): U.S. Commercial Space Launch Competitiveness Act | Congress.gov | Library of Congress](#) [accessed 17/11/22]

<sup>351</sup> Senjuti M and Rajeswari Pillai R, if space is 'the province of mankind', who owns its resources? 2019) 6-9

criticisms that the US did not consult international organisations, such as COSPAR, while creating the law. Nonetheless, it is realised that it is a step towards bolstering systematic certainty of outer space exploration as more people get involved in it for commercial purposes and not only research. Specifically, Luxembourg's Prospector-X was set to mine asteroids while Russia and China have indicated their intentions to engage in space mining missions in the future.<sup>352</sup> Despite such activities of mining outer space minerals, there is still a lack of clarity on the activities which are prohibited, or permitted, under the existing outer space policies.<sup>353</sup>

### ***5.1.2 Potential Conflicts between Astrobiology and Planetary Protection***

A high planetary protection standard is necessary for astrobiology to avoid contamination. Even though the risk can never be zero, a balance must be established.<sup>354</sup> It is easy to think that since astrobiology is concerned with the study of life, no conflicts can arise with planetary protection. However, this is not always the case as scientists may at times want to carry samples to space, or bring back samples from space, which can act as possible sources of contamination. Essentially, COSPAR's planetary protection policies seek to prevent such problems. As such, scientists must change the way they think about planetary protection and consider it as a crucial part of any astrobiology missions, as opposed to viewing it as a limitation to space exploration. With such limitations understood, the science community is best placed to be able to adapt to issues, and be more diverse, than what is afforded to the likes of policy makers. This must therefore be considered a positive and forward-thinking platform for space activities. Policies on planetary protection, particularly those concerned with forward contamination, have been of particular interest and have been devised to protect astrobiology on those other planets.<sup>355</sup> The policies make a consideration whether aspects of microbial life in space would fall under the scope of moral consideration, and whether it is worth protecting the life for its own sake.<sup>356</sup> This means that planetary protection policies are for the benefit of astrobiology in enhancing the continuous search for life in space, and ensuring that the present activities do not compromise the possibility of conducting future missions.

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<sup>352</sup> Senjuti M and Rajeswari Pillai R, if space is 'the province of mankind', who owns its resources? 2019) 9

<sup>353</sup> Senjuti M and Rajeswari Pillai R, if space is 'the province of mankind', who owns its resources? 2019) 16

<sup>354</sup> Persson E, 'Ethics and the Potential Conflicts between Astrobiology, Planetary Protection, and Commercial Use of Space' 8 Challenges (Basel) 12(2017) 1-12

<sup>355</sup> Schwartz JSJ, where no planetary protection policy has gone before, vol 18 (International journal of astrobiology, Cambridge University Press 2019) 353 - 361

<sup>356</sup> Cockell CS, 'The Ethical Status of Microbial Life on Earth and Elsewhere: In Defence of Intrinsic Value', (Space and Society, Springer International Publishing 2016) 1-13

However, an inconsistent view of the conflicts that may emerge during astrobiology and planetary protection was also studied by Fairén and others. The current procedures on bio-burden reduction methods that are applied in planetary protection protocols but are designed to reduce harmful contamination from space exploration. Therefore, microbial contamination can only contribute to infinitesimal biochemical levels, which are not removed from spacecraft by the existing procedures on space cleaning, which have been set out by planetary protection protocols.<sup>357</sup> As such this seems to suggest that the current procedures put in place for spacecraft sterilisation to prevent contaminations during planetary explorations are not, by themselves, sufficient to achieve true sterilisation. However, Rummel and Conley explained that without spacecraft sterilisation, an inadvertent finding of Earth contamination may be confused with indigenous Martian life.<sup>358</sup> The various conflicting views are given by researchers on the importance of planetary protection during astrobiology exploration and point to possible conflicting perceptions and practices of planetary protection. Further views have also indicated that in future explorations, it would be impossible to carry out astrobiology in entirely closed systems as the presence of astronauts on Mars, as projected by 2030, would mean already contaminating the planet.<sup>359</sup> However, further discussions and analysis must be carried out to develop effective strategies that will enhance close cooperation between planetary protection and exploration. In future work, the consideration of future private missions above science will be examined.

To address the observed conflicts between planetary protection and exploration, several recommendations and new and meaningful rules for planetary protection have been proposed. According to Fairén and others, there is an urgent need to designate a few special zones on Mars to which uncrewed spacecraft can be sent to carry out astrobiological studies before sending crewed missions. Such explorations will give a pointer as to the potential of life existence in space before embarking on full-scale mission to Mars.<sup>360</sup> Moreover, there is also a need to re-examine the existing restrictions on planetary exploration to ensure that they are

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<sup>357</sup> Fairén AG and others, 'Planetary Protection and the astrobiological exploration of Mars: Proactive steps in moving forward' (2019) 63 *Advances in Space Research* 1491

<sup>358</sup> Rummel JD and Conley CA, 'Inadvertently Finding Earth Contamination on Mars Should Not Be a Priority for Anyone' (2018) 18 *Astrobiology* 18

<sup>359</sup> Rummel JD and others, 'A New Analysis of Mars "Special Regions": Findings of the Second MEPAG Special Regions Science Analysis Group (SR-SAG2)' (2014) 14 *Astrobiology* 887

<sup>360</sup> Fairén AG and others, 'Planetary Protection and the astrobiological exploration of Mars: Proactive steps in moving forward' (2019) 63 *Advances in Space Research* 1491

effective for use in the new age of space exploration. In essence, there is a need to carry out biological reconnaissance to prepare for future space exploration activities. This will require a re-evaluation of COSPAR rules that govern the robotic exploration of space.

In essence, the views recommend the need to have further discussions concerning planetary protection requirements for space missions, to improve the ability of humans to carry out exploration, while also considering the need for planetary protection. Further, the COSPAR principles should also be defined in a manner that enhances the collaboration between regulators and space explorers. Astrobiology priority exploration regions should be explored in a systematic manner as a reconnaissance prior to carrying out a crewed exploration mission.

In the next decade, it is expected that the existence of a broad societal interest will encourage scholars to explore space. At the same time, there is also rising concern over the gap between planetary protection and astrobiology research. The recurrent considerations that need to be made include information sharing and coming up with collaboration between various researchers across the globe.<sup>361</sup> In essence, there is a need to both fill the gap between planetary protection and exploration, as well as enhance collaboration between scientists to improve coexistence between planetary protection and mission development. In the absence of ethical and moral responsibilities, as is currently the case as they remain undefined presently, a consideration of the social impacts of the approaches adopted to investigate the evolution of life in the universe is considered.<sup>362</sup> This means that the social effects of the practices of planetary protection need to be considered to effectively conduct astrobiology even in this age of planetary protection policy developments. Moreover, in an age that is loaded with a lot of astrobiology information, regulatory bodies need to develop effective information dissemination strategies to enhance awareness about planetary protection and astrobiology. Similar views can be observed from the NASA astrobiology strategy. According to the strategies set out, an understanding of the history of life on Earth is important in gaining insights into how life works, thus enhancing astrobiology practices. Further, the strategy also indicates that we are currently faced with the challenge of coming up with overreaching rules for evolutionary processes through knowledge gained through empirical observations and theoretical frameworks.<sup>363</sup> Hence, creating rules that will enhance planetary protection during

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<sup>361</sup> Dutra F and Carvalho A, Astrobiological Group of Social Issues for the Planetary Science and Astrobiology Decadal Survey 2023-2032 (2021) 2

<sup>362</sup> Dutra F and Carvalho A, Astrobiological Group of Social Issues for the Planetary Science and Astrobiology Decadal Survey 2023-2032 (2021) 2

<sup>363</sup> Huynh M, 'Astrobiology Science Strategy for the Search for Life in the Universe ' (2017) 7



missions is a key challenge facing space exploration currently. Further, the strategy also proposes that the specific areas of research that need to be considered include fundamental innovations in early life, dynamics of subsequent life evolution, common attributes of Earth's living system and origin and dynamics of evolutionary processes in living systems.<sup>364</sup> The views point to the need to consider the earliest metabolic and evolutionary networks of life to understand the origin, and possibility, of life on other planets and hence promoting astrobiology. Further, methodology bias should be reduced concerning astrobiology to ensure consistent application of the regulations. Rather, the regulation principles should be based on researched and peer reviewed knowledge so that in the process of planetary protection, conflicts with astrobiology are limited by reducing what appears to be limitations of astrobiology rather than regulations. The difficulty is that accepted science and space activities need to overcome the application of law and governance. Astrobiology provides a qualifying factor for advising the policy or law on what is required to explore an area without pollution or the fear of contamination. It would therefore be considered as possible good practice without any legal merit. As is the case with most areas of science, such as climate change, economic diversity, and commercialisation, most do not wish to be concerned with scientific issues that may affect their profits and/or plans. The following section will consider the future of COSPAR as an NGO and the development of planetary protection.

The importance of this consideration of astrobiology creates a scientific analogue for why planetary protection policy is necessary in a wider scientific field. A general exclusion of scientific terms and the advancement of astrobiology above what is written must be an accepted exclusion due to the nature of science in comparison to the legal understanding of the question on the future of planetary protection and the legal examination this thesis seeks to offer. The importance therefore of this information is to consider the motives of astrobiology to determine what scientists are seeking from exploration in space, and from a legal understanding how lawyers can develop legal certainty in a sustainable and ethical way.

## **5.2 Planetary Protection Key Concepts**

Planetary protection can be described as the process by which biological cross-contamination is prevented between Earth and other celestial bodies, such as Mars and the Moon. A formal understanding of planetary protection is provided by COSPAR which highlights the planetary

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<sup>364</sup> Huynh M, 'Astrobiology Science Strategy for the Search for Life in the Universe ' (2017) 5

protection policy and the aims and functionality of the group.<sup>365</sup> Meanwhile, the efforts of protecting Earth's environment against contaminants from outer space (back contamination) is also crucial in revealing the potential harm posed by extra-terrestrial materials.<sup>366</sup> The formal understanding of planetary protection<sup>367</sup> began from the notions of space exploration and was<sup>368369</sup> Moreover, COSPAR accepts that controls shall be imposed for given space missions, as required by the specific range of requirements which highlight:

*"The conduct of scientific investigations of possible extra-terrestrial life forms, pre-cursors and remnants must not be jeopardised. In addition, the Earth must be protected from the potential hazard posed by extra-terrestrial matter carried by spacecraft returning from an interplanetary mission."*<sup>370</sup>

There has been a contained close relationship between COSPAR and UNCOPUOS over the past 60 years, specifically with UNCOPUOS' legal and technical and scientific subcommittees. The relationship is based on information exchanges aimed at ensuring improved outer space protection.<sup>371</sup> Hedman's assertion is qualified and understandable given the mandates from both international bodies and the wider space sector. The roles played by COSPAR are justified by the arising conflicts in space. Among the potential drivers of space conflict include civilian use that may result in congestion and competition, increasing military use in space and investments in military technology such as missile defence and ASAT.<sup>372</sup> COSPAR works to ensure that the possibility of these drivers is minimised as much as possible.

More importantly, it is crucial to appreciate that COSPAR implements the policy of planetary protection to protect the outer space environment from contaminations that may be harmful, and could endanger scientific exploration integrity including the study of life known as

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<sup>365</sup> Coustenis A and others, 'The COSPAR Panel on Planetary Protection Role, Structure and Activities' (2019) 205 Space research today 14

<sup>366</sup> Coustenis A and others, 'The COSPAR Panel on Planetary Protection Role, Structure and Activities' (2019) 205 Space research today 14

<sup>367</sup> Coustenis A and others, 'The COSPAR Panel on Planetary Protection Role, Structure and Activities' (2019) 205 Space research today 14

<sup>368</sup> Uhran B, Conley C and Spry JA, 'Updating Planetary Protection Considerations and Policies for Mars Sample Return' (2019) 49 Space policy 10-13,22

<sup>370</sup> COSPAR, 'COSPAR Policy on planetary protection' (2021) 1

<sup>371</sup> Hedman N, '60 years of COSPAR and COPUOS Partnership in Space Science and Exploration' (2020) 208 Space research today 29

<sup>372</sup> Rajagopalan RP, 'Space Security in the Asia-Pacific' Handbook of Space Security (2019) 22

astrobiology.<sup>373</sup> In its wide context, astrobiology involves the study of life in outer space and beyond the confines of planet Earth, an exercise that requires an understanding of life as well as the nature of environments that support life. Astrobiology combines the techniques and knowledge from various fields to gain this understanding.<sup>374</sup> Hence, planetary protection is crucial for astrobiology in ensuring that space can be used by all. Astrobiology has the potential to influence the way human beings view and conduct themselves, including setting out the ethical responsibilities that humans have for any life discovered beyond Earth.

Recent advances in space exploration have seen increased activity, with the most recent ones including several Mars-bound missions such as China and the UAE's first independent missions. Further, the Artemis program has also been recently unveiled by the US to return crewed missions to the Moon and use this as steppingstone for Mars. Private investors such as Jeff Bezos and Elon Musk have also continually advanced activities within outer space.<sup>375</sup> These increased space activities continue to justify the need for the activities and authority of COSPAR, and other bodies, in ensuring that the use of space is safe and sustainable. Overall, the COSPAR policy on planetary protection is part of the space governance regime, and is aligned with several treaties, including the foundational Outer Space Treaty, non-binding soft law and customary international law.<sup>376</sup> Therefore, the Outer Space Treaty is crucial in laying down key principles to which space actors, and private and governmental bodies adhere. The attention of all the space-faring parties has also been brought into the work towards achieving some ability to control some outer space activities due to renewed emphasis on space security. Despite the existing treaties and instruments having done well in outer space activities regulation, the emergence of new threats, and counter space, means that the existing procedures may not adequately address space activities. As such, the study of COSPAR, its role in planetary protection, as well as the international legalities thereof, is crucial moving forward.

The current chapter covers key areas on planetary protection and exploration of outer space, including the role of COSPAR within the framework of outer space activities, astrobiology and scientific certainty, state involvement in planetary protection, the future of COSPAR, and the

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<sup>373</sup> Cheney T and others, 'Planetary Protection in the New Space Era: Science and Governance' 7 *Frontiers in astronomy and space sciences* (2020) 1-3

<sup>374</sup> Abrevaya XC and others, 'The Astrobiology Primer v2.0' (2016) 16 *Astrobiology* 561

<sup>375</sup> Dunbar B, 'Commercial Lunar Payload Services Overview' (2019) 12

<sup>376</sup> Cheney T and others, 'Planetary Protection in the New Space Era: Science and Governance' 7 *Frontiers in astronomy and space sciences* (2020) 1

incorporation of COSPAR within international law. Additionally, there are a number of hypotheses, which will be tested. The first hypothesis is that COSPAR could be strengthened in the future and could overreach to become a formal international organisation within the UN. The second hypothesis is that most policies developed by COSPAR regarding planetary protection are accepted by the state. The third hypothesis is that without the support of the state, COSPAR cannot become an influential international organisation regarding outer space activity regulation. The other hypothesis tested is that COSPAR needs to be given a mandate by the UN for it to thrive and lead globally on planetary protection issues. The following section will start to develop the understanding of what COSPAR is, and how it works, within the international community. Given that there is no association to COSPAR holding an international organisation mandate, the principal understanding will be discussed below to understand what is, and potentially what could be such a mandate.

### **5.3 COSPAR's Structure, Development and Strategy**

#### ***5.3.1 COSPAR's Organisational Structure and Roles***

The development of the Planetary Protection Policy formed by the scientific community, diplomats, and legal scholars in 1956 formed an innovative investment into actions and activities within outer space.<sup>377</sup> In 1957, the US National Academy of Sciences requested the International Council of Scientific Unions to assist in the development of means to prevent contaminating celestial environments.<sup>378</sup> In the response to the launch of Sputnik the general assembly created UNCOPUOS, in which the scientific unions created the Committee on Contamination by extra-terrestrial Exploration CETEX the predecessor to COSPAR. COSPAR is an international space research scientific committee that was formed in 1958. The committee was established with the main objective of promoting scientific outer space research at an international level by facilitating the exchange of findings, data or opinions, which it does through the provision of a forum for scientists and other stakeholders to carry out open discussions as regards the issues that can play a role in influencing space research.<sup>379</sup> In this respect, COSPAR was formed to facilitate the exchange of information among the various stakeholders to aid exploration in space. COSPAR's organisational structure entails scientific commissions that represent the various scientific disciplines that are actively taking part in

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<sup>377</sup> Tennen LI, 'Evolution of the planetary protection policy: conflict of science and jurisprudence?' (2004) 34 *Advances in space research* 23, 54

<sup>378</sup> Phillips CR, *The Planetary Quarantine Program: Origins and Achievements, 1956-1973* (2013) 7-13

<sup>379</sup> Coustenis A and others, 'The COSPAR Panel on Planetary Protection Role, Structure and Activities' (2019) 205 *Space research today* 14

space research, as well as the various panels that are charged with issues affecting certain portions of the international space community.<sup>380</sup> Essentially, the views imply that COSPAR derives its policies and guidelines through a well-structured organisation that enhances scientific research and evidence provision. In total, COSPAR has ten technical panels and eight scientific commissions that are drawn from a variety of topics dealing with planetary protection, as well as issues on planetary protection of space.<sup>381</sup>

From the analysis, COSPAR draws views and evidence from various facets of science to have an elaborate decision-making procedure, hence developing reliable guidelines. COSPAR acts mainly to assist in achieving two main aims. The first aim is to develop a policy on planetary protection as a globally accepted standard to avoid contamination arising from both biological and organic elements from outer space exploration activities. The second one involves the guidance of OST compliance. All these aims are aided by the technical and scientific commissions.

Specific panels of COSPAR governance rest with its council with responsibility under the COSPAR Scientific Advisory Committee (CSAC). CSAC is in turn charged with leading the various other committees including the program, finance, publication, and awards committees.<sup>382</sup> Hence, the governance of COSPAR is well structured, thus further justifying its ability to effectively bring together the various space faring nations in meeting its objectives. The various commissions under the scientific commissions include Committee A, which deals with the Earth surface studies, climate and meteorology. Committee B carries out investigations on the Earth-Moon system, planets, as well as small solar system bodies. Committee C deals with the space studies of the upper atmosphere while Committee D studies the solar system space plasmas. Committee E studies space astrophysics and Committee F, space life sciences. Space material sciences are studied by Committee G while Committee H studies space physics fundamentals.<sup>383</sup> On the other hand, the panels include space weather, education, planetary protection, capacity building, satellite dynamics, interstellar research, innovative solutions, and exploration. Other panels include the panel on environmentally

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<sup>380</sup> Cross MaKD, 'Outer space and the idea of the global commons' (2021) 35 International relations (London) 384

<sup>381</sup> Coustenis A and others, 'The COSPAR Panel on Planetary Protection Role, Structure and Activities' (2019) 205 Space research today 14

<sup>382</sup> 'Committee on Space Research (COSPAR): An Analysis' (2020) 1

<sup>383</sup> 'Committee on Space Research (COSPAR): An Analysis' (2020) 1

detrimental space activities and the panel on scientific ballooning.<sup>384</sup> The structure of COSPAR stresses the need for detailed scientific studies to develop effective guidelines. The various commissions and panels are tasked with the studies in various disciplines of science, hence ensuring that all scientific disciplines are represented within COSPAR and thus improving the chances of a consensus in various policy formulates.

The rationale adopted by COSPAR for planetary protection is based on ensuring that scientific investigations that are related to astrobiology are not compromised. To ensure this, COSPAR protects the investments in exploration and space science, enabling the creation of opportunities to carry out investigations on life origins in a manner that is no longer possible on Earth.<sup>385</sup> The rationale is also based on the protection of the Earth from hazards that can be posed by spacecraft carrying extra-terrestrial matter in returns from missions.<sup>386</sup> In essence, the body ensures that those who carry out space missions develop appropriate procedures on how they will carry out space and Earth protection. The planetary protection framework is based on the goal for which planetary protection is necessary, which is established in OST Article IX.<sup>387</sup>

In essence, it is implied that the various states that subscribe to OST are expected to ensure that their national space activities, whether private or governmental, are safe and do not compromise the wellbeing of space for the universal benefit of space farers. The provision implies that states are expected to ensure that space activities that are taken by private organisations are regulated to conform to the requirements of the OST. As such, the involvement of states in assisting the planetary protection duties of COSPAR is very crucial for its success.

### ***5.3.2 Development of COSPAR***

The formation of COSPAR reflects the concerns that were raised by UNCOPUOS, NASA and IAF. Firstly, the committee on CETEX was established by the International Science Council ISU. The code of conduct for CETEX was adopted and later led to the formation of COSPAR in 1958. Following its establishment, COSPAR developed the Consultative Group on

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<sup>384</sup> 'Committee on Space Research (COSPAR): An Analysis' (2020) 1

<sup>385</sup> Coustenis A and others, 'The COSPAR Panel on Planetary Protection Role, Structure and Activities' (2019) 205 *Space research today* 14

<sup>386</sup> Coustenis A and others, 'The COSPAR Panel on Planetary Protection Role, Structure and Activities' (2019) 205 *Space research today* 14

<sup>387</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI) Article IX

Potentially Harmful Effects of Space Experiments.<sup>388</sup> COSPAR was established during the international meeting of ISU in 1958 that took place in London with the debut symposium of space science being held in Nice two years later.<sup>389</sup> In essence, COSPAR adopted its role of planetary protection and started by obtaining scientific evidence from its technical composition and stakeholder views. During its early years, COSPAR employed an apolitical framework in which the entity ignored all political associations, as well as viewing all matters from the point of a scientific consideration.<sup>390</sup> The view of the entity as apolitical is important in the promotion of space research at a global level through international collaboration programs in the mainstream scientific areas. The collaboration is only possible when the entity is viewed as not leaning on any political ideologies which may compromise its transparency in coming up with internationally recognised policies and guidelines on space research.

Further, it is also important to appreciate that COSPAR's development was based on passing recommendations. The entity does not play the role of specifying how states should adhere to its planetary protection policies and associated guidelines. Rather, COSPAR plays the role of recommending guidelines from which nations can develop certification and compliance strategies.<sup>391</sup> The views imply that COSPAR plays a major role in developing evidence for the recommendations made, while the role of ensuring that the recommendations are domesticated is left to individual states. In 1961 the ICSU created a declaration that all countries that play a part in launching space experiments that may have adverse effects should provide COSPAR and ICSU with the necessary information for the evaluation of the potential contamination from the experiments.<sup>392</sup> Following this recommendation, COSPAR developed a group of consultative experts on the possible harmful effects of space experiments to assist in carrying out evaluations aimed at determining the level of potential harm that various space missions may result to.<sup>393</sup> Further, in 1963, the planetary protection policies, involving celestial bodies such as Venus, Mars and the Moon, were adopted by NASA, which was followed by the

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<sup>388</sup> Coustenis A and others, 'The COSPAR Panel on Planetary Protection Role, Structure and Activities' (2019) 205 Space research today 14

<sup>389</sup> Coustenis A and others, 'The COSPAR Panel on Planetary Protection Role, Structure and Activities' (2019) 205 Space research today 14

<sup>390</sup> Coustenis A and others, 'The COSPAR Panel on Planetary Protection Role, Structure and Activities' (2019) 205 Space research today 14

<sup>391</sup> Coustenis A and others, 'The COSPAR Panel on Planetary Protection Role, Structure and Activities' (2019) 205 Space research today 14

<sup>392</sup> National Academies of Sciences E and Medicine, The Goals, Rationales, and Definition of Planetary Protection: Interim Report (2017) 2

<sup>393</sup> National Academies of Sciences E and Medicine, The Goals, Rationales, and Definition of Planetary Protection: Interim Report (2017) 2

establishment of the interim quantitative framework in the protection standards development that were important in setting limits on the possibilities of carrying viable organisms in spacecraft to planetary bodies.<sup>394</sup> As such, the development of COSPAR missions has followed evidence aimed at limiting contamination of space and Earth during space missions. The interim frameworks were replaced in 1967 with a policy that was used for planetary protection until 1983 that set limits of potential planetary contamination during biological exploration.<sup>395</sup> The policy that remains in effect to date was comprehensively revised by COSPAR in 2021. The policy states that:

*“The conduct of scientific investigations of possible extra-terrestrial life forms, precursors, and remnants must not be jeopardised. In addition, the Earth must be protected from the potential hazard posed by extra-terrestrial matter carried by spacecraft returning from an interplanetary mission.”*<sup>396</sup>

As such, the development of COSPAR’s policies has been extensively revised and updated over time as new scientific knowledge and interests from stakeholders arise. As such, it is expected that as more is discovered about space and the potentially harmful effects of space missions, the policies and guidelines will be continually updated.

COSPAR has a role to inform the international community, such as UNCOPOUS and various organisations it deals with, of the policy agreements on planetary protection.<sup>397</sup> The communication of these terms of reference is important in ensuring that there is a good balance between scientists and the representatives that get appointment from the various space agencies. The panel, which is led by a chairperson and two vice-chairpersons is composed of members appointed to represent the national and international space agencies, and the representatives of COSPAR’s scientific commissions. The panel leadership, and members, are formally appointed by the COSPAR bureau.<sup>398</sup> In this manner, the leadership of COSPAR is kept transparent and considers the diverse needs of the various stakeholders.

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<sup>394</sup> Coustenis A and others, 'The COSPAR Panel on Planetary Protection Role, Structure and Activities' (2019) 205 Space research today 14

<sup>395</sup> National Academies of Sciences E and Medicine, The Goals, Rationales, and Definition of Planetary Protection: Interim Report (2017) 2-6

<sup>396</sup> Kminek G and Rummel JD, 'COSPAR’s planetary protection policy' (2015) 193 Space Research Today 7

<sup>397</sup> Kminek G and Rummel JD, 'COSPAR’s planetary protection policy' (2015) 193 Space Research Today 7

<sup>398</sup> G Kminek BC, CA Conley, MA Jones, M Patel, MS Race, MA Rucker, O Santolik, B Siegel & JA Spry, 'Report of the COSPAR Workshop on Refining Planetary Protection Requirements for Human Missions' (2008) 11



Further, COSPAR members are expected to communicate to COSPAR the planetary protection requirements they have established, as well as procedures utilised in planetary protection. The reports that are offered to COSPAR should contain the estimated bioburden at launch with a detailed method that has been used to arrive at the estimates. The reports should also detail the composition of the bioburden as well as the method that can be used to control the bioburden.<sup>399</sup> As such, COSPAR expects not just the policies that have been adopted for planetary protection procedures, but also a justification of the methods and policies. COSPAR also divides its planetary protection into categories ranging from category I to category V.

### ***5.3.3 COSPAR's strategy of planetary protection***

The panel on planetary protection of COSPAR is concerned with the biological contaminations that may happen during the conduct of solar system exploration. The strategies that the entity applies involve coming up with the most current and peer reviewed scientific knowledge. Most importantly, the strategies are based on enabling the exploration of space, as opposed to prohibiting it.<sup>400</sup> In essence, COSPAR's strategies are mostly generated from existing evidence and their success is based on successful collaboration with the various states.

The provisions of the policy imply that the planetary protection strategy is based on obtaining concerted cooperation from the various stakeholders. Additionally, it is also evident that the implementation of the strategy is done with a strong focus on enabling not just the governments, but also the private sector to carry out space exploration sustainably and safely. The Space Studies Board (SSB) also plays a key role in aligning the strategies of COSPAR with those of governments. The strategies have originally been focused on the prevention of contamination, but the focus has now shifted to addressing backward contamination as missions are now planned to bring samples on return missions to Earth.<sup>401</sup> It must be acknowledged that during the Apollo era, a sustainable isolation period was carried out with direct application on forward contamination during space exploration. As such, planetary protection strategies implemented by COSPAR, and governments continually change their

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<sup>399</sup> Coustenis A and others, 'The COSPAR Panel on Planetary Protection Role, Structure and Activities' (2019) 205 Space research today 14

<sup>400</sup> Frick A and others, 'Overview of current capabilities and research and technology developments for planetary protection' (2014) 54 Advances in space research 221

<sup>401</sup> G Kminek BC, CA Conley, MA Jones, M Patel, MS Race, MA Rucker, O Santolik, B Siegel & JA Spry, 'Report of the COSPAR Workshop on Refining Planetary Protection Requirements for Human Missions' (2008) 11

strategies to keep up with the changing space exploration activities. Several recommendations by bodies such as Planetary Protection Independent Review Board (PPIRB) have come forward to recommend the need to change planetary protection strategies and even terminologies. This is justified by the fact that there has been an entire paradigm change for planetary protection. COSPAR has been seen to work on the issues, as can be observed, for example on the reformed and reorganised panel on planetary protection to broaden its membership as well as increase the frequency of its meetings.<sup>402</sup> In this regard, there has been an increased focus on enabling policy developments to enhance the sustainable, and safe, use of space. The development of policy over law is a significant approach throughout the international community, and commentators only need to consider the international environmental law to understand the political and legal abstinence to treaty law. It has been important to understand the nature of astrobiology and the need for such a field. Although this has been informative, the nature of this chapter is to demonstrate a need to which planetary protection and subsequent governance is required in the wider field of study. The next chapter will consider COSPAR with direction of planetary protection. The earlier part of Chapter Five will remain a point of reference.

## **5.4 The Future of COSPAR as a Non-Governmental International Organisation**

### ***5.4.1 Policies and Practices in Planetary Protection***

The planetary protection policies and guidelines by COSPAR are divided into five categories. The first category (Category I) is described as "any mission to a target body, which is not of direct interest for understanding the process of chemical evolution or the origin of life."<sup>403</sup> As such, the category is concerned with invasive missions that have an impact on a celestial body. On the other hand, category II is concerned with target bodies that are of interest regarding the origin of life but for which there is "only a remote chance that contamination carried by spacecraft could compromise future investigations."<sup>404</sup> In essence, some of the target bodies that can be categorised as II may include outer solar system planets, such as Venus. Further, Category III comprises those missions in which there is no contact between "the spacecraft and a target body, which is of interest relative to the origin of life, but where the mission could still

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<sup>402</sup> Frick A and others, 'Overview of current capabilities and research and technology developments for planetary protection' (2014) 54 *Advances in space research* 221

<sup>403</sup> Catharine A. Conley GK, 'Planetary Protection for Mars Sample Return' (2013) 6

<sup>404</sup> Board SS, National Academies of Sciences E and Medicine, 'Assessment of the Report of NASA's Planetary Protection Independent Review Board' (2020) 79-84

potentially pose a contamination risk.”<sup>405</sup> Category IV comprises “certain missions (primarily missions where a lander contacts the surface) to the same bodies as Category III” while category V covers “all missions in which the spacecraft will ultimately return to Earth.”<sup>406</sup> As such, it means that COSPAR creates procedures and policies according to the various categories for which the target bodies are sub-divided. For each category, the available guidelines detail the specific requirements for planetary protection. However, no planetary protection is imposed for category I.<sup>407</sup> Category II is subject to a short planetary protection plan while category III is required to have more documentation as compared to category II and further develop protective procedures to be implemented. Category IV and V further require more documentation, as well as more enhanced protective procedures.<sup>408</sup> In essence, the procedures for planetary protection tend to be stricter for those missions that are more likely to lead to significant contamination of target bodies of interest to understand extra-terrestrial life, and for return to the Earth-Moon system. The documentation required is contained in COSPAR recommendations and it is important that space-faring bodies assist in ensuring that the guidelines are domesticated in their jurisdictions and followed, with particular attention given especially to private space actors.

Policies on planetary protection were born out of international treaties to a certain extent. The legal certainty and scientific commitment allow for laws and policy to develop through a varied branch of avenues which have already been discussed in Chapter Two. As advances in scientific knowledge and technology continue, planetary protection policies also change to reflect the advances. Historically, the planetary protection role of COSPAR is derived from COSPAR’s Resolution No. 26, which COSPAR issued at its 1964 Scientific Assembly in Florence, Italy. The policy set out that a certain sterilisation level is accepted so long as:

*“The probability of a single viable organism aboard any spacecraft intended for planetary landing or atmospheric penetration would be less than  $1 \times 10^{-4}$ , and a probability limit for accidental planetary impact by unsterilised flyby or orbiting spacecraft of  $3 \times 10^{-5}$  or less”*<sup>409</sup>

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<sup>405</sup> SS Board, National Academies of Sciences E and Medicine, 'Assessment of the Report of NASA's Planetary Protection Independent Review Board' (2020) 90-94

<sup>406</sup> Catharine A. Conley GK, 'Planetary Protection for Mars Sample Return' (2013) 6

<sup>407</sup> Catharine A. Conley GK, 'Planetary Protection for Mars Sample Return' (2013) 6

<sup>408</sup> Gundersen K, 'BEYOND THE TARDIGRADES AFFAIR: PLANETARY PROTECTION, COSPAR, AND THE FUTURE OF PRIVATE SPACE REGULATION' (2021) 53 New York University journal of international law & politics 871

<sup>409</sup> SS Board and NR Council, Preventing the forward contamination of Mars (National Academies Press 2006) 22-35

Essentially, at its inception, COSPAR policies on planetary protection relied on the fewer number of space missions and hence set just the basic requirements to protect against space contamination during space exploration. Over the years, the policies have been continually improved to comply with the reality of increasing space activity. The COSPAR policy also required strict regulations to ensure biological contamination of outer space during the period of searching for extant or extinct extra-terrestrial life did not take place. The policy is agreed to be applied on different contexts, including missions to obtain samples from Mars.<sup>410</sup> Moreover, COSPAR also plays a key role in managing international consensus on planetary protection policy. The consensus was established by the ICSU in 1958 when space laws were just beginning to take root.<sup>411</sup> Essentially, the views imply that the creation of COSPAR was for, among other reasons, enabling international cooperation in space research. Therefore, the global community must find a way to enhance the compliance of private space actors with the guidelines put in place for planetary protection before the contamination of space begins to threaten the extra-terrestrial space environments. This is aimed at ensuring that private entities engaging in outer space activities, but which are not party to the international treaties, should be regulated by the specific government agencies responsible. COSPAR can also be viewed as being consistent with Statute of the International Court of Justice (ICJ), Art. 36 which highlights:

*“The court, whose function is to decide in accordance with international law such disputes as are submitted to it, shall apply international conventions, whether general or particular, establishing rules expressly recognised by the contesting states”*<sup>412</sup>

Article 36 of the ICJ statute demonstrates that COSPAR’s formation allows for additional autonomy to ensure that in case of disputes between states, COSPAR may be used as a dispute mediation process giving their status within international space exploration which offers impartiality. In this sense, COSPAR is regarded as a hybrid within international law because its role in developing policies and guidelines ensures that different state agencies observe the same safety standards to protect the planet and reduce inter-state conflict. The technical panel

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<sup>410</sup> Rummel JD, 'Seeking an international consensus in planetary protection: COSPAR's planetary protection panel' (2002) 30 *Advances in space research* 15, 73

<sup>411</sup> Committee on Space Research (COSPAR), 'About COSPAR' (2012) Available: <https://cosparhq.cnes.fr/about>

<sup>412</sup> ICJ Justice, 'Statute of the Court | International Court of Justice' (2019)

of COSPAR on planetary protection has led the way in promulgating the guidelines with specific requirements aimed at protecting against space contamination.<sup>413</sup> Though the guidelines are not legally binding, they are important in influencing recommendations to states that carry out space missions in the kinds of domestic policies on planetary protection that they need to adopt. Moreover, the policies have also been endorsed by UNCOPUOS.<sup>414</sup> Thus, it is not possible for COSPAR to impose its guidelines directly as such implementation requires support by space-faring states to adopt the policies as their domestic guidelines. States have the free will as to whether they will adopt the guidelines and COSPAR neither enforces, nor monitors, the guidelines.<sup>415</sup> As such, it is crucial to notice that since states directly control and oversee their national space agencies, cooperating states can easily support the implementation of the procedures and policies of COSPAR. Hence, COSPAR plays a crucial role in ensuring that planetary protection is promoted in this era of private space activity increase.

The main objective of the COSPAR Planetary Protection Panel is to develop and keep up with policies that clearly state the specific requirements that need to be met to satisfy planetary protection requirements from space contamination.<sup>416</sup> For the policies developed to be effective, they must be based on peer reviewed, and the most recent scientific knowledge. In this sense, it is important to note that the policies set forth by the body should be periodically updated to ensure that they are most relevant. The panel on planetary protection regularly meets to review scientific knowledge on planetary protection and update the existing policies by considering new scientific information gathered. As such, the policies and recommendations developed by COSPAR are often well researched and based on contributions from signatory members. This ensures that there is little, or no, contention as regards the policies that are eventually adopted on planetary protection.

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<sup>413</sup> Gundersen K, 'BEYOND THE TARDIGRADES AFFAIR: PLANETARY PROTECTION, COSPAR, AND THE FUTURE OF PRIVATE SPACE REGULATION' (2021) 53 New York University journal of international law & politics 871

<sup>414</sup> Gundersen K, 'BEYOND THE TARDIGRADES AFFAIR: PLANETARY PROTECTION, COSPAR, AND THE FUTURE OF PRIVATE SPACE REGULATION' (2021) 53 New York University journal of international law & politics 871

<sup>415</sup> Gundersen K, 'BEYOND THE TARDIGRADES AFFAIR: PLANETARY PROTECTION, COSPAR, AND THE FUTURE OF PRIVATE SPACE REGULATION' (2021) 53 New York University journal of international law & politics 871

<sup>416</sup> Gundersen K, 'BEYOND THE TARDIGRADES AFFAIR: PLANETARY PROTECTION, COSPAR, AND THE FUTURE OF PRIVATE SPACE REGULATION' (2021) 53 New York University journal of international law & politics 871

#### **5.4.2 International compliance with COSPAR guidelines**

COSPAR has received extensive international support since its formation in the mid-20<sup>th</sup> century, with most space agencies adopting planetary protection policies developed by the organisation.<sup>417</sup> However, there has been laxity among space faring nations to push for COSPAR guidelines in international binding guidelines. This implies that despite the actions of COSPAR to protect space for astrobiology, universal agreement on standard policies is still lacking. In the US specifically, NASA plays a central role in ensuring that there is a close relationship between the regulations adopted domestically and COSPAR policies, by adopting the same requirements and categories. In the same manner, ESA also introduced comprehensive guidelines on planetary protection based on COSPAR guidelines in 2007. Further, JAXA has adopted policies in line with COSPAR guidelines.<sup>418</sup> As such, it is implied that there is a significant level of agreement with COSPAR guidelines, as per the evidence derived from the various policies domesticated by the planetary bodies in specific regions of the globe. Moreover, the implementation of COSPAR influenced policies and guidelines on planetary protection by national space agencies, also suggests that there is enough clout by COSPAR worldwide hence justifying its authority to continue serving in its role as a standard setting body in the area of planetary protection. Hence, it makes sense that governments should seek to implement the same COSPAR policies for uniformity in regulations both in the private and public sectors.

However, it is important to underline that it is not yet clear how COSPAR's rules on planetary protection are enforced for private-sector missions. The analysis by Frans Von der Dunk, space law application to private human space flight is derived from UNCOPOUS' global framework, which follows the four treaties developed on spaceflight.<sup>419</sup> Essentially, this means that private space missions should adopt international standards to ensure the policies are followed by all actors involved in space exploration. Customary law has been noted to be essential for international organisations, and organisations are supposed to derive both obligations and

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<sup>417</sup> Pelton JN and Jakhu RS, *Global Space Governance: An International Study* (Space and Society, Springer 2017) 3-4

<sup>418</sup> Gundersen K, 'BEYOND THE TARDIGRADES AFFAIR: PLANETARY PROTECTION, COSPAR, AND THE FUTURE OF PRIVATE SPACE REGULATION' (2021) 53 *New York University journal of international law & politics* 871

<sup>419</sup> Frans G, 'The integrated approach—Regulating private human spaceflight as space activity, aircraft operation, and high-risk adventure tourism' (2013) 92 *Acta Astronautica* 199

rights from international law sources.<sup>420</sup> Hence, it is reasonable that private organisations adopt the various international laws and be regulated by various jurisdictions to achieve equality in planetary protection rights and obligations as set out by the various international laws. Further evidence also suggests that there is a sufficient level of concern in developing an agreed legal framework that addresses all the applicable parameters and events. Resolving the existing regulatory gap is essential to developing planetary protection policy for the private sector.<sup>421</sup> If the US with much more developed commercial space mission's regulations is still deficient in proper regulations as required by international standards, other states' laws may likely be even more unequipped to develop implementation guidelines for planetary protection rules as recommended by COSPAR for private missions. Cavanaugh discusses the prominent space-faring countries must develop explicit policies for planetary protection for the private sector, except for Russia.<sup>422</sup> In the Russian Planetary Protection Policy as set out in Article 4(2) of the Law of the Russian Federation about Space Activities, harmful contamination in outer space is prohibited. Further, applicants must also demonstrate that their missions conform to the required safety standards.<sup>423</sup> This demonstrates that Russia has taken considerable steps in the implementation of privacy regulations of planetary protection. Hence, other space-faring nations such as China also need to develop comprehensive guidelines in a bid to develop uniformity on the application of rules and procedures.

On the other hand, partnerships between private and governmental entities in the conduct of private missions have been found to adopt the application of COSPAR policies to activities of the private sector. In such cases, the private sector is often subject to the same standards of planetary protection as the agency itself. For instance, the participation of NASA in non-NASA missions is regulated by the NASA policy that:

*“Mission's organiser, whether a governmental or private entity, must adhere to appropriate policies, regulations and laws regarding planetary protection that are generally consistent*

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<sup>420</sup> Blokker N, 'International Organizations and Customary International Law: Is the International Law Commission Taking International Organizations Seriously?' (2017) 14 International Organizations Law Review 1

<sup>421</sup> Gundersen K, 'BEYOND THE TARDIGRADES AFFAIR: PLANETARY PROTECTION, COSPAR, AND THE FUTURE OF PRIVATE SPACE REGULATION' (2021) 53 New York University journal of international law & politics 871

<sup>422</sup> Cavanaugh CP and others, An International Perspective on Planetary Protection Policies (Presentation), 2020) 3-4

<sup>423</sup> Cavanaugh CP and others, An International Perspective on Planetary Protection Policies (Presentation), 2020) 5

*with the COSPAR Planetary Protection Policy and Guidelines.*"<sup>424</sup>

Therefore, the biggest challenge lies in the regulation of independent private missions of which no governmental body is part. Similar policies are also found in ESA regulations<sup>425</sup> hence ensuring that COSPAR guidelines on Planetary Protection are upheld, even as more private space actors get on board in space missions. However, problems may hinder the success of COSPAR in the private sector. One of the major problems is the institutional design, which functions informally and thus allowing anyone who wishes to attend discussions to do so. The vulnerability of this may be that the composition of participants may sway decision making to favour a particular interest, which may not necessarily be based on planetary protection wellbeing.<sup>426</sup> In essence, not all the entities that are charged with the responsibility of COSPAR standards are members of the Planetary Protection Policy. Moreover, the government agencies represent governments and may not legislate with the private sector in mind.<sup>427</sup> As such, it is implied that the decision-making process of COSPAR may be skewed to reflect certain interests, while some decisions are made without all the players in mind. The result is that the resulting policies may not be effective for all actors in space exploration. The other problem with COSPAR is the lack of participation in decision-making. There has historically been a low level of attendance at planetary protection policy creations meetings, with few scientists attending, hence there is only a limited contribution to policy development. As such, it may be difficult to say that the resulting policies reflect a true consensus.<sup>428</sup> Moreover, the lack of private sector participation is an even bigger problem. The views imply the need to improve awareness about COSPAR's roles to progress a formal attendance procedure to develop binding guidelines. Unnecessarily restrictive guidelines are also another major problem with COSPAR, with some believing that the private sector is already overregulated. The problem with this is the increase in space exploration costs, which may discourage private sector

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<sup>424</sup> NASA, 'Planetary Protection Provisions for Robotic Extraterrestrial Missions' (2021) [NPR 8715.24 - main \(nasa.gov\)](#) [accessed 24/11/22]

<sup>425</sup> European Space Agency, Highlights of ESA rules and regulations, [ESA - Highlights of ESA rules and regulations](#) [accessed 17/11/22]

<sup>426</sup> Gundersen K, 'BEYOND THE TARDIGRADES AFFAIR: PLANETARY PROTECTION, COSPAR, AND THE FUTURE OF PRIVATE SPACE REGULATION' (2021) 53 New York University journal of international law & politics 871

<sup>427</sup> Tennen LI, *The Role of COSPAR for Space Security and Planetary Protection* (Springer International Publishing 2020)

<sup>428</sup> Gundersen K, 'BEYOND THE TARDIGRADES AFFAIR: PLANETARY PROTECTION, COSPAR, AND THE FUTURE OF PRIVATE SPACE REGULATION' (2021) 53 New York University journal of international law & politics 871



participation.<sup>429</sup> In light of this concern, one may argue that there is a need to soften COSPAR standards to encourage private exploration. Additionally, COSPAR also lacks a mechanism to monitor compliance hence planetary protection policies may not be effectively evaluated regarding the extent to which they have been adopted by various states.<sup>430</sup> The views imply that the voluntary nature of COSPAR guidelines makes it difficult to ascertain the level of compliance. However, as noted earlier, space-faring nations can play a key role in ensuring that the guidelines proposed by COSPAR are domesticated within their jurisdictions. The analysis confirms the first hypothesis developed since it reveals that COSPAR has many regulatory responsibilities, as well as facilitating collaboration between stakeholders in the outer space exploration sector. The analysis also shows that with the increased level of activity in outer space exploration, there is a need for extensive oversight in the next decades which COSPAR may be mandated to carry out by the UN. The conducted analysis confirms the second hypothesis that entails policies developed by COSPAR are acceptable by state agencies such as NASA and JAXA. However, the analysis also reveals that COSPAR still lacks capacity to enforce compliance within state jurisdictions and can only provide guidance on standards to be met when developing regulations for planetary protection. Moreover, it may well be that the influence of COSPAR is a simple discussion that states can consider. As COSPAR discusses these issues with UNCOPUOS, the idea that the performance or allowance of a UN mandate for COSPAR is a consideration, but unlikely. By simply providing good practice, COSPAR creates a critical component that creates a discussion on planetary protection for states and the international community to consider. The following section will begin to discuss the sustainability and ethical approach to planetary protection. The need for ethics and the consideration of sustainable space activities are considerations that should be balanced when considering such plans.

#### ***5.4.3 Influence of Private Actors on State Practice***

In the introduction section, some private actors in the space sector were identified: manufacturers, satellite operators, and launch providers.<sup>431</sup> In this section, their influence over state practice is discussed. This section argues that private actors in the space sector tend to

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<sup>429</sup> Gundersen K, 'BEYOND THE TARDIGRADES AFFAIR: PLANETARY PROTECTION, COSPAR, AND THE FUTURE OF PRIVATE SPACE REGULATION' (2021) 53 New York University journal of international law & politics 871

<sup>430</sup> Gundersen K, 'BEYOND THE TARDIGRADES AFFAIR: PLANETARY PROTECTION, COSPAR, AND THE FUTURE OF PRIVATE SPACE REGULATION' (2021) 53 New York University journal of international law & politics 871

<sup>431</sup> Clelia Iacomino, "The Evolving Role of Private Actors in Space Exploration" [2019] Commercial Space Exploration xxvii, 24

influence state practice over time because of the following reasons: (a) public-private partnerships (PPPs), (b) non-restrictive and universally/nationally accepted domestic space laws, (c) OST's lack of binding authority and vague language, and (d) COSPAR's non-binding scientific guidelines.

#### **5.4.4 Public-private partnerships**

The public-private partnership (PPP) business model employed by most private actors in the space sectors gives them a platform to dominate state practice, which, over time, may become a recognised state practice. In science and innovation, PPP models are formed by comprising a committee of academics and industry experts who help balance out the interests of the public and private partners.<sup>432</sup> Private actors have commercial interests in space exploration; hence, they are dedicated to facilitating cheaper and quicker space travel.<sup>433</sup> A company like SpaceX was born out of the idea that depending on USA's NASA alone to take humans to Mars would take several decades, something that made the company's founder, Elon Musk, impatient and subsequently believed in the possibility to travel to space much cheaper and quicker because there was a presenting market opportunity. On 24 May 2012, SpaceX became the first private actor to succeed in ferrying cargo to the International Space Station (ISS) using its Dragon capsule, which also returned successfully to Earth on 31 May 2012. This success deeply attracted NASA's interest to partner with SpaceX in subsequent launches and other space exploration activities.<sup>434</sup> The NASA-SpaceX partnership is a perfect example of how the private actors can slowly influence state practice in a spacefaring nation like the United States.

The same case has been demonstrated in non-spacefaring countries. The PPP model is the most adopted model for commercial space activities worldwide because private actors like SpaceX and Blue Origin can produce technologies and space exploration innovations that are cheaper and faster, reducing the duration of long-term government projects.<sup>435</sup> The model has seen even non-space-faring nations suddenly turn spacefaring. For instance, like the case of SpaceX, New Zealand became a spacefaring nation able to launch orbital rockets when Rocket Lab performed its first successful launch using its Electron.<sup>436</sup> The partnership between NASA and SpaceX

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<sup>432</sup> Dirk Meissner, "Public-Private Partnership Models for Science, Technology, and Innovation Cooperation" (2015) 10 *Journal of the Knowledge Economy* 1341-1361

<sup>433</sup> Chad Anderson, "Rethinking public-private space travel" (2013) 29 *Space Policy* 267

<sup>434</sup> Chad Anderson, "Rethinking public-private space travel" (2013) 29 *Space Policy* 267

<sup>435</sup> Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 *Cal W Int'l LJ* 217

<sup>436</sup> Gil Denis and others, "From new space to big space: How commercial space dream is becoming a reality" (2020) 166 *Acta Astronautica* 435

has primarily been in the form of government funding SpaceX's activities. For example, Blue Origin has collaborated with the United Launch Alliance to work on a spacecraft engine for the US's planned Vulcan heavy payload launch vehicle through a PPP model.<sup>437</sup> NASA relies on private actors like SpaceX because they are faster and cost-effective, facilitating the ferrying of astronauts to the ISS more cheaply and quickly.<sup>438</sup> This approach is indispensable because NASA has been struggling financially. For example, at the dawn of intensive space commercialisation in the early 2000s, NASA's space shuttle Columbia disintegrated due to a technical hitch, killing a seven-member crew.<sup>439</sup> NASA was forced to suspend its space shuttle program, further delaying the construction of the ISS. In January 2004, NASA launched and implemented the "Vision for Space Exploration" to transform NASA into an organisation that relies heavily on PPPs to support its Earth orbit and beyond activities.<sup>440</sup> The PPP model came as a perfect opportunity to solve some of its technical and financial problems. Private actors can build, study, design cost-effectively, and operate space exploration missions on behalf of the Government.<sup>441</sup>

The flourishing of private actors in the space sector implies that the model is effective and presents a significant market opportunity that satisfies the interests of private actors. The public sector purchases more than 75% of the commercial products and services developed by private actors in the space industry.<sup>442</sup> In that regard, if power is to be balanced between the public and private partners, it is evident that public partners are somewhat overpowered by private partners, which means that governments must intensely and keenly take care of the interests of the private partners for continued collaboration. Some private actors produce disruptive innovations from time to time, which means the Government must continue to rely on private actors for the most prolonged period to cope well in the industry.<sup>443</sup> Based on this observation, it can be concluded that private actors tend to influence state practice slowly but significantly, and over time, they become legitimised and normative in a given jurisdiction. This influence

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<sup>437</sup> Tim R. Bowler, "A New Space Race" [2018] *Deep Space Commodities* 17

<sup>438</sup> Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 *Cal W Int'l LJ* 217

<sup>439</sup> Christina Isnardi, "Problems with Enforcing International Space Law on Private Actors" (2020) 58 *Colum J Transnat'l L* 494

<sup>440</sup> Christina Isnardi, "Problems with Enforcing International Space Law on Private Actors" (2020) 58 *Colum J Transnat'l L* 495

<sup>441</sup> Giancarlo Genta, "Private space exploration: A new way for starting a spacefaring society?" (2014) 104 *Acta Astronautica* 481

<sup>442</sup> Gil Denis and others, "From new space to big space: How commercial space dream is becoming a reality" (2020) 166 *Acta Astronautica* 435

<sup>443</sup> Gil Denis and others, "From new space to big space: How commercial space dream is becoming a reality" (2020) 166 *Acta Astronautica* 435

comes in the form of the public partners' keen interest in bringing maximum acceptable good to the public, such as enhancing telecommunication infrastructure, while maintaining the commercial interests of private partners. Therefore, for the interest of private partners to be catered for adequately, public partners must provide conditions that facilitate market expansion for the private partners. Such conditions could be having a direct impact on state practice.

#### ***5.4.5 Non-restrictive domestic space laws***

Non-restrictive domestic space laws mean that governments have given private partners much discretion in space exploration. Another possible explanation is that private actors have had a significant influence on how domestic space laws are formulated, meaning their non-restrictive nature reflects the commercial interests of private actors in state practice. OST is one of the most successful international space treaties because it has the highest number of ratified party states and has consistently applied its principles.<sup>444</sup> Its success is attributable to three factors, namely (a) intent to promote the greater good of all humankind, (b) it addressed a universally acceptable concern, i.e., escalating Cold War between the United States and the former Soviet Union, and (c) it is not overly restrictive.<sup>445</sup> Although states refused to sign and ratify the Moon Agreement, they have continuously and consistently adopted or extended the OST provisions into their domestic space laws, which is why party states have not contested, proposed amendments, or withdrawn.<sup>446</sup> Supposing domestic space laws are in tandem with the three characteristics (a-c) highlighted above, it can be hypothesised that domestic space laws are also non-restrictive, intend to promote the common good of the national population and address a significant concern in society. The introduction section outlines that most private actors worldwide have strong links to governments, which indicates the high intensity of PPPs in the space sector.<sup>447</sup> It was also stated that the rapid growth of PPPs in the space sector is due to the non-restrictiveness of domestic space laws.

First, as of 31 December 2021, there were one thousand and eleven (1,011) private partners that had signed the Domestic Space Act Agreements in the United States.<sup>448</sup> As of 30 June 2021, only eight hundred and ninety-seven (897) private partners had signed the Domestic

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<sup>444</sup> Tanja Masson-Zwaan, "New States in Space" (2019) 113 AJIL Unbound 99

<sup>445</sup> Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 Cal W Int'l LJ 223-226

<sup>446</sup> Tanja Masson-Zwaan, "New States in Space" (2019) 113 AJIL Unbound 99

<sup>447</sup> Gil Denis and others, "From new space to big space: How commercial space dream is becoming a reality" (2020) 166 Acta Astronautica 435

<sup>448</sup> NASA, "List of Active Domestic Space Act Agreements Signed After July 31, 2017, Citing NASA's "Other Transactions Authority" under the Space Act (51 U.S.C. § 20113(e)) (report as of December 31, 2021)" (NASA.GOV 2021) 3-13

Space Act Agreements.<sup>449</sup> A 13.5% growth in PPPs within six months is enormous, which means the domestic regulatory environment is also non-restrictive. The United States has the most advanced legislative framework to regulate and control space activities by its citizens, and many other spacefaring states like the United Kingdom, France, and Japan have plans to integrate the US domestic space law into their jurisdictions.<sup>450</sup> Some of the backing arguments that have been provided include the non-restrictive nature of US domestic law, as evidenced by recent amendments of various Acts.

Other reasons the US domestic space law is seen as the most robust and advanced include that it most significantly complies with international standards while ignoring a few of them to allow its private sector to grow.<sup>451</sup> Some of the US's recent legal amendments include the Commercial Space Launch Competitiveness Act of 2015, which allowed private actors to obtain property rights over the resources they mine from asteroids.<sup>452</sup> The amendment reflects why the United States refused to sign and ratify the Moon Agreement, which aimed to extend international authority over space activities to ensure party states conduct their activities for the common good of humankind and restrict the appropriation of resources obtained from space activities.<sup>453</sup> In that regard, the Moon Agreement was abandoned by many states because of its restrictive nature. Since the United States is set to inform domestic space law for other spacefaring countries, it can be argued that private actors have contributed to the non-restrictive nature of domestic space law in the United States. Domestic space laws reflect legitimised and accepted state practice. Some of the ways the private sector has managed to have such an enormous impact on state practice include that the Government does not influence demand and other market dynamics because it is only a customer and partner of the private actors.<sup>454</sup> Therefore, it can be concluded that the status quo of domestic space law reflects the extent to which the commercial interests of the private partners have shaped state practice.

Second, although private actors have already had an enormous impact on state practice, it seems like it is not yet over; it is a continuing project. This claim is based on the argument

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<sup>449</sup> NASA, "List of Active Domestic Space Act Agreements Signed After July 31, 2017, Citing NASA's "Other Transactions Authority" under the Space Act (51 U.S.C. § 20113(e)) (report as of June 30, 2021)" (NASA.GOV 2021) 3-13

<sup>450</sup> Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 Cal W Int'l LJ 216

<sup>451</sup> Arindrajit Basu and Arthad Kurlekar, "Highway to the Danger Zone: United States Legislative Framework Regulating the Commercial Space Sector" (2016) 14 Astropolitics 44

<sup>452</sup> Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 Cal W Int'l LJ 216

<sup>453</sup> Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 Cal W Int'l LJ 229

<sup>454</sup> European Commission, "Space Strategy for Europe", 2016 12

that when international or domestic law is based on principles of promoting the greater good of all humankind, it becomes readily accepted by stakeholders and the public.<sup>455</sup> OST was formulated to solve the nuclear war conflict between the United States and the former Soviet Union during the Cold War era. Therefore, it was formulated to promote the greater good for all humankind. Since the Cold War ended, the space race seized between the two superpowers and flourished between private companies, such as SpaceX versus Blue Origin.<sup>456</sup> As a result, private partners have enormously influenced the domestic governance of outer space since OST's original intent of promoting the greater good of all humankind vanished with the end of the Cold War. Sovereign states have developed a domestic legislature that reflects the common good's national value.

In the general description, states intend to come up with domestic space laws that have a common good for its citizens in that such common good emanates from the need to provide a safe, peaceful, and law-abiding environment that enables public and private actors and the general public to enjoy the wonders and benefits of outer space.<sup>457</sup> States have not yet arrived at a universal goal for the common good because they are securing their national economic and social interests first.<sup>458</sup> It can be concluded that private actors are likely to exploit this legislative gap to exert more influence on state practice unless an international treaty provides a universal greater good for all humanity. In his view, Ross Harper believes that since the Cold War that informed the formulation of OST is over, a new legislative framework should be adopted by the United Nations to provide a consensual objective for all party states.<sup>459</sup> The author has confidence in using planetary protection as the universal goal for all party states because it is of mutual interest and universally accepted.<sup>460</sup> Unless states urgently adopt such an international treaty, private actors are likely to develop new market opportunities that might harm the common good by exploiting this gap in legislation, especially considering they already overpower public partners in the PPP models. The need to regulate private partners' activities is of universal interest because domestic space laws are formulated within a power

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<sup>455</sup> Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 Cal W Int'l LJ 223-226

<sup>456</sup> Saadia M. Pekkanen, "Governing the New Space Race" (2019) 113 AJIL Unbound 92

<sup>457</sup> Mark J. Sundahl, "Returning to the Moon: Legal Challenges as Humanity Begins to Settle the Solar System" (2021) 9 Global Bus. L. Rev. 1 61

<sup>458</sup> Mark J. Sundahl, "Returning to the Moon: Legal Challenges as Humanity Begins to Settle the Solar System" (2021) 9 Global Bus. L. Rev. 63 97

<sup>459</sup> Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 Cal W Int'l LJ 223-226

<sup>460</sup> Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 Cal W Int'l LJ 240

imbalance between public and private partners. The non-restrictive nature of domestic laws to the extent that they may allow private partners to have too much control over space activities can also be blamed on the non-binding nature of the OST and other providers of international space exploration guidelines (e.g., COSPAR), as well as the vague language used in the OST that permits private partners to exploit their power in the PPP by interpreting some of the fundamental OST provisions in ways that best suit their commercial interests.<sup>461</sup> This issue will be elaborated on in a separate sub-section.

#### ***5.4.6 The non-binding nature and vague language of the OST***

Another reason private actors are rapidly shaping state practice can be traced to the non-binding nature and vague language of the OST and other international treaties by the United Nations.<sup>462</sup> Second, OST does not have an enforcement framework that can help it regulate the private sector's activities.<sup>463</sup> When these reasons are put together, they imply that private actors could be having excessive discretion in space exploration activities because even state governments or the public sector is already overpowered in their PPPs.

Firstly, the non-binding nature of the OST encourages governments and private actors in the space sector to interpret its vague language in ways that best fit their domestic or national interests. Private actors in the space sector contribute enormously to medicine, electronics, biotechnology, and energy science and technologies.<sup>464</sup> Private actors boost their public partners by sharing risks and costs and fostering innovation and market development.<sup>465</sup> As stated above, it is because of their efficiency and effectiveness in carrying out space activities that public partners like NASA have always been attracted to work with them in partnerships. However, the main problem is that domestic laws are too weak, and international treaties like the OST do not have binding authority to control or enforce regulations against private actors that infringe provisions stated therein.<sup>466</sup> Instead, OST requires state governments to control and regulate the space activities carried out by their citizens and entities. Article VI of the OST

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<sup>461</sup> Philip De Man, "State practice, domestic legislation and the interpretation of fundamental principles of international space law" (2017) 42 Space Policy 92

<sup>462</sup> Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 Cal W Int'l LJ 219

<sup>463</sup> Christina Isnardi, "Problems with Enforcing International Space Law on Private Actors" (2020) 58 Colum J Transnat'l L 489

<sup>464</sup> Bartosz Ziemblicki and Yevgeniya Oralova, "Private Entities in Outer Space Activities: Liability Regime Reconsidered" (2021) 56 Space Policy 10-14,27

<sup>465</sup> Clelia Iacomino, *Commercial Space Exploration: Potential Contributions of Private Actors to Space Exploration Programmes* (Springer International Publishing 2019) 45

<sup>466</sup> Christina Isnardi, "Problems with Enforcing International Space Law on Private Actors" (2020) 58 Colum J Transnat'l L 489

states as follows: "States Parties to the Treaty shall bear international responsibility for national activities in outer space (...) 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."<sup>467</sup> The power imbalance in PPPs has jeopardised the state governments' ability to regulate private actors strictly. A good example is the issue of liability, as elaborated below.

Laws governing liability in international space are vague and insufficient, giving private actors excessive discretion to space exploration, which is likely to endanger the safety of the public or private property. At the outset, private actors in the space sector were mainly involved in satellite manufacturing and satellite launching business.<sup>468</sup> Under the new concept of *New Space*, private actors are extending to other activities like mining asteroids, space tourism, and landing on Mars as soon as possible.<sup>469</sup> Such unfolding of events calls for the urgent need to strengthen legal frameworks for regulating liability in international space. The Liability Convention<sup>470</sup> is already about five decades old, and it was formed under the Cold War mentality.<sup>471</sup> It does not capture contemporary sectoral dynamics, such as the fast-growing private sector in space exploration and the divergent interests of private actors. The Liability Convention is not legally binding, and it does not apply to private actors because, under OST, governments of party states will be responsible for governing and controlling the activities of private actors. The convention has also never been applied before in settling any liability disputes. It was only formally applied when the Soviet Cosmos 954 disintegrated over Canada in 1978, whereby Russia agreed to pay Canada C\$ 3 million *ex gratia* for damages caused.<sup>472</sup> Although the convention was mentioned in the claimant's official records, the resolution did not reflect its provisions. Instead, a diplomatic negotiation approach was applied.

The same dilemma applies to the collision between Cosmos 2251 satellite of the Russian Military and Iridium 33, a satellite owned by an American private actor. Unlike the

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<sup>467</sup> "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies" (United Nations Office for Outer Space Affairs 1967)

<sup>468</sup> Bartosz Ziemblicki and Yevgeniya Oralova, "Private Entities in Outer Space Activities: Liability Regime Reconsidered" (2021) 56 Space Policy 10-14,27

<sup>469</sup> Bartosz Ziemblicki and Yevgeniya Oralova, "Private Entities in Outer Space Activities: Liability Regime Reconsidered" (2021) 56 Space Policy 10-14,27

<sup>470</sup> 2777 (XXVI). Convention on International Liability for Damage Caused by Space Objects (United Nations Office for Outer Space Affairs 1972)

<sup>471</sup> Trevor Kehler, "Closing the Liability Loophole: The Liability Convention and the Future of Conflict in Space" (2019) 20 Chic. J. Int. Law 191

<sup>472</sup> Frans G. von der Dunk, "Too-Close Encounters of the Third-Party Kind: Will the Liability Convention Stand the Test of the Cosmos 2251-Iridium 33 Collision?" [2010] Space, Cyber, and Telecommunications Law Program Faculty Publications 200



Russia-Canada dispute described above, the collision between Cosmos 2251 and Iridium 33 illustrates how the Liability Convention's ambiguity impairs its effectiveness in regulating private activities. Although the convention did not shape or inform the Russia-Canada dispute resolution, it was at least mentioned by the claimant, unlike in the issue of Cosmos 2251 and Iridium 33.<sup>473</sup> The main issue arising from their dispute is that the Liability Convention regulates launching states, and in this case, although Iridium 33 belongs to an American private actor, it was launched from Russia using Proton. Under the Liability Convention, Russia is the launching state of both satellites, making it unclear how the United States can claim on behalf of Iridium 33 or how Cosmos 2251 can claim against Iridium 33.<sup>474</sup> Therefore, on an international level, no law can govern or regulate the space activities of private actors because most international treaties like the OST and the Liability Convention contain ambiguities that are challenging to interpret in specific contexts.<sup>475</sup> It is one of the reasons nations chose to formulate and enforce domestic space laws, which have, in turn, been put at risk of ineffectiveness due to power imbalance between public and private partners in PPPs. The ambiguity of international space law gives private actors too much discretion to space exploration, which allows them to exert more influence over state practice.

Domestic space laws are also weak in governing or regulating the liability of private actors in international space. As highlighted earlier, the US's domestic space law is seen as the most robust and advanced, and spacefaring countries like the United Kingdom and France have plans to integrate it into their domestic space laws.<sup>476</sup> Therefore, since the US's domestic space law is seen as the most advanced, this thesis will examine its effectiveness in governing issues with liability among private actors in international space. The main argument is that domestic space laws are still weak and insufficient in governing and regulating liability among private actors, which is an urgent issue because private actors like SpaceX and Blue Origin have plans of space tourism, where private civilians will be seeking space adventure. Liability must be examined in this realm of reasoning because international space law is vague and subject to

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<sup>473</sup> Frans G. von der Dunk, "Too-Close Encounters of the Third-Party Kind: Will the Liability Convention Stand the Test of the Cosmos 2251-Iridium 33 Collision?" [2010] Space, Cyber, and Telecommunications Law Program Faculty Publications 201

<sup>474</sup> Frans G. von der Dunk, "Too-Close Encounters of the Third-Party Kind: Will the Liability Convention Stand the Test of the Cosmos 2251-Iridium 33 Collision?" [2010] Space, Cyber, and Telecommunications Law Program Faculty Publications 201

<sup>475</sup> Adrian Taghdiri, "Flags of Convenience and the Commercial Space Flight Industry: The Inadequacy of Current International Law to Address the Opportune Registration of Space Vehicles in Flag States" (2013) 19 B.U. J. Sci. & Tech. L. 405

<sup>476</sup> Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 Cal W Int'l LJ 216

multiple interpretations regarding how private actors can be held accountable in adverse events, whereby passengers or users of space tourism and asteroid mining activities die. As seen above, the current regime in international space law only holds states responsible for regulating space activities by its citizens and entities, and they are liable to any damage (e.g., injury or death of persons or destruction of property belonging to private citizens, other nations, or intergovernmental space property) caused by private actors.<sup>477</sup> As a result, state governments are rushing to develop effective domestic space laws that will ensure private actors are well regulated through establishing state authorities responsible for the licensing, registration, insurance, liability, safety, environmental obligations, indemnification, and enforcement.<sup>478</sup> However, significant loopholes have been noted in domestic space laws concerning liability, among other issues, because states are taking advantage of the ambiguity of international space law to develop and enforce domestic space laws that only benefit or fulfil their national interests.<sup>479</sup> For instance, in the United States, two domestic space legislation regulate the liability of private actors in international space, namely the Commercial Space Launch Act of 1984 (amended in 1988 and 2004) and the Commercial Space Launch Competitiveness Act of 2015. The Commercial Space Launch Act of 1984 promotes public health and safety, the safety of property, or any national security interest by the United States itself or of foreign origin by issuing licensing requirements for space launches and empowering the Secretary of Transportation to inspect launch vehicle and launch site owners/operators to ensure they meet safety standards.<sup>480</sup> Section 16 of the Act requires those launch vehicles and launch site owners/operators to acquire liability insurance mandatorily.<sup>481</sup> Section 115(3) of the Commercial Space Launch Competitiveness Act of 2015 requires private actors to compensate third parties that suffer damage due to death, bodily injury, or property damage or loss. Section 103 of the Act stated an extension of the period in which the Government indemnifies for the damage caused by private entities beyond their liability licensure.<sup>482</sup> Therefore, it is evident that even in the United States, liability held by private companies is limited, giving them excessive discretion in space activities. However, once the extension period matures, private actors in the United States will be fully liable for damage caused by their activities. In this

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<sup>477</sup> Paul Stephen Dempsey, "National Laws Governing Commercial Space Activities: Legislation, Regulation, & Enforcement" (2016) 1 Northwest. J. Int. Law Bus 44

<sup>478</sup> Paul Stephen Dempsey, "National Laws Governing Commercial Space Activities: Legislation, Regulation, & Enforcement" (2016) 1 Northwest. J. Int. Law Bus 44

<sup>479</sup> Philip De Man, "State practice, domestic legislation and the interpretation of fundamental principles of international space law" (2017) 42 Space Policy 92

<sup>480</sup> Commercial Space Launch Act (Government of the United States 1984)

<sup>481</sup> Commercial Space Launch Act (Government of the United States 1984)

<sup>482</sup> U.S. Commercial Space Launch Competitiveness Act, 2015

regard, it can be stated that the US Government is non-restrictive regarding liability and indemnification in regulating private actors because it is interested in the faster growth of the sector to share risks and losses and spur innovation and market development.<sup>483</sup> In other words, the non-restrictive nature of US domestic space laws concerning indemnification and liability is solely attributable to the Government's urgent need to facilitate private actors in making the United States a centre of space excellence. Based on the loopholes identified in the US domestic space law and considering that it is the most advanced and robust in the world, it can be concluded that domestic space laws are also in development, and they are yet to attain maturity because they develop slower than the pace at which the commercial space industry grows. It is hard to determine the exact cause of the slower pace of domestic space law development, but it can be linked to the ambiguity of international space law in which they are based. The consequence of such a trend is that private actors are taking advantage of the legal loopholes at the domestic level to exert more influence on state practice.

Secondly, spacefaring states are developing domestic space laws because, besides being ambiguous, international law also lacks enforcement authority. Domestic space laws like the US's Commercial Space Launch Act of 1984 indicate that the Secretary of Transportation is responsible for enforcing the provisions stated therein.<sup>484</sup> However, international treaties governing space activities do not have an enforcement framework, unlike domestic space law. Scholars like Christina Isnardi argue a need to establish a single international regulatory and judicial authority well equipped with enforcement mechanisms to control and govern commercial space activities.<sup>485</sup> Similarly, Feyisola Ruth Ishola and others suggested the need to amend international law treaties to include enforcement mechanisms through an institutional framework; for example, international space treaties are designed under the auspices of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), but UNCOPUOS is not mentioned anywhere in these treaties as an enforcement authority.<sup>486</sup> Due to the emerging trends in commercial space exploration, there is a need to amend international space laws to make UNCOPUOS the enforcing body.<sup>487</sup> These suggestions are based on the notion that there is a need to promote multilateral dispute resolution mechanisms by

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<sup>483</sup> Clelia Iacomino, *Commercial Space Exploration: Potential Contributions of Private Actors to Space Exploration Programmes* (Springer International Publishing 2019) 35–74

<sup>484</sup> Commercial Space Launch Act (Government of the United States 1984)

<sup>485</sup> Christina Isnardi, "Problems with Enforcing International Space Law on Private Actors" (2020) 58 Colum J Transnat'l L 489

<sup>486</sup> Feyisola Ruth Ishola and others, "Legal Enforceability of International Space Laws: An Appraisal of 1967 Outer Space Treaty" (2021) 9 New Space 33

<sup>487</sup> Feyisola Ruth Ishola and others, "Legal Enforceability of International Space Laws: An Appraisal of 1967 Outer Space Treaty" (2021) 9 New Space 33

discouraging current developments in domestic space laws, whereby unilateral dispute resolution mechanisms are being promoted.<sup>488</sup> For example, US's Commercial Space Launch Competitiveness Act grants private citizens and entities the right to ownership over resources extracted from outer space, which seems to advance a specific interpretation of OST's provision on appropriation.<sup>489</sup> The United States Government took advantage of the ambiguous nature of the provision to provide an interpretation that best suits its domestic interests, such as spurring the growth of the private sector in the space industry. If every State Party to the OST comes up with a specific interpretation of this provision in their domestic space laws, then a substantial legal crisis will take place soon, mainly where the dispute will involve private entities of two different nations, or a state actor and a private entity from different nations, as is the case of Cosmos 2251 versus Iridium 33.<sup>490</sup> The main argument here is that discrepancy in the interpretation of international space law by State Parties is mainly attributable to the divergent interests of private actors, which directly influence state practice. For instance, the extension of the indemnification exemption period by the United States Government under Section 103 of the Commercial Space Launch Competitiveness Act of 2015 can be seen as a product of private actors' influence over state practice.<sup>491</sup> Hence, to make commercial space exploration more cooperative and peaceful and avoid any possible military confrontations in the future, there is a need to standardise regulations governing the activities of private actors in the space industry.<sup>492</sup> Giving private actors too much discretion in space exploration will divergently influence state practice. If left uncontrolled and unregulated, a massive plethora of state practices will emerge and compromise and complicate multilateral agreements to the extent of provoking the militarisation of outer space.

#### ***5.4.7 COSPAR's non-binding planetary protection guidelines***

At the beginning of this section, it was highlighted that PPPs offer an excellent opportunity for public partners to ensure progressive space exploration activities by reducing

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<sup>488</sup> Philip De Man, "State practice, domestic legislation and the interpretation of fundamental principles of international space law" (2017) 42 Space Policy 93

<sup>489</sup> Philip De Man, "State practice, domestic legislation and the interpretation of fundamental principles of international space law" (2017) 42 Space Policy 93

<sup>490</sup> Frans G. von der Dunk, "Too-Close Encounters of the Third-Party Kind: Will the Liability Convention Stand the Test of the Cosmos 2251-Iridium 33 Collision?" [2010] Space, Cyber, and Telecommunications Law Program Faculty Publications 201

<sup>491</sup> Philip De Man, "State practice, domestic legislation and the interpretation of fundamental principles of international space law" (2017) 42 Space Policy 93

<sup>492</sup> Ram S. Jakhu and others, "Threats to Peaceful Purposes of Outer Space: Politics and Law" (2020) 18 Astropolitics 27

the cost and time of space travel.<sup>493</sup> It was also noted that private actors are determined to land humans on Mars as soon as possible.<sup>494</sup> However, the plans to land humans on Mars keep on being postponed from time to time because there is a lack of a detailed plan on how PPPs can sustain their presence on the red planet since no policy exists governing and regulating the exploration of a planet for the first time.<sup>495</sup> As stated earlier, such a legal void can be seen as a product of power imbalance between private and public partners. Scholars who are advocates of PPP governance in various sectors of the economy recommend balancing power between public and private partners to optimise the effectiveness and efficiency of PPPs.<sup>496</sup> Although it is not a must that public and private partners must have an exact balance of power, a system of majoritarianism or dominance by one partner is likely to jeopardise the effectiveness of PPPs.<sup>497</sup> The power imbalance between public and private partners in the United States can be considered one of the reasons missions of landing on Mars have been postponed from time to time. As further elaborated below, some attractive solutions to this situation have been proposed. It should be noted that the issue of landing on Mars is only used for illustration purposes in this sub-section and that it does not form the core of the argument. Hence, the discussion can be generalised to other space exploration activities other than missions of landing on Mars.

First, the discussion will assume that the Committee on Space Research's (COSPAR) planetary protection guidelines on the safe exploration of space are legally binding, although they are not in reality. Such orientation offers the opportunity to reveal the blind spot in the current policy frameworks, especially after the emergence of private actors in the space industry. This approach was informed by Ross Harper's observation that since the Cold War mentality (that informed OST and subsequent international space treaties) is no longer usable, there is a need to develop a new universally accepted issue that is also of great concern regarding the greater good of the public.<sup>498</sup> The author suggested planetary protection as the

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<sup>493</sup> Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 Cal W Int'l LJ 217

<sup>494</sup> Bartosz Ziemblicki and Yevgeniya Oralova, "Private Entities in Outer Space Activities: Liability Regime Reconsidered" (2021) 56 Space Policy 10-14,27

<sup>495</sup> Jack B. Chaben, "Extending Humanity's Reach: A Public-Private Framework for Space Exploration" (2020) 13 J. Strateg. Secur 75

<sup>496</sup> Irene Calboli and Delphine Marie-Vivien, "One Size Does Not Fit All: The Roles of the State and the Private Sector in the Governing Framework of Geographical Indications\*" [2018] The Cambridge Handbook of Public-Private Partnerships, Intellectual Property Governance, and Sustainable Development 309

<sup>497</sup> Irene Calboli and Delphine Marie-Vivien, "One Size Does Not Fit All: The Roles of the State and the Private Sector in the Governing Framework of Geographical Indications\*" [2018] The Cambridge Handbook of Public-Private Partnerships, Intellectual Property Governance, and Sustainable Development 309

<sup>498</sup> Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 Cal W Int'l LJ 219

ultimate goal of regulating commercial space activities; in this way, the expansion of an international authority to enforce international space law will be eased.<sup>499</sup> Before explaining what would have happened if COSPAR's planetary protection guidelines were legally binding, it is imperative to describe them briefly.

COSPAR developed planetary protection guidelines to help nations comply with OST's Article IX.<sup>500</sup> Article IX of the OST states as follows: "...parties to the Treaty shall pursue studies of outer space including the Moon and other celestial bodies, and conduct exploration of them 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...."<sup>501</sup> NASA, European Space Agency (ESA), Canadian Space Agency (CSA), and Japan Aerospace Exploration Agency (JAXA) are among the space agencies that participated in the drafting of COSPAR's planetary protection policy.<sup>502</sup> These agencies also comply with domestic laws and guidelines that reflect the COSPAR policy on planetary protection.<sup>503</sup> Due to the success of OST, Party States have essentially ensured COSPAR's planetary protection guidelines are strictly followed. The COSPAR planetary protection policy emphasises the need to avoid back contamination in Mars missions involving both humans and robots because it is believed that life might have existed or could be existing on the red planet and that it could be gravely dangerous to contaminate Earth with Mars' organisms and the vice versa.<sup>504</sup> Scholars believe that public and private actors in space exploration use the policy to ensure compliance with Article IX of OST.<sup>505</sup> For example, in the United States, no NASA space launch will be permitted without a clearance certificate from the NASA Planetary Protection Officer.<sup>506</sup> Compliance with the COSPAR policy on planetary protection is voluntary, but it is slowly becoming an international customary law concerning planetary protection.

Therefore, what would have been the case if COSPAR's policy on planetary protection was legally binding as a minimum requirement for states and private actors before commencing

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<sup>499</sup> Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 Cal W Int'l LJ 219

<sup>500</sup> European Space Agency, "Planetary protection" 2020

<sup>501</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (United Nations Office for Outer Space Affairs 1967)

<sup>502</sup> COSPAR, *COSPAR's Planetary Protection Policy*, 2017ebook 65

<sup>503</sup> Kathryn Gundersen, "Beyond the Tardigrades Affair: Planetary Protection, COSPAR, and the Future of Private Space Regulation" (2021) 53 NYU J Int'l L & Pol 886-887

<sup>504</sup> COSPAR, *COSPAR's Planetary Protection Policy*, 2017ebook 55

<sup>505</sup> Thomas Cheney and others, "Planetary Protection in the New Space Era: Science and Governance" (2020) 7 Front. Astron. Space Sci. 4

<sup>506</sup> James J. Butler, "Unearthly Microbes and the Laws Designed to Resist Them" [2006] Ga. L. Rev. 1357 9

the launch of any mission? As stated above, in his view, Ross Harper believes that a new international space regime should focus on developing a new mentality concerning how space exploration activities can be safe and be of benefit to all humankind and that planetary protection can serve that goal perfectly.<sup>507</sup> The author's argument is entirely valid considering the uptake of COSPAR's planetary protection guidelines by public and private entities in the space industry. That said, if COSPAR's policy was legally binding, it means that OST must have also been legally binding because the policy helps states and private actors to comply with Article IX of OST. The main argument here is that using the planetary protection approach described by Ross Harper can slowly and progressively promote the expansion of the international authority to control and regulate space exploration by private entities. That implies that state Governments would not have been directly involved in regulating private entities in the space sector, avoiding the unilateral effect described above. However, in his view, Jack Chaben noted that one of the sources of power for government entities in PPPs is regulation and control over the actions of the private actors.<sup>508</sup> Therefore, transferring regulation power to an international authority may result in a further power imbalance between private and public entities. Even so, Jack Chaben further noted that what matters the most in the success of PPPs is the extent to which public and private entities coordinate.<sup>509</sup> Once the international authority is extended to regulate and control commercial space activities, State Party Governments can divert their regulatory effort to coordinate space exploration activities with private actors. However, Governments will have to seek alternative means to fill the power void left in such a case. At the same time, it is anticipatable that public partners' power in PPPs might increase gradually and attain a balance with private partners because the current power imbalance emanates from how private entities influence the formulation of domestic space laws. Having an international authority would standardise the regulatory environment,<sup>510</sup> and as such, governments will have to only focus on the successful launch of missions and strategizing to maximise their socio-economic impact. In other words, the lack of standardisation and excessive discretion to private entities on space exploration currently undermines the PPP power balance.

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<sup>507</sup> Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 Cal W Int'l LJ 219

<sup>508</sup> Jack B. Chaben, "Extending Humanity's Reach: A Public-Private Framework for Space Exploration" (2020) 13 J. Strateg. Secur 75

<sup>509</sup> Jack B. Chaben, "Extending Humanity's Reach: A Public-Private Framework for Space Exploration" (2020) 13 J. Strateg. Secur 75

<sup>510</sup> Kathryn Gundersen, "Beyond the Tardigrades Affair: Planetary Protection, COSPAR, and the Future of Private Space Regulation" (2021) 53 NYU J Int'l L & Pol 888

Second, the argument provided in the previous paragraph will not be complete without highlighting what the case is like presently since compliance with COSPAR's planetary protection guidelines is entirely voluntary. All public partners in space exploration in most spacefaring countries, including China, India, and Russia, have developed domestic policies that reflect the spirit of COSPAR's planetary protection guidelines.<sup>511</sup> Similarly, when private partners coordinate with public partners in space exploration activities, COSPAR guidelines are strictly followed.<sup>512</sup> However, not all private actors in the space industry work under the PPP model. Some others carry out their activities on their own, such as the case of Iridium 33 that Russia entirely launched under a private arrangement.<sup>513</sup> Kathryn Gundersen notes that currently, there are no clear planetary policy guidelines that govern and control the space activities of private actors who are not in partnership with public entities.<sup>514</sup> An excellent example of this issue is how the lunar lander mission *Beresheet* was handled. *Beresheet* was a lander of a lunar mission expected to land on the moon on 11 April 2019.<sup>515</sup> The lander had in it a sample of human DNA and lunar tardigrades (microorganisms that can survive for long without water), which is contrary to COSPAR's planetary protection guidelines that require the reduction of bio-loads of spacefaring crafts to preserve the effort to find life elsewhere in the universe.<sup>516</sup> In this regard, allowing such microorganisms and human DNA samples to board *Beresheet* was apparently against the COSPAR planetary protection policy. The case study of *Beresheet* implies that the non-binding nature of COSPAR planetary protection policy gives private actors too much discretion that may even undermine the space exploration efforts of parties that are compliant with the policy. This scenario provides further ground which can be used to promote the extension of international authority over the regulation of commercial space activities. The scenario also demonstrates how governments' regulatory authority helps public partners balance power with their private partners; the perfect example is when private actors working under PPPs must comply with planetary protection guidelines. The scenario also illustrates how domestic space laws are overly weak in regulating and controlling space

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<sup>511</sup> Kathryn Gundersen, "Beyond the Tardigrades Affair: Planetary Protection, COSPAR, and the Future of Private Space Regulation" (2021) 53 NYU J Int'l L & Pol 888

<sup>512</sup> Kathryn Gundersen, "Beyond the Tardigrades Affair: Planetary Protection, COSPAR, and the Future of Private Space Regulation" (2021) 53 NYU J Int'l L & Pol 889

<sup>513</sup> Ting Wang, "Analysis of Debris from the Collision of the Cosmos 2251 and the Iridium 33 Satellites" (2010) 18 Science & Global Security 87

<sup>514</sup> Kathryn Gundersen, "Beyond the Tardigrades Affair: Planetary Protection, COSPAR, and the Future of Private Space Regulation" (2021) 53 NYU J Int'l L & Pol 890

<sup>515</sup> Oded Aharonson and others, "The science mission of SpaceIL's Beresheet lander" (2020) 194 Planetary and Space Science 10,51

<sup>516</sup> Keren Shahar and Dov Greenbaum, "Lessons in space regulations from the lunar tardigrades of the Beresheet hard landing" (2020) 4 Nature Astronomy 208



exploration entirely done by private actors.

In summary, 5.2 has demonstrated how private actors in the space industry have already and continue to influence state practice. Subsections 5.2.1 and 5.2.2 illustrated the possible correlation between the fast-rising number of commercial space launches in the past two decades and the unrestrictive nature of domestic space laws. The two points were primarily used to demonstrate that private actors have already managed to influence state practice as evidenced by the rapid privatisation of the space industry (Outcome 1) and the slow development of domestic space laws (Outcome 2), reflecting the pressure private actors put on their public partners in PPPs. Subsections 5.2.3 and 5.2.4 outlined how the international legal and scientific regime (i.e., OST and COSPAR) influences the relationship between private and public actors in the space industry. Scenarios, where the regimes' legal provisions and scientific guidelines were legally binding versus non-binding, were compared, and contrasted, showing how the non-binding nature (current status) of the OST and COSPAR exposes State Parties to the risk of being over-influenced by their private partners in PPPs, a situation of power imbalance. Thus, it can be concluded that extending an international authority to regulate private actors can eliminate the undermining effects of the current international legal and scientific regime on the relationship between private actors and state practice. In 5.3 below, it is demonstrated how state practice possibly mediates the relationship between private actors and international standards, furthering the argument on the essentiality of an international legal framework that regulates private actors in the space sector.

## **5.5 Planetary Protection and State involvement**

### ***5.5.1 Obligations of States on Planetary Protection***

The drafting of Resolutions 1721 A and B (XVI) of the United Nations General Assembly and the Declaration of Principles Governing the Activities of States in the Exploration and Use of Outer Space also adopted by the United Nations General Assembly, did not make an explicit expression of the roles of states in planetary protection.<sup>517</sup> However, COSPAR has for a long time considered the matter of forward and backward contamination as a result of space exploration activities carried out by states. To this extent, COSPAR has included it among its recommendations on biological contamination concerns after consultations with UNCOPUOS. The recommendations were included in UNCOPUOS' 1959 report, which dealt with the issue

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<sup>517</sup> General ASSEMBLY, 'International co-operation in the peaceful uses of outer space' (1961) 1721 (XVI)

of space contamination and the role of states.<sup>518</sup> Further to this, COSPAR also gave several recommendations in 1964 on the need to carry out sterilisation of space vehicles. The recommendations were adopted by UNCOPUOS, which also recommended the member states address the issues.<sup>519</sup> Hence, COSPAR has considerably set out the roles that states are expected to play in planetary protection during space missions. As enumerated by Blokker, international organisations, which are state organisations, derive both rights and obligations from international laws.<sup>520</sup> As such, just as states expect to be protected by international provisions, they are also expected to identify and set out their roles as stated in the international laws. Therefore, states have a key role to play in ensuring that COSPAR recommendations on planetary protections are not only domesticated within their jurisdictions, but also adhered to for the well-being of all state-faring nations. The implementation of COSPAR influenced planetary protection guidelines by several states worldwide, is a pointer that COSPAR has a significant level of clout globally, which states appreciate. Moreover, it is also important to indicate that under the OST, governments are equally expected to be responsible for the conduct of their private sectors in space.<sup>521</sup> As such, states play a role in regulating the activities of their private sector to ensure international compliance with COSPAR guidelines and OST provisions.

Concerning the international organisations and states' responsibilities towards international laws, Blokker asserted that:

*“In certain cases, the practice of international organisations also contributes to the formation, or expression, of rules of customary international law”*<sup>522</sup>

In essence, this points to the fact that states also have a role in contributing to the development of international laws. As such, since states contribute to the formation of these laws, they are

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<sup>518</sup> Boccardo G, 'Planetary Protection Obligations of States Pursuant to the Space Treaties and with Special Emphasis on National Legislations Provisions' (2019) 65

<sup>519</sup> John DR, 'Planetary Protection in Planetary Exploration Missions', (University of Arizona Press 2020) 12

<sup>520</sup> Blokker N, 'International Organizations and Customary International Law: Is the International Law Commission Taking International Organizations Seriously?' (2017) 14 International Organizations Law Review 1

<sup>521</sup> Gundersen K, 'BEYOND THE TARDIGRADES AFFAIR: PLANETARY PROTECTION, COSPAR, AND THE FUTURE OF PRIVATE SPACE REGULATION' (2021) 53 New York University journal of international law & politics 871

<sup>522</sup> Blokker N, 'International Organizations and Customary International Law: Is the International Law Commission Taking International Organizations Seriously?' (2017) 14 International Organizations Law Review 1

obligated to not only watch over their implementation within their borders, but also promote the laws. In carrying out the role of the implementation of planetary protection guidelines, states are also expected to adhere to ethical standards that aim at promoting scientific research. As enumerated by Schwartz, planetary protection policies by states should not ignore that they have an ethical duty to promote the scientific study of the solar system. To protect this duty, states should collaborate with COSPAR to ensure that scientific opportunities for satisfying scientific curiosity are created.<sup>523</sup> In essence, states must collaborate with COSPAR and other planetary protection agencies to create and protect opportunities for scientific exploration of space. Similarly, Rummel and others also posited that the recognition of the broader ethical duty of protecting opportunities for space exploration is important in broadening grounds for the protection of ethically motivated planetary protection guidelines.<sup>524</sup> However, according to Schwarts, COSPAR is yet to endorse any ethical motivations for planetary protection policies, and it is only until recently that it started to have discussions about the involvement of ethical considerations in planetary protection.<sup>525</sup> In these instances, states are expected to present their considerations for ethical needs in enhancing their ability to explore space. As such, a close working relationship must be developed between COSPAR and states, to enhance the possibility of creating planetary protection policies that satisfy the need of all states to explore space. Such collaborations also improve the possibility of the policies being ratified by states. However, according to Conley, the biggest obligation that states are expected to play is set out in the OST.<sup>526</sup>

Essentially, states have a major duty of working together with planetary protection bodies to ensure that harmful space exploration activities are prevented for the safe use of space to the benefit of all parties. In essence, COSPAR maintains and promulgates the policies of planetary protection for the reference of space faring nations. Hence, the body is expected to provide accepted guidelines around planetary protection to guide compliance with the Outer Space Treaty, as well as other relevant international agreements, to which the states are a party.

An international perspective of planetary protection can further be obtained from the analysis

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<sup>523</sup> James Schwartz, 'Where no planetary protection policy has gone before.' (2019) 18 IJOA 4, 354

<sup>524</sup> Rummel JD, Race MS and Horneck G, 'Ethical considerations for planetary protection in space exploration: a workshop' (2012) 12 Astrobiology 10-17

<sup>525</sup> Schwartz JSJ, where no planetary protection policy has gone before, vol 18 (International journal of astrobiology, Cambridge University Press 2019) 2,6,15-17

<sup>526</sup> Catharine A. Conley GK, 'Planetary Protection for Mars Sample Return' (2013)

carried out by Cavanaugh and others. In the study, the researchers posited that states can also organise into blocks for effective planetary protection practices that enhance maximum benefits for all space faring nations. An example is given in the case of Europe, which combines planetary protection policies and practices from various national space agencies, including CNES in France, DLR in Germany, ASI in Italy as well as the ESA in Europe which has 22 member states.<sup>527</sup> ESA is effective in representing the interests of all the member states, which are all signatories of the OST.<sup>528</sup> ESA ensures that the Articles of space protection coincide with those of the OST. In essence, states also have a responsibility of looking out for other states to collaboratively carry out planetary protection practices. In these quests, the states must realise that the search for life in space is a potentially valid objective for solar system exploration.

Moreover, collaboration has also been observed between national space agencies, of various states, in enhancing planetary protection. For example, ESA seeks to collaborate with the US to plan and execute Mars sample returns. During this collaboration, it is expected that COSPAR policies on the prevention of backward contamination will be considered, based on enhancing the ability of each state to grow its space exploration abilities.<sup>529</sup><sup>530</sup> In essence, the collaboration between various space exploration agencies can be crucial in improving space exploration activities by various states for the benefit of science improvement and planetary protection. As such, it is evident that states have an important role to play in enhancing planetary protection. During this process, collaboration enhances not just the ability of individual states, but also their preparedness through technological transfer and policy creation.

### ***5.5.2 Planetary protection, legal ambiguity, and the decision-making process***

As planetary protection requirements are developed by COSPAR, national space agencies and space mission planners, they must recognise the socio-political context of the various states for which the decisions about the missions are made, as well as pay attention to the public concerns. Further, possible legal ambiguities that may arise between the policies and the various legal

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<sup>527</sup> Cavanaugh CP and others, An International Perspective on Planetary Protection Policies (Presentation), 2020)  
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<sup>528</sup> Cavanaugh CP and others, An International Perspective on Planetary Protection Policies (Presentation), 2020)  
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<sup>529</sup> Cavanaugh CP and others, An International Perspective on Planetary Protection Policies (Presentation), 2020)

<sup>530</sup> G. Kminek, M. A. Meyer, D. W. Beaty, B. L. Carrier, T. Haltigin and L. E. Hays Mars Sample Return (MSR): Planning for Returned Sample Science Astrobiology 2021 Vol. 22 Issue S1 Pages S-1-S-4 DOI: 10.1089/ast.2021.0198 <https://doi.org/10.1089/ast.2021.0198>

regimes must also be considered and addressed appropriately. Specifically, from the view gathered from Uhran, Conley and Spry, various considerations for planetary protection requirements, such as OST, COSPAR guidelines and NASA management requirements, must be considered for sample return missions. Additionally, there are also non-space laws that must be considered in various states.<sup>531</sup> Essentially, this increases the risks, of not just legal ambiguities arising, but also delays that may be caused by administrative bureaucracies and lengthy legal procedures in some countries. As such, these matters are important to consider as they may have a direct influence on the success of space missions. A key legal example that may affect the planning of space missions is the National Environmental Policy Act. The Act requires that federal agencies assess the environmental effects of their proposed actions before arriving at a decision.<sup>532</sup> The Act can be used by opponents of specific space missions to impose lengthy delays, which may compromise space missions since an environmental impact statement and public hearings may be required.<sup>533</sup> such, legal ambiguities between COSPAR policies and specific state laws may compromise and delay the decision-making process for various space missions.

Further, there is also a considerable challenge that may be experienced in conflicting regulations and overlapping jurisdictions in various countries during the planning of space missions. The result may be that multiple agencies, from the federal level to local zoning and permit offices, may become involved in space missions thus leading to conflicting regulations and overlapping jurisdictions.<sup>534</sup> As such, the various overlapping regulations may result in the delay of space missions, thus compromising their effectiveness. To avert this challenge, inter-agency agreements must be reached between the various agencies involved in regulating the different elements of space missions within states to prevent bottlenecks in legal provisions. Further complications may be experienced in cases where a mission is collaboratively done between one or more international partners. To resolve the ambiguities and overlapping regulations in such missions, public perceptions, legal judgments, and technical and scientific interpretations must be integrated.<sup>535</sup> The integration process may be viewed as an attempt to

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<sup>531</sup> Uhran B, Conley C and Spry JA, 'Updating Planetary Protection Considerations and Policies for Mars Sample Return' (2019) 49 Space policy 10-13,22

<sup>532</sup> National Environmental Policy Act 1970

<sup>533</sup> Uhran B, Conley C and Spry JA, 'Updating Planetary Protection Considerations and Policies for Mars Sample Return' (2019) Vol 49 Space policy 10,13-22

<sup>534</sup> Meltzer M, *When Biospheres Collide: A History of NASA's Planetary Protection Programs* (United States Government Printing Office 2011) 5

<sup>535</sup> Meltzer M, *When Biospheres Collide: A History of NASA's Planetary Protection Programs* (United States Government Printing Office 2011) 3-9

iron out the grey areas and ambiguities that exist in the various forms of regulations drawn from multiple laws and policies. Further, proposals have also been made to establish codes of conduct that are appropriate for environments and different types of celestial bodies, as well as an elaboration of how they may be applied to countries.<sup>536</sup> This will reduce the ambiguities that may exist, hence establishing an agreed mode on how policies will be applied. However, it should be noted that the state policies regarding space missions have a lot in common, and hence focus should be on addressing the conflicting areas through proven scientific evidence for which existing recommendations may be drawn from COSPAR policies.

Despite the difference that may exist between the various regulations and policies available, it is accepted that the regulation for outer space activities should reflect the shared values of the various stakeholders and participants in the activities of space exploration. The basic values to be shared are listed in the OST Article VI, which states that the provisions shall apply to government and non-governmental activities. The shared values include scientific exploration freedom, freedom of access to, and use of, outer space without restrictions and based on equality, non-appropriation of outer space benefits sharing among all people of the world without discrimination based on economic or scientific development, and peace in outer space through the development of friendly relations.<sup>537</sup> As such, the provisions of OST seek to ensure that in the development of guidelines, policies and recommendations for planetary protection, factors that enhance the equal and peaceful use of space be considered. Other shared values at the development stage include shared guidelines regarding the use of space resources and shared guidelines on human space habitation.<sup>538</sup> The development of shared policies among states is crucial in reducing conflicts in regulations and establishing standard space exploration and planetary protection procedures.

Space users from various states must appreciate the fact that the use of space is not limitless and as such, there is a need to consider accommodating all users as well as allowing expansion without restraints.<sup>539</sup> To realise this, the procedures and recommendations for planetary

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<sup>536</sup> Race MS, *Policies for Scientific Exploration and Environmental Protection: Comparison of the Antarctic and Outer Space Treaties* (2011) 63

<sup>537</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI) article VI

<sup>538</sup> Larsen PB, 'Outer Space: How Shall the World's Governments Establish Order among Competing Interests' (2019) 29 Wash Int'l LJ 1 21

<sup>539</sup> Larsen PB, 'Outer Space: How Shall the World's Governments Establish Order among Competing Interests' (2019) 29 Wash Int'l LJ 1 21

exploration that are developed by states must take into consideration the use of space by other states. For this reason, consensus should be established among the various regulations of space exploration and planetary protection. Space is continually becoming congested.<sup>540</sup> As such, there is a need for states to adopt planetary protection guidelines that are standard to the internationally recommended procedures, such as COSPAR guidelines, to prevent conflicts as regards the use of space.

According to the views indicated by Larsen, outer space ought to be viewed as global commons.<sup>541</sup> The concept of global commons is linked to Article I of the OST, which states that outer space is free for use by all states.<sup>542</sup> In essence, if space is viewed as a global commons, there would be consideration and respect from various space faring states for the common uses of all outer space, hence the policies created would limit ambiguity and make the decision making process effective. Further principles of global commons are enumerated by Walljasper. A potential argument is that among the requirements for the effective management of common properties include congruence between the provision rules and local conditions. Further, there should also be mechanisms of conflict resolution that can easily, and cheaply, be accessed.<sup>543</sup> Essentially, viewing space as a global common would be important in enhancing focus on coming up with a universally agreed regulatory framework. In essence, outer space should be considered fragile and not able to heal itself from abuse. In this regard, local state regulations must be made with this in mind. Overall management of space is required to ensure that a standard procedure of planetary protection guidelines is formulated by the various space regulation bodies. The implementation of an outer space regime is a common principle and should be accepted as such. As a key principle, managed global support should enable continued scientific exploration while at the same time providing unrestricted freedom to all users.<sup>544</sup> Therefore, states should consider these facts when enacting policies for planetary exploration. The analysis confirms the third hypothesis developed, since it reveals that countries have different agencies which seek to manage and regulate outer space activities within the state, such as ASI, DLR and CNES which means that COSPAR must work closely

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<sup>540</sup> Pekkanen SM, 'Governing the New Space Race' (2019) 113 AJIL unbound 92

<sup>541</sup> Larsen PB, 'Outer Space: How Shall the World's Governments Establish Order among Competing Interests' (2019) 29 Wash Int'l LJ 1 3, 22-41

<sup>542</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI) article I

<sup>543</sup> Walljasper J, 'Elinor Ostrom's 8 Principles for managing a commons' On the Commons (2011) 55

<sup>544</sup> Larsen PB, 'Outer Space: How Shall the World's Governments Establish Order among Competing Interests' (2019) 29 Wash Int'l LJ 1 17, 26

with the state agencies to gain recognition and become influential concerning policy development in planetary protection. The analysis also confirms the fourth hypothesis made by showing that relevance of COSPAR on an international level can be achieved if the UN gives it a specific mandate which makes it a global oversight authority on all matters pertaining to outer space activities.

## **5.6 Summary**

The current chapter sought to analyse the international legalities of COSPAR, and planetary protection. In doing this, the chapter explored the future of COSPAR and their planetary protection policy, as to whether there is a formal understanding of planetary protection and an agreed method given the nature of COSPAR. Additionally, the chapter analysed whether the development of COSPAR from ICJ makes it have the power to maintain space uses, or whether there is a consensus as regards planetary protection, and the points of contention between states and COSPAR. The analysis made indicated that COSPAR has an organisational framework that is aimed at the promotion of scientific research at an international level through the exchange of information, which is facilitated through scientific and stakeholder discussions. The policies of COSPAR are obtained through well-structured processes that enhance scientific research and evidence provision. The policies also rely on OST to avoid back and forward contamination. Essentially, COSPAR adopts a rationale that is based on planetary protection to ensure that astrobiology investigations are not compromised. In this sense, it is evident that there is a need to strengthen COSPAR to be a formal international organisation within the UN, hence the first hypothesis was accepted.

COSPAR was formed in 1958 after UNCOPUOS, NAS and IAF raised concerns about the need for planetary protection actions. The development of COSPAR has been based on passing recommendations and does not explicitly specify how states should carry out planetary protection procedures. Over the years, the policies and recommendations passed by COSPAR have been revised to comply with the space exploration needs of the current times. The strategy applied by COSPAR in planetary protection is based on the prevention of biological contamination that can occur during the process of conducting an exploration of the solar system.

Further, it was realised that the astrobiology roadmap has considered over the years the ethical considerations that need to be considered in both the study of life in space, as well as planetary



protection policies. Moreover, the astrobiology roadmap also considers the need to create opportunities that would lead to the study of life in other planetary bodies in the solar system for the possibility of discovering life outside Earth. The roadmap was developed during a 2-day interdisciplinary workshop at the SETI Institute in Mountain View, California in 2009. Generally, living conditions on Earth can be used to set the limits of life, which can then be crucial pointers for the possibility of extra-terrestrial life on other planets. Despite planetary protection being carried out to protect the future of astrobiology research, there is also a conflict that may arise between astrobiology research and planetary protection. A key conflict involves some scientists viewing planetary protection as limiting rather than promoting astrobiology research. A section of scientists also feels that limiting uncrewed exploration of space as stipulated by COSPAR only serves to delay the progress of astrobiology research. However, there is an overall need for discussions to gain a consensus between planetary protection and astrobiology research.

The policies for planetary protection, as formulated by COSPAR, are derived from international laws and, as such, their implementation is supposed to be supported by the various member states. The domestication of the recommendations as part of planetary protection policies by national space agencies is seen as a step towards the realisation of universal agreements on planetary protection procedures. The promulgation of the guidelines of planetary protection is led by the technical panel of COSPAR through consultations and discussions by various stakeholders. The recommendations for planetary protection are divided into various categories grouped from category I to V depending on the potential harm that the categories may cause to space contamination. There is a generally accepted level of international compliance with the policies put in place by COSPAR for planetary protection, with these guidelines having been adopted by the various national space exploration agencies. As such, the second hypothesis that most policies developed by COSPAR regarding planetary protection are accepted by the state is confirmed. Further, since the support of states is crucial as elaborated, the third hypothesis that COSPAR cannot become an influential international organisation regarding outer space activity regulation is also accepted.

However, there is a general need for ethics in planetary protection, including ensuring that the policies adopted aid in the promotion, rather than limit space exploration. Ethics are also important in gaining the support of scientists in planetary protection thus assisting in guiding scientific research and preserving the natural record of all planets explored. Different policies

are currently necessary that set different recommendations for space exploration and space colonisation. Generally, states must ensure that planetary explorations launched from within their borders, whether by government or private missions, comply with the recommendations of COSPAR on planetary protection. In this regard, the result confirmed the fourth hypothesis showing that COSPAR needs to be given a mandate by the UN to enforce policies related to planetary protection to gain global influence.

The nature of COSPAR and non-governmental organisation does develop a unique qualification to understand the legal application towards COSPAR and others that develop in space. The notion therefore of their planetary protection policy must be an attempt of an unqualified motion of best practice without political bias and legal efficacy. But this notion within such an area of consideration must therefore be examined in order to determine the status of whether or not any elements of a planetary protection policy can be legal. The preserved views of a public private partnership may as such develop a form of acceptable state practice through default. By funding and allowing such actions in a joint and curious endeavour the notion of state acceptance could therefore be argued to be credible. It goes without saying that international law considers states and other bodies with agreement of the general assembly, and therefore COSPAR just fails to be in such a category. Therefore, the question on the future of COSPARs planetary protection policy could be seen to be a form of acceptance, as such that the content of such is not certain due to scientific change.

Based on the analysis in this chapter, various recommendations can be made. First, there is a need to develop policies that are agreed upon by all the international space-faring nations on planetary protection. Moreover, there is a need to ensure that ethical considerations are considered during planetary protection missions by the various space missions. Further, a close working collaboration between COSPAR and various states is crucial in ensuring that the policies adopted are ratified by the various nations to promote planetary protection without limiting astrobiology research. Moreover, space should be viewed as global commons, which will be important in ensuring that the use of space is for the benefit of all space-faring agencies. The need for continued discussions between COSPAR and the various stakeholders is necessary to ensure that the policies formulated are based on peer reviewed scientific information to enhance compliance by the various member states. In this manner, states will find it easy to implement the planetary protection guidelines and ensure that both private and governmental missions adhere to the set standards for planetary protection. Our attention

should be focused on improving the ability of humankind to continually carry out studies on the origin and future of life without undue limitations. Moving into the future, planetary protection policies should identify the need for a concerted effort among the various bodies in ensuring that the needs of all the stakeholders are put into consideration, and that the use of space by some states does not negatively affect the possibility of other states to use space. Continuous policy developments in this area of study will be important in focusing on this objective of COSPAR over the years.

## **6 Chapter Six: Conclusion**

### **6.1 Chapter Overview**

At the beginning of this thesis, Chapter One introduced the research project and identified a number of current issues within the governance of outer space. Many concepts were developed to consider what the future of space governance and planetary protection could look like. Thus, through considering the literature, and identifying the gaps, the project was formed to allow space to be critically analysed and to the development of governance throughout. Chapter Two expressed the positive approach of the thesis by allowing a firm understanding of international law and to what the basis of the thesis explores. Chapter Three brings together the understanding of space governance, space laws and the overall understanding of international law. This chapter is incredibly important as it sets down the key elements of space throughout the international community. By doing so, Chapter Three allows the future discussion of the weaknesses and possible developments within the current legal practices within outer space. The importance of Chapter Three cannot be underestimated as this chapter creates the legal foundation for the research project. Chapter Four considers an array of different governance models that can be used and developed for the uses of outer space. Within the chapter the developing question of what the future of space governance, is developed through different considerations and analysis in the attempt to develop future governance concepts. Chapter Five considers the area of COSPAR and Planetary Protection Policy within the international community, as well as its direction towards space activities. The development of this chapter considers the legal basis set down in Chapter Three, and questions the model currently used by COSPAR. This chapter takes a critical approach to understanding planetary protection, to attempt and consider what a future Planetary Protection Policy may look like. This chapter allows for the literature and conclusions views on what further possibilities space governance and Planetary Protection Policy could look like in the future.

Chapter Six is the final chapter in which each chapter consideration and summary will be critically analysed to consider the overriding research question. Primary consideration will focus on the international legal review of space law and how this is a possible legal feature within the basis of planetary protection and to offer an understanding of space governance. By doing so each chapter will allow for the question on the future of space governance and COSPARs Planetary Protection Policy to be critically examined into a number of conclusions.

Such a function will consider the nature of space governance and how such activities are considered under the direction of the OST and the international community. Moreover, this section will assume a fundamental element of the geopolitical nature of space to understand the international community and the derelict nature of such areas. The following section within this chapter will consider the future of international space governance and law, to potentially understand how space governance could be used, and or fragmented, throughout current, and controversial governance structures. The section will then move on to the development and understanding of COSPAR to decide the committee's future and whether their Planetary Protection Policy can develop space activities. This section will not consider its current structure as discussed in Chapters Two and Five. Still, it will link into the international legal sphere and consider the rationale and relationship COSPAR has within international law and what keeps their proactivity to multiple areas around space activities. The chapter will summarise the discussions above and draw upon original developments to enable the community to consider what space may look like in the future, and how such an organism can grow within the three factors of law and governance.

The focus of the work thus far has resulted in conversations surrounding law, governance, planetary protection and COSPAR. Therefore, it has been necessary to delve into each area to consider subjectively the nature to which they act within space. This has been aimed at assessing the research question and to what is the future of COSPAR, planetary protection, law, and governance. Each tailor-made question has been posed to critically analyse the main question and subject matter to enable us to understand the nature of space, any issues and whether positive actions can foster a new era of commercial exploration. The following sections will consider these areas and break down the questions into a summary conclusion.

## ***6.2. International Law & Governance***

As discussed within Chapter three, the operation of international space law and governance provides a foundation and legal certainty for space activities throughout the international community. Unfortunately, increased discussions are based on the nature of the ongoing in space and what considerations are not factored in within the legal frameworks. The creation and advancement of such space activities have caused legal uncertainty for states and actors that wish to explore and exploit the natural resources space offers. This section will bring together Chapter Three and Chapter Four to consider what is above the expectations within the OST and governance framework. This section will therefore look to challenge the current practices and exploit the vulnerabilities, while acknowledging the strengths to formulate an

argument for the dissipation of the current version and what a potentially new version may look like. However, it must be stated that the current system is functional, and these questions are based upon the highlighted view of space to understand the needs of future governance. To date, there has been no international litigation regarding space that would allow us to understand a legal advancement through international law. Although this being the current legal understanding, crashes, and injuries to the state, as discussed in Chapter Three, have all been considered outside of international law. Such a challenge would allow us to develop a reflective article for such challenges to the OST and current governance practices. Still, the challenges and uncertainty have been, and continue to be, exposed through the literature, technological advances and the pre requisition of private actors in international space and during exploration.

### ***6.2.2 International Law***

As discussed in Chapter Three, there has been a limited acceptance and approach to foster in additional treaties and legally binding agreements since the creation of the OST. The foundations of space law created by the OST are accepted and are broadly followed in a comprehensive approach by states. After considering the limitations of modern space laws, one of the fundamental questions is whether space law principles and practices for space exploration were broad enough to create a binding acknowledgment and understanding for the future of space development. The OST allows for free exploration, utilisation of space resources and the non-appropriation of space.<sup>545</sup> Moreover, the OST created a number of principles, facilitating anthropogenic extra-terrestrial pollution.

The international community is faced with a legal dilemma. On the one hand, the non-appropriation of space and the development of voluntary agreements have contributed to the advancement of space research. Still, they have created a problematic legal and geopolitical uncertainty for states to adopt. On the understanding that the foundations of space are fostered and followed, regional and state-based space agencies can adopt and regulate areas within their sovereignty. The issue occurs when developments do not align with other states. A vital example of this would be the political activities based within Russia and China, in comparison to the European Space agencies and the US. The main concern is that these events such as mining, and any increases on the current extraterritorial pollution such as debris abandonment would have a profound negative effect on the space environment. Moreover, a developmental approach between states has certain advantages of cost, conformity, and best practice. It would

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<sup>545</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (XXI)

be a leisurely early acknowledgement that this section does not consider, given the geopolitical nature of international environmental law and the current disturbance within the general assembly and security council. With such excluded, the question of what international space law looks like in the future is a well-considered point within the academic space clusters. To further elaborate on this argument, it can be considered that new treaties that look to bind states in future space activities will simply fail, as was proven by the Moon Agreement. It could be challenged that the ASAT test ban and the Artemis accords have proved a political success but created very little for the environmental, governance and political unwillingness aspects. As the development of space gains add ground, the notion of the growth of private space actors and the grow in demands create the rise of domestic law with greater proactivity. The likes of the UK Space Industry Regulations 2021,<sup>546</sup> and The Commercial Space Launch Competitiveness Act on space activities show that a change has occurred within the domestic willingness of space exploration with direct application on exploitation. Each state, in this instance, bridges the elements of the OST and creates an open and exploratory law to govern commercial exploration and exploitation with legal certainty. Moreover, it must be considered that the OST is interpreted more as a legally binding advisory statement on space activities for the development of peace and security. Such a statement provides a foundational legal apparatus for the inclusion of states, international law, and a developmental feature for future growth. Therefore, on this basis, it would make sense when understanding the approaches of states and commercial actors while they express an overarching interest in commercial space endeavours.

A normative position of international law, with regards to self-regulation of a treaty offers a number of possible vacancies within law and governance. As discussed above the international community creates a possibility where in general one applicable rule is created by international principles of interpretation such as maxims *lex specialis derogat legi generali* “the general does not derogate from the specific or special law repeals general laws”<sup>547</sup> and *lex posterior derogat legi priori* “A maxim meaning that a legal rule arising after a conflicting legal rule prevails over the earlier rule to the extent of the conflict”,<sup>548</sup> the development and precursor preclude

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<sup>546</sup> The Space Industry Regulations 2021, [The Space Industry Regulations 2021 \(legislation.gov.uk\)](https://www.legislation.gov.uk/ukdsi/2021/0001/div1/data/1-1) accessed 29/07/22

<sup>547</sup> Guide to Latin in International Law, Guide to Latin in International Law (2 ed.) Aaron X. Fellmeth and Maurice Horwitz 2022 [Lex specialis derogat legi generali - Oxford Reference](https://www.oxfordreference.com/display/10.1093/acref/9780197583104.001.0001/acref-9780197583104-e-1321?rskey=ODIMQ0&result=1) accessed 21/04/23

<sup>548</sup> Guide to Latin in International Law, Guide to Latin in International Law (2 ed.) Aaron X. Fellmeth and Maurice Horwitz 2022 <https://www.oxfordreference.com/display/10.1093/acref/9780197583104.001.0001/acref-9780197583104-e-1321?rskey=ODIMQ0&result=1> accessed 21/04/23

that a treaty may become self-executing and thus developing within the international legal system, in addition to beyond the applied scope. The principal approach therefore allows for an appreciation of the possibility of the self-executing of the OST. As such the OST could be considered as self-regulating within the international community and legal sphere if article III can be understood to offer additional unwritten principles in which the state narrowly agrees to follow.

Article IX has been previously discussed as to the principles that can be seen within other areas of international law. It is an important article to consider within the application of space activities, and this article presents the first direct correlation as to international environmental law. The thought and relevance of such a concept were hinted at in the *Gabcikovo-Nagymaros Case*<sup>549</sup> that sources of international law may be applied to such a proposed doctrine of a similar approach. For example, Larsen<sup>550</sup> plays with the precautionary principal approach discussed in the Stockholm Declaration 1972, as to whether a similar cross over may be applied to space. Moreover, the possible same application should be understood and envisaged for the nature of transboundary harm<sup>551</sup> and the principle of due regard,<sup>552</sup> which is already considered in article IX of the OST and international environmental reports.

Therefore, a doctrine of similarity may be considered should the treaty not be able to self-execute the provision. One may therefore conclude that international space law may be designed and considered a *lex specialis* under general international legal principles and that some form of customary international law creates such an obligation to allow the interdisciplinary approach of international law to develop grey areas and divisions to where activities are notably unclear. From developing the literature, a conclusion could suggest that a proactive approach to the regulation of future space exploration is vital. The school of thought draws critical insight from the limitations of the OST, commercialisation of space research, legal ambiguities, and the need to safeguard humankind from non-divisive events. The researcher concurs with the argument's validity due to prudence and the necessity of the initiation of action based on expected future problems. The following section will consider the

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<sup>549</sup> *Gabcikovo-Nagymaros Project Judgment* ICJ Reports 1997 6 et seq

<sup>550</sup> Larsen B, *Application of the Precautionary Principle to the Moon*, 71 J. AIR L. & COM. (2006) 295, 295–306

<sup>551</sup> Stubbe P, *State accountability for space debris: a legal study of responsibility for polluting the space environment and liability for damage caused by space debris* (Brill 2017) 335-338, 402

<sup>552</sup> Barnidge R, 'The due diligence principle under international law' (2006) 8 *International Community Law Review* 81



approaches of space governance and the ability to adapt and create a hybrid system that allows for a more proactive, and developing, governance structure.

### **6.2.3 Governance**

The current governance practice of space is served well by UNCOPUOS. However, doing something well in an international unstable community can only be lasting with improvement. To consider UNCOPUOS a success and still seek to challenge it, should be a reflective and practiced approach within the international community. If UNCOPUOS is evaluated and compared to other international bodies, the governance structure becomes a unique issue when considering progressive space governance. For example, the World Trade Organisation mandate as discussed in Chapter Two, could help define the clear difference between international cooperation, disputes and at developing relationships. A straightforward and utmost flaw of space governance is the development and willingness to be bound by international law, given the unique and unqualified area of space. However, what happens if international law fails, and a state fails within its treaty obligations? UNCOPUOS as a governance body is limited in disputes and the creation of preference, unlike its cousins, the WTO, International telecommunications Union, or that of the Seabed Authority. The feature of some form of dispute resolution given the understanding of the Vienna Convention would lead the dispute to the primacy of international law and jurisprudence. A positive action such as judicial intervention is intertwined with international law and would offer validation to such an argument. Such help would create a safety net to develop and foster a gradient of global peace, security, and cooperation throughout space governance and planetary protection.

However, is this the only problem with UNCOPUOS and the current governance issues? If the seamless nature of international law and the spirit of Article III of the OST allows for the development of space law through international law, as discussed above, the terms of reference of UNCOPUOS are adaptable enough to adopt international global governance mechanisms and international principles as has been suggested in Chapter Three and Four. As discussed, the approach of different governance structures throughout the global governance spectrum is an exciting and creative hypothetical idea. Nevertheless, its formation is perhaps challenging to adopt and create under the UNCOPUOS system. An argument could be made that Article III and the approach of UNCOPUOS should develop a progressive global governance model such as one that has already been discussed. This would be challenged and assessed in the short term due to the jump within governance models. However, this may start to allow UNCOPUOS to test the waters to allow gradual governance introduction over time. As the new form of

governance grows and develops within the functionalism and fragmentation under Article III, domestic law and geopolitical relationships and space governance may develop for the betterment of space. The unique nature of UNCOPUOS makes this a greater possibility than the likes of international environmental law, which suffers from a lack of governance and treaty development. By such a nature, the committees within UNCOPUOS hold a degree of international acceptance to which a strategic approach towards space creates a discussion for a customary practice to such an adaptable governance model. Whether the consideration of intention and support creates a paradox approach to where a greater political will is fostered from states compare to space is a consideration and a future project. The innovation of non-binding declarations such as the Stockholm and Rio declarations allows a basis of legal certainty as far as political challenge is acceptable. The nature of space is initiative-taking should be the first consideration, to which such a governance models must consider. Given that UNCOPUOS is a body of specialism and accepts members based on such invitation, space governance practices could be seen to be as the best fit at this time.

#### ***6.2.4 Non-Binding Approach***

Non-binding declarations, or principles, are now commonly used within the international community, with more agreements being made in this capacity instead of legally. Such regulations are internationally and domestically followed by new norms that states wish to be bound to. As discussed in Chapter Three, such agreements and procedures may be entwined in international law by actions over time. Much literature is available that describes this function under the Statute of the ICJ section 38 and how customary law or state practice could develop such agreement. This section will consider such principles as whether they can create a balanced approach for space activities and whether having them creates a better governance structure, or whether they are just hindrances.

With the increase in global tension and new developments within outer space, international space law is showing its age and not identifying issues and understanding. The treaty was not created to adopt such a futuristic approach and concepts, such as mining activities, space debris and other areas that create an advanced burden that international space laws have not considered. It must be mentioned that these issues were a feature at the research stage of the OST, but like many issues they were ahead of the curve and not the most forefront issues at the time of inception. The general flaw with the rule is that proactivity is impossible to understand until a cause is developed. Therefore, the introduction of non-binding principles creates a caveat that space can remain proactive, including the current law, while setting international

standards for the area. By developing such self-governance and proactively developing space principles, UNCOPUOS creates a new intervention area. Such a place creates extreme emphasis on international law, the foundations of the international community and space as a self-executing international area. The allowance and willingness to agree to non-legal agreements may seem to some to be a weaker form of international law, but the willingness to compromise cannot be understated. Such contracts and principles are politically motivated and crucial for developing space activities in an international geopolitical area.

#### **6.2.5 Conclusion**

What is the future of space governance? This question is free from being a time barred question, with any answer being subject to current geopolitics. To develop a solution, international law, governance, and political and non-legal principles have been considered the leading manufacturers of this question. Therefore, the answer will be regarded as developed enough to be answered.

Firstly, international law creates a function for space activities, no matter how fragmented the law is. The role of international space law is a fundamental approach to the foundations of space activities and principles. Moreover, the functions of international space law allow several uncertainties to arise and gaps to be left. It could be said that this was the prime reason for the treaty to be created. By agreeing to a set of principles, but not critically accounting for all areas, international space law allows for space activities and issues to be proactively addressed without the hindrance of treaty law. It is a legal certainty that under article III of the OST, international space law and governance can be enhanced to a practical problem-based model, to which alternative principles can be selected that could apply to an issue within space. Moreover, the acceptance and formulated view of a doctrine of similarity will allow a clear route for principles that allow space to develop, while other areas are supplemented by space law. As space remains politically charged, these principles and mechanisms would be used to enhance the global commons and allow for legal certainty throughout the international community.

The thesis and considerations such far have provided the normative understanding for this question. With application, the answer to the question must be “no” international law and governance does not provide a strong enough basis to balance current space activities legally and politically. The extent that article III of the OST allows for a subjective application for international law with state objection creates boundless legal uncertainty. In such away states

there seem to be able to pick and mix principles of international law that suites them best. The UNCOPUOS governance model has a number of practicable flaws to which their actions cannot be without object or independence. With comparison to the likes of the WTO, UNCOPUOS cannot function as such a mediator unless terms are agreed, and therefore the notable argument of strong enough governance must be accepted, with a current model encroaching into the realms of adviser or overseer of space application. But this model serves space well in its current form. Giving the geopolitical nature of space, the United Nations, and other international forums, UNCOPUOS are dealing with the hand they have. By promoting cooperation, discussing points, and asking as an unofficial mediator at the international level, UNCOPUOS seems to be placed at the foundation of space activities and the future application of states. Moving forward, the promotion and dedication to space law and governance must be understood for the benefit of humanity, which is in a fragile area of no jurisdiction. Chapter three considered the approach of other governance models to discover whether at the current time UNCOPUOS could alter their terms to become more legally binding or create additional certainty. Unfortunately, like most laws and governance changes do not happen until an unprecedented event occurs.

The next section will consider a separate question on COSPAR and planetary protection. The consideration will incorporate legal elements throughout the text to better help show and understand the ramifications of space activities.

### ***6.3. COSPAR & Planetary Protection Policy***

As discussed in Chapter Five, COSPAR and its planetary protection are synonymous with international and domestic approaches to space activities. The difficulty arises when talking about the legal ramification of COSPAR and their approach to planetary protection. This section will consider the future of COSPAR and the legal developments it may prescribe in the future. The recognition and development through the international community will also play a feature in understanding the end of the organisations now and in all future space activities. Before concluding, a discussion on the practical aspects of COSPAR and the future of planetary protection will be discussed to allow a topical and development conversation for the future of planetary protection.

### ***6.3.2 Customary International Law***

The nature of section 38 (b) of the statute of the ICJ, which states “international custom, as evidence of a general practice accepted as law”<sup>553</sup>, develops a temperament that has thus been untested within the space domain in open litigation. The hypothetical nature creates the allowance of customary law if the state acts in such awareness, which is considered in Chapter Two. Therefore, this abstract area could be used about COSPAR and planetary protection with an open-ended degree of legal speculation. This section looks to draw on the applicability of customary law to develop an argument that shows that the creation and constant development of planetary protection creates the potential for accepted customary international law. It can be argued with a degree of certainty, that some states accept COSPAR’s policy and continue to develop it through international legal cooperation. Without a doubt, Planetary Protection Policy is a form of best practice and a global legal requirement under article IX of the OST. This thesis promotes the idea that although the current policy from COSPAR may not be legally binding, the need for a policy is binding under international law. To question what key features are agreeable and which are not are beyond the scope of this work but remain a developing factor. Therefore, it must be a concluding point that even by considering a policy, and or using elements from COSPAR, the legal status of Planetary Protection Policy must be a recognisable legal requirement for space activities and a customary legal obligation under international custom.

The legal paradox of COSPAR is more challenging to consider. As it has no international legal consideration, the proposal therefore of COSPAR is that it runs as a non-governmental actor. The novel approach would conclude that COSPAR remains within the international community within the space sector and, therefore, legal certainty is achieved. A further option may consider a European Space Agency model, which would form a hybrid form of a government machine model founded on legitimacy, accountability, and social purpose identification. This seems to be the best fit to allow a unified approach for Planetary Protection Policy, or that COSPAR could be considered a branch of UNCOPUOS. Therefore, when considering these actions, it is clear that Planetary Protection Policy is an international legal obligation under the OST and enshrined in customary international law. To further develop this argument, the applicability of section 38 (b) of the statute of the ICJ creates an overreaching burden on the community.

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<sup>553</sup> International Court of Justice, ICJ, ‘Statute of the International Court of Justice’ (2022). Available: <https://www.icj-cij.org/en/statute>

The positive approach of an opinion, allows for an additional argument to be made under section 38 (d) of the statute of the ICJ which creates a sturdy foundation that acknowledges the legality of planetary protection. Therefore, there is a degree of legal certainty, that “a” Planetary Protection Policy is customary law.

### ***6.3.3 International Organisation vs International Recognition***

COSPAR provides an expert best practice approach for areas of space activities, exploration, and exploitation. They do so without political intervention which sets them apart from the current governance model of the United Nations. The COSPAR model presents a different and unique qualification when demonstrating international cooperation, efficiency, and effectiveness. Unlike UNCOPUOS, and other international committees, COSPAR remains effective without a political approach. Moreover, COSPAR has involved the international community, states and governance bodies and embodies international law at the heart of planetary protection and other areas in which COSPAR operates. As COSPAR produces best practices on applications of space without the need to reflect the condition of the U.N., COSPAR is situated in a desirable location. Undoubtedly, COSPAR is internationally recognised within the international community. It can be equally noted that both parties adopt and accept the knowledge base of COSPAR either entirely or in part. COSPAR continues to proactively develop space research with inclusion and cooperation to benefit space, science, and humanity.

The benefit of this model is one that we can see within environmental issues with groups such as Greenpeace, which has enormous scope and, like COSPAR, has an international relationship while maintaining its representative independence. As discussed in Chapter Four, NGOs are not included in international law, and states are the only ones considered. Over the past decades, the international community has recognised the need to include such groups and individuals due to their expertise and efficacy within the international area. Therefore, it is of utmost importance that models, such as COSPAR, continue and gain private and political cooperation to develop different areas of space that can be politically stagnant. The primary consideration is whether such models are the new norm. International bodies without enforcement, such as UNCOPUOS, are being held by political bias through a broken and political deficit. The ideas within this section create future recommendations and developments of the global political union while carrying on a discussion for space. Although considering the international community is outside of the scope of this work, it is essential to consider the structure and the

issues to be able to critically analyse the current political system, international government bodies and NGOs that inflate and create opposing proactive materials without political intervention.

#### ***6.3.4 Practicality and the future of COSPAR***

A lot has been discussed regarding the nature and functions of COSPAR that are believed to be appropriate to the future character of COSPAR. If COSPAR were an international body, the recommendation and vision would be a limited function within the community and, therefore, its presence is not needed with reflection. However, this is not the case. Their critical attempts at protecting the future of space create a determination to develop policy to allow such a fragile environment to be preserved and accessible to all. The developing understanding is that the pursuit of knowledge should be accessible to everyone, whether this is now or within a hundred years. With such a scientific goal, COSPAR seeks to promote understanding for no gain of its own. As COSPAR includes states within their policy functions and seeks cooperation with private actors, the hope is that “come one, come all” is a developing function of COSPAR to enable freedom within all aspects of space.

International space law and governance are developing rapidly through non-typical legal routes, and therefore the future of COSPAR is exceptionally bright. Albeit what has already been discussed about the potential of customary international law being created, COSPAR still develops policy with the ability to create and better understand the accepted science. It is difficult to understand why a state would not wish to use COSPAR to promote science and develop relations without the political and legal foundation.

Without reason, states may choose to consider COSPAR as an NGO that seeks to produce the best for space without politics, but they may also think this to be such that it challenges the state’s sovereignty. Such a challenge may be conceived as if the state wishes not to follow COSPAR best practices; implications from other states that have accepted such policies may look upon states as unfavourable. This may be a consideration, but the likes of NASA and the US. have created their policies favouring the western expansion in commercialisation rather than the more restricted view COSPAR offers. They have still followed a formative review loosely based on COSPAR’s recommendations. This must be seen as a positive transaction for developing the space environment. The understanding and future activities will demonstrate such nature in time, to which COSPAR carries on developing and undertaking a complete and definitive view of all activities of space.

### 6.3.5 Conclusion

It is difficult to speculate on the future of COSPAR within a turbulent and hyper-political community. The affirmed view of COSPAR and the scientific community is set, and it allows COSPAR to be initiative-taking to the needs of space. As an NGO, the idea of such a body creates unequalled resource for the uses of space and allows all actors to be involved. The benefit of such a forum is that it provides a new and developing area away from the U.N. and UNCOPUOS. By such an approach, the inclusion is not represented solely by states, but experts, NGOs and private actors can all include their knowledge, expertise and aims within such policies. A positive view of such areas would question whether we are in the cusp of a different format in which space politics is no longer the dominant force in a futuristic formation of policy, actors and science that helps to better understand the actual benefits of space.

The OST creates a false comfort blanket and allows an argument to be made that states are the gatekeepers; the state authorises such bodies and they are ultimately liable for actions. Moreover, this is not questioned nor denied within the current international community, but it is unimaginative and limited in scope. As none of the space treaties holds any dispute resolution outside of the standard mechanisms in international law (ICJ etc), the space treaties are only functional if the states wish them to be. Giving that this is typically acceptable for all international treaty law, the binding nature and importance to all states that operate within space, a clear understanding of such actions can offer a different standard. The moratorium on international space law and passive expenditure must be questioned regarding effectiveness and efficiency. Questions and criticisms have raised worrying developments that have asked why the need for space is relatively essential when the likes of health, social conditions and now an energy crisis all eclipse the necessity of space activities. The war in Ukraine has already established that states must act within other areas and that space is a by-product of economics and global domestic productivity. The recent ESA mission to Mars, which included significant contributions from Roscosmos, was subsequently cancelled due to the political differences and breakdown between Russia and Ukraine in their illegal invasion.<sup>554</sup> The question relatable to such is whether states can afford space after the global pandemic, and whether research will be bottlenecked towards technology developments rather than scientific exploration. The allowance of COSPAR as a forum for such can be used to focus research, consider science, and create a body of focus without political agendas. It is important to recognise such changes

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<sup>554</sup> Independent News Paper 17 March 2022, [European journey to Mars suspended as war in Ukraine makes Russian flight 'impossible', space agency says | The Independent](#)



in the future. Such developments through practical sides of space could bypass current space governance models entirely in favour of a robust first-generation route, where actors and activists carry on within states but move in a positive unified direction. Although this might be a liberal approach, the focus on space through the likes of ESA, and others, stems from a relationship with the state to create a positive approach to space. Therefore, it would not be an impossibility for COSPAR, given its current ties, to develop a science driven assembly that mirrors the current model and carries on growing in the future. The following section will consider the law, governance, and science. The priority focus will consider the gaps within space policy while factoring in private actors and what this looks like at the international level.

#### **6.4 Overall Conclusion and Recommendations**

Space develops rapidly to provide humanity with several sectors of economic growth. The developmental nature therefore of the future of space governance and planetary protection is not only topical, but important. The sixty-fifth panel of UNCOPUOS in June 2022 created a monogram of where space considerations are currently and what its actors need to focus on in the near future. Firstly, creating a new treaty that governs space is not practicable; the political will on such an idea would be time wasted and illogical. Therefore, the practical development of space policy through bilateral and multilateral agreements provides a stable development of space activities to be carried out within a robust evolving regulated area. Moreover, within such an idea, it is directly applicable that UNCOPUOS be the only body of regulation. The likes of COSPAR and private actors can develop documents to deliver space activities effectually and efficiently. As the aftermath of the pandemic hits, these organisations are pivotal to developing space and that states solely understand their gatekeeping obligations under international law. In theory, it could be expressed that the product of space should remain a factor of the state, and by doing so, other actors can contribute to the betterment of space activities. This is demonstrated by the proposals of UNCOPUOS and their focus being on sustainable development,<sup>555</sup> gender equality<sup>556</sup> and global health.<sup>557</sup> Moreover, the applicability of space laws and governance is an area that is not generally of importance within such a concept of current space advancement. Although this statement is based on opinion, lack of legal advancement and geopolitical news of international law, it offers a better suited

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<sup>555</sup> General Assembly, 'The "Space2030" Agenda: space as a driver of sustainable development ' (2021)

<sup>556</sup> General Assembly, 'Report on the United Nations/Brazil/United Arab Emirates Space for Women expert meeting: initiatives, challenges and opportunities for women in space' (2022) A/AC.105/1267

<sup>557</sup> General Assembly (2022) A/AC.105/C.1/121 Report of the Working Group on Space and Global Health on the work conducted under its multi-year workplan

outlook for space democracy outside of the current international structure. The nature of this work is to consider the future of COSPAR, governance and the current international legal system in all these areas. As seen in this chapter, the core relationship between the current space governance and that of different governance models used within the international community is underdeveloped. Moreover, it would be appropriate to use this underdevelopment to advance space by using NGOs and space centres to portray their best approach above the governance model. This removes the political tension of geopolitical states to an area of advance without prejudice. It would not be effective or efficient to suggest adopting or creating a new governance model when the current one is functional without consequence. It would be of importance that all sectors are considered, however, in a wider scope to all for the understanding of space.

Private actors, NGOs and space centres should be considered the frontrunners within space development and initiative-taking space governance. In that case, we can consider what a governance model could look like. Without direct applicability to states and therefore non-politicised, the model can develop and be underpinned by conditions as a collective. Therefore, the introduction of a space charter could be seen as a natural step towards achieving practical activities in space, outside of the current political UN system. With the creation of a body that understands the legal development of all that is involved in space, the mandate and their ability would offer unparalleled growth as a multi-dimensional forum. Moreover, the creation of such a charter would not only create some form of legitimacy for such an organisation but would allow for a form of consultation so that states may adopt and play an integral part in such an idea. This will also allow for a term of reference to be created and acknowledged throughout the broader application of space actors. Therefore, this scenario would conclude the question of the future of COSPAR and space governance as to a possible outcome. As space continues to grow and create wealth the importance of an “all in” approach would be the most applicable future goal of space. A space charter therefore builds upon the recognisable structures with the inclusion of the likes of the doctrine of similarity, customary international legal elements and structures a degree of legal certainty.

However, if the first conclusion is the primary factor, a grand invitation and involvement would occur in such a landmark move. There are, as with everything, negatives of such an organisation and that this conclusion has simply substituted one model for another with effect. Moreover, issues could arise with the lack of formal international liabilities and wish to discount this theory. This is acknowledged, but it is easily defended due to the political nature of the U.N.

Moving space policy toward organisations with no political involvement can only help legitimise the functionality and demonstrate cause and effect. The uses of science, commerce, and commercialisation within the parameters of the launching states, but above such individual regulations in line with a global practice, creates a unified exportable function for all space actors. Such an adoption allows for more economic value to space activities, technology, and the public in the space sector. Moreover, a unified front creates better value for money when considering public funds, research, and the development of advances in space exploration. Therefore, this theory would seem to be a legitimate development over the current system when weighing up the potential issues. The existing space laws and governance model do have a place within the international community, but the loss of legitimacy is based on their location. In this theory, states still play a fundamental role within space, but like many sectors, the development of such needs to be better versed in future economic growth, which is beyond a state. The liable approach that states hold absolute liability has been further commercialised by introducing insurance for commercial endeavours, which would show that states are developing mechanisms above their basic legal requirements. Such an early idea creates a new form of value for a sector that is in its infancy. Such insurance products create a monetary value and economic valuation for space within the private sector to better allow for economic value for stock markets, loans, and equity to allow for the sector to grow.

Therefore, the early space sector has much scope for improvement whether this is independently, economically, or legally. Space policy and economic value to the pursuit of sustainable development through exploration, exploitation and international cooperation must be the main goals moving forward. The promotion and activities of COSPAR will remain a cornerstone of scientific development and non-political best practice until the amalgamation, or creation, of a super NGO as described above. Although currently fit for purpose, the current space governance model will remain in situ until a determination in the space sector occurs, and the need for development or the formation of a new council is deemed necessary. The OST, and other space treaties, must stand the time as foundations of international law that create the inducement of space activities. Hence, the promotion and development of all actors should understand the minimal expectation of the international community. While seeking the idea of legal certainty, scholars, diplomats, and entrepreneurs will all hold a stake in developing space law and policy. Developing a future solution for space above the current system must be of utmost importance, considering space's economic and intrinsic value. Therefore, along with

providing adequate protection for the fragility of space, developing states must be protected in all space endeavours.

## **6.5 Future Work**

The thesis has brought together a number of aspects that go beyond the international legal basis. Therefore, immediate future work will be preparing to make this thesis either a book or a number of journal articles.

However, to build on this thesis I will first begin to consider in greater context the doctrine of similarity, and to what extent that can be shaped throughout the wider regions of international law. These concepts will all take place in the wider areas of space, environmental and international public law, to be able to test the doctrine and theories.

To build a doctrine within international law, will allow for a greater scope and critical approach of international legal area within space under such an advanced doctrine. By such an approach, the doctrine will allow me to develop international legal principles throughout space and create a normative approach for other international developing areas. The consideration of such a doctrine of similarity will consider the issues of space debris and other space sustainability issues that are limited by space law and the overall geopolitical nature of such issues.

In turn the issues discussed while considering what a doctrine may look like will allow me to express and develop a running theme of space laws and governance aspects. Branching off from such scope will allow additional ideas on treaty law, the force of space governance and the enhancement of the Artemis Accords and whether other commercial aspects could be developed above politics and international stagnation.

The second element of such work will consider the sustainability of space with clear reference to the Mars sample return mission and the potential hazards of biosecurity and planetary protection. The sample return mission presents one of the greatest technological advances since the Apollo missions, and yet potentially bring microorganisms back to Earth presents a unique and developing area to establish legal mechanisms above space science on planetary protection and biosecurity.

The forward and backwards contamination question has been muted within the thesis, simply due to the size and the nature surrounding the legal implications of it. However, the transparency nature of the sample return mission, mutual assistance principles and that of international sharing are all positive and developing legal aspects that can be considered. The

questioning of such contamination leads to questions above the Outer Space Treaty and ordinary idea of planetary protection and asks what can be a concludable source of certainty giving the nature of space exploration in the future. Whether this consideration is that of human space flight, commercial and private international law or even the need for a unified international space force can all be questioned. A full overview of international legal considerations on contamination at such sites as Antarctica and in the High Seas will allow some form of contrast to space while attempting to understand and hypothesise the regions of discovery in such explorations.

The final consideration of planetary protection will be to discover and understand what the basic accepted understanding of such a policy is. As such, this will require a formative investigation to each published national policy, in addition to the international agreeable considerations under both private and public law. Overall, this will be a large project and will allow for a normative broad-based area of understanding as to what is accepted and what is the developing nature of such a policy.

The final area of future work will focus on the environmental and sustainability of future space. It will be important to understand and vet the nature of commercial space and what that means for humanity in space. This will allow me to critically evaluate the nature of international private law and the commercial needs within space governance. Critically, the Artemis Accords are such a foundation to where space communication aims to be, so that functionality of commercial space can be profitable and sustainable for business. A number of issues such as appropriation, contamination and safety concerns are all early sources of literature that can be defined and amplified during such investigations.

When focusing on sustainability it will be important to consider companies such as Astroscale, who seek to remove debris from space, but also seek to advance their technology and unique selling position throughout the space sector. This can also be seen from the likes of SpaceX and the commercial development of Star Ship One. The commercial endeavours do leave scope for a number of hypotheses on space mining, property rights and the colonisation of celestial bodies. It would be permissible at this stage to become complacent and develop an entire new treaty to attempt and protect such a fragile area of the global commons.

The future of space law, governance, astrobiology, and planetary protection are all relative giving the understanding and developing nature of the international community and state ambition. A number of advanced projects and literature can be refined and developed through

a number of different legal aspects found in the twenty first century. A lot of these ideas and conclusions have been referenced throughout the thesis but excluded due to their nature and accessibility. The remit of deglobalisation after the pandemic has allowed for a number post pandemic bubbles to form to which research, commercial activities and the future of international legal certainty remain abstract. It is therefore my hope to continue and develop my domestic and international relationships to challenge the literature, form a consensus and drive for better future for space.

## List of References

1. A Clarke and others, 'A Low Temperature Limit for Life on Earth' (2013) 8 PloS one e66207
2. A Cumbers, 'Constructing a global commons in, against and beyond the state' (2015) 19 Space & polity
3. A Salmeri,. (2019). Houston We Have a Law. A Model for National Regulation of Space Resources Activities. In Proceedings of the 70th International Astronautical Congress 2018. International Astronautical Federation.
4. Aaron X Guide to Latin in International Law, Guide to Latin in International Law (2 ed.). Fellmeth and Maurice Horwitz 2022 Lex specialis derogat legi generali - Oxford Reference accessed 21/04/23
5. Abashidze A, and others, 'International legal, technical and financial challenges for implementing the concept of space traffic management' (2021) 25 RUDN Journal of Law 700
6. Abbey GWS, 'Reprint of: International cooperation and the continuing exploration of space-recommendation for the new administration' (2021) 8 Journal of space safety engineering 111
7. Access to Knowledge Graphs' (2022) [https://live.dbpedia.org/page/Ministry\\_of\\_Education](https://live.dbpedia.org/page/Ministry_of_Education) accessed
8. Adrian Taghdiri, "Flags of Convenience and the Commercial Space Flight Industry: The Inadequacy of Current International Law to Address the Opportune Registration of Space Vehicles in Flag States" (2013) 19 B.U. J. Sci. & Tech. L
9. Aerospace B, 'Bigelow Aerospace' (2019) [https://bigelowaerospace.com/pages/news/learnmore.php?story=charlie\\_bolden/](https://bigelowaerospace.com/pages/news/learnmore.php?story=charlie_bolden/) accessed
10. AF Cooper and Pouliot V, 'How much is global governance changing? The G20 as international practice' (2015) 50 Cooperation and conflict
11. AG Fairén and others, 'Planetary Protection and the astrobiological exploration of Mars: Proactive steps in moving forward' (2019) 63 Advances in Space Research
12. Aganaba-Jeanty T, 'Introducing the Cosmopolitan Approaches to International Law (CAIL) lens to analyze governance issues as they affect emerging and aspirant space actors' (2016) 37 Space policy 3
13. Agbedahin AV, 'Sustainable development, Education for Sustainable Development, and the 2030 Agenda for Sustainable Development: Emergence, efficacy, eminence, and future' (2019) 27 Sustainable development (Bradford, West Yorkshire, England) 669
14. Agency ES, New Space Strategy for Europe launched at the European Space Expo, 2016)
15. Aharonson O, and others, 'The science mission of SpaceIL's Beresheet lander' (2020) 194 Planetary and Space Science 105115
16. Allen S, 'Legal Consequences of the Separation of the Chagos Archipelago from Mauritius in 1965 (I.C.J.)' (2019) 58 International legal materials 445

17. Almar I, 'What could COSPAR do to protect the planetary and space environment?' (2002) 30 *Advances in space research* 1577
18. Al-Rodhan N, *Meta-Geopolitics of Outer Space: An Analysis of Space Power, Security and Governance* (Palgrave Macmillan UK 2012)
19. Amariles DR, 'Legal indicators, global law and legal pluralism: an introduction' (2015) 47 *Journal of legal pluralism and unofficial law* 9
20. Anderson C, 'Rethinking public–private space travel' (2013) 29 *Space policy* 266
21. Arindrajit Basu and Arthad Kurlekar, "Highway to the Danger Zone: United States Legislative Framework Regulating the Commercial Space Sector" (2016) 14 *Astropolitics*
22. Asaduzzaman M, and Virtanen P, 'Governance Theories and Models' in Farazmand A (ed), *Global Encyclopedia of Public Administration, Public Policy, and Governance* (Springer International Publishing 2016)
23. Astrobotic, 'Astrobotic Reveals New Lunar Regolith Lab for Rover Testing' (2021) <https://www.astrobotic.com/astrobotic-reveals-new-lunar-regolith-lab-for-rover-testing/> accessed
24. B S Bhat, 'Application of environmental law principles for the protection of the outer space environment: a feasibility study' (2014) 39 *Annals of air and space law*
25. B Weeden, C., & Chow, T. (2012). Taking a common-pool resources approach to space sustainability: A framework and potential policies. *Space Policy*, 28(3)
26. Baiocchi D, and Welser W, *Confronting Space Debris: Strategies and Warnings from Comparable Examples Including Deepwater Horizon* (RAND Corporation 2010)
27. Baiocchi D, and Welser W, 'The Democratization of Space: New Actors Need New Rules' (2015) 94 *Foreign Affairs* 98
28. Baiocchi D, and Welser WIV, *Confronting Space Debris: Strategies and Warnings from Comparable Examples Including Deepwater Horizon* (RAND Corporation 2010)
29. Bair J, and Palpacuer F, 'CSR beyond the corporation: contested governance in global value chains' (2015) 15 *Global networks* (Oxford) S1
30. Barnidge R, 'The due diligence principle under international law' (2006) 8 *International Community Law Review* 81
31. Barr S, *A CONSISTENT POLAR NATION? ANALYSIS OF AN IMAGE SEEN THROUGH THE HISTORY OF THE NORWEGIAN POLARINSTITI* (Cambridge University Press 3 2003)
32. Bartolini G, *Yearbook of International Disaster Law; Volume 2*, vol 2021 (Ringgold, Inc 2021)
33. Bartosz Ziemblicki and Yevgeniya Oralova, "Private Entities in Outer Space Activities: Liability Regime Reconsidered" (2021) 56 *Space Policy*
34. Basu A, and Kurlekar A, 'Highway to the Danger Zone: United States Legislative Framework Regulating the Commercial Space Sector' (2016) 14 *Astropolitics* 44
35. BDBpedia, 'Global and Unified' <https://www.dbpedia.org/>
36. Bellamy A.J. and Dunne T, *The Oxford Handbook of the Responsibility to Protect* (OUP Oxford 2016)



37. Benvenisti E, 'Upholding democracy amid the challenges of new technology: What role for the law of global governance?' (2018) 29 *European journal of international law* 671
38. Bhat S, 'Application of environmental law principles for the protection of the outer space environment: a feasibility study' (2014) 39 *Annals of air and space law* 323
39. Bhat S, *International Environmental Law* (APH Publishing Corporation 2007)
40. Björgvinsson E, Ehn P and Hillgren P-A, *Participatory design and "democratizing innovation"* (ACM 2010)
41. Blog FTN, 'SpaceX's Starlink satellites will soon get glare-reducing 'sunshades,' Elon Musk says – Space.com | Futurist Transhuman News Blog' (2020) <https://www.evolution.com/futurist-transhuman-news-blog/elon-musk/spacexs-starlink-satellites-will-soon-get-glare-reducing-sunshades-elon-musk-says-space-com-2.php> accessed
42. Blokker N, 'International Organizations and Customary International Law: Is the International Law Commission Taking International Organizations Seriously?' (2017) 14 *International Organizations Law Review* 1
43. Blumenauer CE, 'Legislation from Senior Ways and Means Democrat would tax space travel for non-scientific research purposes' (2021) <https://blumenauer.house.gov/media-center/press-releases/blumenauer-announces-new-space-tax-proposal> accessed
44. Boccardo G, 'Planetary Protection Obligations of States Pursuant to the Space Treaties and with Special Emphasis on National Legislations Provisions' (2019)
45. Boeing, 'Boeing: Performing under pressure' (2022) <https://www.boeing.com/features/2022/02/performing-under-pressure.page> accessed
46. Borda AZ, 'A formal approach to article 38(1)(d) of the ICJ statute from the perspective of the international criminal courts and tribunals' (2013) 24 *European journal of international law* 649
47. Borgen C, 'Resolving treaty conflicts' (2005) 37 *The George Washington international law review* 573
48. Bowler TR, 'A New Space Race' in James T (ed), *Deep Space Commodities: Exploration, Production and Trading* (Springer International Publishing 2018)
49. Brinkerhoff DW, 'Accountability and good governance: concepts and issues' (2017) *International development governance* 269
50. Brittingham BC, 'Does the world really need new space law?' (2010) 12 *Oregon review of international law* 31
51. Brown K, 'Global environmental change II: Planetary boundaries – A safe operating space for human geographers?' (2017) 41 *Progress in human geography* 118
52. Brownlie I, *The Rights of Peoples in Modern International Law. The Rights of Peoples. Ed. by J. Crawford* (Oxford: Clarendon Press 1988)
53. Bryce Space, 'Technology, "2017 State of the Satellite Industry Report,"' (2017) accessed
54. Buntaine MT, 'Accountability in Global Governance: Civil Society Claims for Environmental Performance at the World Bank' (2015) 59 *International studies quarterly* 99

55. Burnay M, and Chaisse J, 'Global Commons as an Emerging Arena of Contestation of Global Governance Structures and Norms' (2020) 22 International community law review 533
56. Bush L, 'International space station commercialization policy' (2002) 24 Technology in society 69
57. Butina AJ, 'Managing NASA's International Space Station Logistics and Maintenance program' (2001) 552 AIP Conference Proceedings 161
58. Butler J, 'Unearthly microbes and the laws designed to resist them' (2007) 41 Georgia law review (Athens, Ga : 1966) 1355
59. C Doldirina,. (2018). Regulating'the province of mankind'[Space Legislation]. Engineering & Technology, 13(1)
60. C Mouat, M., Techera, E. J. E., Notebaert, L., Blake, M., & Barker, R. (2021). (Un) earthly governance: beyond functional frameworks to flourishing spacescapes. Journal of Property, Planning and Environmental Law.
61. C Newman, The new space ethics: COSPAR, Planetary Protection and beyond - Room: The Space Journal (2015)
62. Calboli I and Marie-Vivien D, 'One Size Does Not Fit All: The Roles of the State and the Private Sector in the Governing Framework of Geographical Indications', (Cambridge University Press 2018)
63. Calboli I, and Marie-Vivien D, 'One size does not fit all: The roles of the state and the private sector in the governing framework of geographical indications' (2018)
64. Cara P. Cavanaugh and others, An International Perspective on Planetary Protection Policies (Presentation), 2020)
65. Carns MG, 'CONSENT NOT REQUIRED: MAKING THE CASE THAT CONSENT IS NOT REQUIRED UNDER CUSTOMARY INTERNATIONAL LAW FOR REMOVAL OF OUTER SPACE DEBRIS SMALLER THAN 10CM<sup>sup 2</sup>' (2017) 77 The Air Force Law Review 173
66. Chad Anderson, "Rethinking public-private space travel" (2013) 29 Space Policy
67. Chaddha S, 'AN INQUIRY FOR AN INSTITUTIONAL ARRANGEMENT TO GOVERN THE SPACE COMMONS' (2013)
68. Chaddha S, 'Elinor Ostrom Goes to Outer Space - An Association of Space Appropriators' (2013)
69. Charney JI, 'Universal International Law' (1993) 87 American Journal of International Law 529
70. Cheney T, Christopher and others, 'Planetary Protection in the New Space Era: Science and Governance' (2020) 7 Frontiers in astronomy and space sciences
71. Chiu SW, 'Promoting international co-operation in the age of global space governance – A study on on-orbit servicing operations' (2019) 161 Acta astronautica 375
72. Christensen I, and others, 'NEW POLICIES NEEDED TO ADVANCE SPACE MINING' (2019) 35 Issues in science and technology 26
73. Christina Isnardi, "Problems with Enforcing International Space Law on Private Actors" (2020) 58 Colum J Transnat'l L

74. Cinelli CP, Katarzyna, 'The Current International Legal Setting for the Protection of the Outer Space Environment: The Precautionary Principal Avant La Lettre' (2013) 22 Review of European, Comparative & International Environmental Law 186
75. Clare M. Mouat and others, '(Un)earthly governance: beyond functional frameworks to flourishing spacescapes', *Journal of property, planning and environmental law*, vol 13 (Emerald Publishing Limited 2021)
76. Clark KB, 'Smart Device-Driven Corticolimbic Plasticity in Cognitive-Emotional Restructuring of Space-Related Neuropsychiatric Disease and Injury' (2022) 12 Life (Basel, Switzerland) 236
77. Clarke A, and others, 'A Low Temperature Limit for Life on Earth' (2013) 8 PloS one e66207
78. Clelia Iacomino, "The Evolving Role of Private Actors in Space Exploration" [2019] Commercial Space Exploration xxvii
79. Clelia Iacomino, Commercial Space Exploration: Potential Contributions of Private Actors to Space Exploration Programmes (Springer International Publishing 2019)
80. Clewley PT, 'NEWSPACE: THE RISE OF THE PRIVATE SPACE INDUSTRY IS THREATENING THE CURRENT LEGAL FRAMEWORK GOVERNING OUTER SPACE' (2021) 21 Journal of high technology law 354
81. Cockell CS, 'The Ethical Status of Microbial Life on Earth and Elsewhere: In Defence of Intrinsic Value', (Space and Society, Springer International Publishing 2016)
82. Commercial Space Launch Act (Government of the United States 1984)
83. *Committee on Space Research (COSPAR) (2021)*
84. Committee on Space Research (COSPAR) Committee on Space Research (COSPAR) » About (cnes.fr) accessed 20/04/23, Committee on Space Research (COSPAR) Committee on Space Research (COSPAR) » Panel on Planetary Protection (PPP) (cnes.fr) accessed 20/04/23
85. Committee on Space Research (COSPAR) Committee on Space Research (COSPAR) » About (cnes.fr) accessed 20/04/23
86. Committee on Space Research (COSPAR) Committee on Space Research (COSPAR) » Panel on Planetary Protection (PPP) (cnes.fr) accessed 20/04/23
87. Committee on Space Research (COSPAR), Committee on Space Research (COSPAR) » Panel on Planetary Protection (PPP) (cnes.fr) accessed 20/04/23
88. Conley CA, 'Planetary Protection for Mars Sample Return' (2013)
89. Cooper AF, and Pouliot V, 'How much is global governance changing? The G20 as international practice' (2015) 50 Cooperation and conflict 334
90. COSPAR, COSPAR's Planetary Protection Policy, 2017ebook
91. COSPAR, COSPAR's Planetary Protection Policy, 2017ebook
92. Cottin H, and others, 'Astrobiology and the Possibility of Life on Earth and Elsewhere...' (2017) 209 Space Science Reviews 1
93. Council NR and others, *Preventing the Forward Contamination of Mars* (National Academies Press 2006)
94. Coustenis A, and others, *The COSPAR Panel on Planetary Protection Role, Structure and Activities* (Elsevier Ltd 2019)

95. CR Webster and others, 'Mars methane detection and variability at Gale crater' (2015) 347 *Science*
96. Craven M, 'Other spaces': Constructing the legal architecture of a cold war commons and the scientific-technical imaginary of outer space' (2019) 30 *European journal of international law* 547
97. Crawford J, and Brownlie I, *Brownlie's Principles of Public International Law* (Oxford University Press 2019)
98. Crawford J, *State Responsibility: The General Part* (Cambridge University Press 2013)
99. Criddle E, 'The Vienna Convention on the Law of Treaties in U.S. treaty interpretation' (2004) 44 *Virginia journal of international law* 431
100. Crootof R, 'Change without consent: how customary international law modifies treaties' (2016) 41 *The Yale journal of international law* 237
101. Cross MaKD, 'Outer space and the idea of the global commons' (2021) 35 *International relations* (London) 384
102. CS Cockell, 'The Ethical Status of Microbial Life on Earth and Elsewhere: In Defence of Intrinsic Value', (*Space and Society*, Springer International Publishing 2016)
103. Cumbers A, 'Constructing a global commons in, against and beyond the state' (2015) 19 *Space & polity* 62
104. Cypser DA, 'INTERNATIONAL LAW AND POLICY OF EXTRATERRESTRIAL PLANETARY PROTECTION' (1993) 33 *Jurimetrics* 315
105. D Garcia, 'Global commons law: norms to safeguard the planet and humanity's heritage' (2021) 35 *International relations* (London)
106. D Hassan and Soinenen N, 'United Nations Convention on the Law of the Sea as a framework for marine spatial planning', *Transboundary Marine Spatial Planning and International Law* (Routledge 2015)
107. D. Baitukayeva, Achilleas P and Baitukayeva A, 'International cooperation of states in outer space exploration' (2020) 90 *KazNU BULLETIN International relations and international law series* 45
108. Dal EP, 'Status competition and rising powers in global governance: an introduction', *Contemporary politics*, vol 25 (Routledge 2019)
109. Daniel L. Oltrogge and Christensen IA, 'Space governance in the new space era' (2020) 7 *Journal of space safety engineering* 432
110. Daniel PM, 'Commercial space operations within an existing national legal framework: some lessons learned and the challenges ahead', (*Leuven Global Governance series*, Edward Elgar Publishing 2017)
111. David L, 'Space Junk Removal Is Not Going Smoothly' (2021) <https://www.scientificamerican.com/article/space-junk-removal-is-not-going-smoothly/> accessed
112. de Waart PJ, H. Mosler, *The International Society as a Legal Community*, *Alphen aan den Rijn, Sijthoff & Noordhoff*, 1980, pp. Dfl. 55, vol 28 (*Netherlands international law review*, 1981)

113. Dean M, and Larsson OL, 'Sovereignty and sovereign powers in global governmentality', *The Globality of Governmentality* (Routledge 2021)
114. Debus A, 'Estimation and assessment of Mars contamination' (2005) 35 *Advances in space research* 1648
115. Dellmuth LM, and Tallberg J, 'Advocacy Strategies in Global Governance: Inside versus Outside Lobbying' (2017) 65 *Political studies* 705
116. Deloffre MZ, *Global accountability communities: NGO self-regulation in the humanitarian sector*, vol 42 (Review of international studies, Cambridge University Press 2016)
117. Dembling P, and Arons D, *The Evolution of the Outer Space Treaty* (1967)
118. Dempsey PS, 'National laws governing commercial space activities: Legislation, regulation, & enforcement' (2016) 36 *Northwestern journal of international law & business* 1
119. Denis G, and others, 'From new space to big space: How commercial space dream is becoming a reality' (2020) 166 *Acta Astronautica* 431
120. Dennerley JA, 'Emerging space nations and the development of international regulatory regimes' (2016) 35 *Space policy* 27
121. Department for Business, Government announces plans for largest ever R&D budget, 2022) <https://www.gov.uk/government/news/government-announces-plans-for-largest-ever-rd-budget>
122. Deplano R, 'THE ARTEMIS ACCORDS: EVOLUTION OR REVOLUTION IN INTERNATIONAL SPACE LAW?' (2021) 70 *The International and comparative law quarterly* 799
123. Di Pippo S, and Journal of International A, "“SPACE PROVIDES THE REQUIRED MAGNITUDE OF PERSPECTIVE. IT UNITES US TOWARDS COMMON GOALS”" (2018) 71 *Journal of International Affairs* 116
124. Dirk Meissner, "Public-Private Partnership Models for Science, Technology, and Innovation Cooperation" (2015) 10 *Journal of the Knowledge Economy*
125. Djeflal C, 'Commentaries on the law of treaties: A review essay reflecting on the genre of commentaries' (2013) 24 *European journal of international law* 1223
126. Dodge M, 'The US commercial space launch competitiveness act of 2015: Moving US space activities forward' (2016) 29 *Air & Space Law* 4
127. Doldirina C, 'Regulating the province of mankind'[Space Legislation]' (2018) 13 *Engineering & Technology* 62
128. Dunbar B, 'Commercial Lunar Payload Services Overview' (2019)
129. Dunk FGVd, 'From Space Tourists to Unruly Passengers? The US Struggle with "On-Orbit Jurisdiction"' (2014)
130. Dunk FGVd, 'The integrated approach—Regulating private human spaceflight as space activity, aircraft operation, and high-risk adventure tourism' (2013) 92 *Acta astronautica* 199
131. Dunk FGVd, 'Too-Close Encounters of the Third Party Kind: Will the Liability Convention Stand the Test of the Cosmos 2251-Iridium 33 Collision?' (2010)

132. DURKEE\* MJ, 'INTERSTITIAL SPACE LAW' (2019) [VOL. 97:423 424 WASHINGTON UNIVERSITY LAW REVIEW]
133. Dutra F, and Carvalho A, *Astrobiological Group of Social Issues for the Planetary Science and Astrobiology Decadal Survey 2023-2032* (2021)
134. DW Brinkerhoff, 'Accountability and good governance: concepts and issues' (2017) International development governance
135. E Erman, 'A Function-Sensitive Approach to the Political Legitimacy of Global Governance' (2020) 50 British journal of political science
136. E Kassoti, 'The Constitutionalization of International Law and the Challenge of Non-State Actors' 11 Vienna online journal on international constitutional law: ICL-Journal (2017)
137. E Persson, 'Ethics and the Potential Conflicts between Astrobiology, Planetary Protection, and Commercial Use of Space' 8 Challenges (Basel) 12(2017)
138. E Tepper, (2019). Polycentric Governance in Global Affairs: The Case of Space Governance. Available at SSRN 3400217
139. E Tepper, (2020). The Big Bang of space governance: towards decentralized regulation of space activities.
140. Eberlein B, 'Who Fills the Global Governance Gap? Rethinking the Roles of Business and Government in Global Governance' (2019) 40 Organization studies 1125
141. Elaine F, 'CETA and Global Governance Law: What Kind of Model Agreement Is It Really in Law?' (2017) 2 European Papers 293
142. EraOfLight, 'Bigelow Aerospace Founder Says ET's Are Present On Earth Now' (2017) <https://eraoflight.com/2017/06/05/bigelow-aerospace-founder-says-ets-are-present-on-earth-now/> accessed
143. Erman E, 'A Function-Sensitive Approach to the Political Legitimacy of Global Governance' (2020) 50 British journal of political science 1001
144. European Commission, "Space Strategy for Europe", 2016
145. European Space Agency, "Planetary protection" 2020
146. European Space Agency, Planetary protection, 2020) <https://www.euspa.europa.eu/newsroom/news/new-space-strategy-europe-launched-european-space-expo>
147. Eytan T, 'THE BIG BANG OF SPACE GOVERNANCE: TOWARDS POLYCENTRIC GOVERNANCE OF SPACE ACTIVITIES' (2022) 54 New York University journal of international law & politics 485
148. F Dutra and Carvalho A, *Astrobiological Group of Social Issues for the Planetary Science and Astrobiology Decadal Survey 2023-2032* (2021)
149. Fairén G, and others, 'Planetary Protection and the astrobiological exploration of Mars: Proactive steps in moving forward' (2019) 63 Advances in Space Research 1491
150. Falk R, *Religion and humane global governance* (Springer 2016)
151. Filho MF, and Tonél R, *SPACE LAW, STATE AND SOCIETY: AN EXPLORATORY APPROACH* (2021)

152. Fioretos O, and Tallberg J, 'Politics and theory of global governance' (2021) 13 International Theory 99
153. Fitzmaurice J and Stacey H, 'On the legality of mars colonisation' (2019) 40 Adelaide law review 841
154. Fox H, *Customary International Law and Treaties*. By Mark E. Villiger. [Dordrecht: Martinus Nijhoff Publishers. 1985. xxxiii + 432 pp. DFL.225/\$74/£62.50], vol 35 (The International and comparative law quarterly, 1986)
155. Frans G, 'The integrated approach—Regulating private human spaceflight as space activity, aircraft operation, and high-risk adventure tourism' (2013) 92 Acta Astronautica 199
156. Frans G. von der Dunk, "Too-Close Encounters of the Third-Party Kind: Will the Liability Convention Stand the Test of the Cosmos 2251-Iridium 33 Collision?" [2010] Space, Cyber, and Telecommunications Law Program Faculty Publications
157. Freeland S, 'Overview of Current International Space Law in the Context of Planetary Defence', *Legal Aspects of Planetary Defence* (Brill Nijhoff 2021)
158. Freeland S, *The role of soft law in public international law and its relevance to the International Legal Regulation of Outer Space* (2012)
159. Frick A, and others, 'Overview of current capabilities and research and technology developments for planetary protection' (2014) 54 Advances in space research 221
160. Froehlich A, Seffinga V and Qiu R, 'Initial Mandates of the Committee on the Peaceful Uses of Outer Space (COPUOS) and the Conference on Disarmament (CD)', (Studies in Space Policy, Springer International Publishing 2019)
161. G. P Herd, & Kriendler, J. (Eds.). (2013). Understanding NATO in the 21st century: Alliance strategies, security and global governance. Routledge.
162. Gallagher NW, 'Space Governance and International Cooperation' (2010) 8 Astropolitics 256
163. Galli A, and Losch A, 'Beyond planetary protection: What is planetary sustainability and what are its implications for space research?' (2019) 23 Life sciences in space research 3
164. Garcia D, 'Global commons law: norms to safeguard the planet and humanity's heritage' (2021) 35 International relations (London) 422
165. Gebhardt C, 'U.K. government acquires OneWeb in curious move' (2020)
166. Genta G, 'Private space exploration: A new way for starting a spacefaring society?' (2014) 104 Acta astronautica 480
167. Georgiev DD, 'A Review of Space Tourism Services: Supply and Demand Challenges' (2020) 2
168. Giancarlo Genta, "Private space exploration: A new way for starting a spacefaring society?" (2014) 104 Acta Astronautica
169. Gil Denis and others, "From new space to big space: How commercial space dream is becoming a reality" (2020) 166 Acta Astronautica

170. Girth AM, 'What Drives the Partnership Decision? Examining Structural Factors Influencing Public-Private Partnerships for Municipal Wireless Broadband' (2014) 17 *International public management journal* 344
171. Goguichvili S, 'The Global Legal Landscape of Space: Who Writes the Rules on the Final Frontier? | Wilson Center' (2021)
172. Gorove S, 'The Outer Space Treaty' (1967) 23 *Bulletin of the atomic scientists* 44
173. Grush L, 'How an international treaty signed 50 years ago became the backbone for space law' (2017)
174. Gugunskiy D, Chernykh I and Khairutdinov A, *Legal Models for Activities on the Exploration and Utilization of Space Resources: Towards the "Space-2030" Agenda* (Springer International Publishing 2020)
175. Gundersen K, 'BEYOND THE TARDIGRADES AFFAIR: PLANETARY PROTECTION, COSPAR, AND THE FUTURE OF PRIVATE SPACE REGULATION' (2021) 53 *New York University journal of international law & politics* 871
176. Gupta V, 'Critique of the International Law on Protection of the Outer Space Environment' (2016) 14 *Astropolitics* 20
177. Guzman AT, and Meyer TL, 'International Soft Law' (2010) 2 *The journal of legal analysis* 171
178. H Cottin and others, 'Astrobiology and the Possibility of Life on Earth and Elsewhere...' 209 *Space Science Reviews* 1 (2017)
179. H Wang, 'New Multilateral Development Banks: Opportunities and Challenges for Global Governance' (2017) 8 *Global policy*
180. Habermas J, 'Plea for a constitutionalization of international law' (2014) 40 *Philosophy & Social Criticism* 5
181. Halunko V, 'Space Law: the Present and the Future' (2019) 3 *Advanced Space Law* 30
182. Hansen-Magnusson H, Vetterlein A and Wiener A, 'The problem of non-compliance: knowledge gaps and moments of contestation in global governance' (2018) 23 *Journal of international relations and development* 636
183. Harper R, 'Planetary protection: A new launch pad for the regulation of the commercial space industry' (2019) 50 *Cal W Int'l LJ* 207
184. Harper R, 'Planetary protection: A new launch pad for the regulation of the commercial space industry' (2020) 50 *California Western international law journal* 207
185. Hassan D, and Soininen N, 'United Nations Convention on the Law of the Sea as a framework for marine spatial planning', *Transboundary Marine Spatial Planning and International Law* (Routledge 2015)
186. Hazard J, 'The International Court of Justice and Some Contemporary Problems: Essays on International Law. Taslim O. Elias. The Hague/Boston/ London: Martinus Nijhoff Publishers, 1983. Pp. ix, 374 (Legal Aspects of International Organization)' (1983) 11 *International Journal of Legal Information* 304



187. Hedman N, '60 years of COSPAR and COPUOS Partnership in Space Science and Exploration' (2020) 208 *Space research today* 29
188. Henderson IL, and Tsui WHK, 'The Role of Niche Aviation Operations as Tourist Attractions' (2019) *Air Transport: A Tourism Perspective*
189. History International Court of Justice' (2018) <https://www.icj-cij.org/en/history> accessed
190. Hobe S, *Space Law* (Nomos Verlagsgesellschaft 2019)
191. Hofmann M, and Blount PJ, *Innovation in Outer Space: International and African Legal Perspective: 5th & 6th Luxembourg Workshops on Space and Satellite Communication Law* (Nomos Verlag 2018)
192. Huynh M, 'Astrobiology Science Strategy for the Search for Life in the Universe ' (2017)
193. Iacomino C, *Commercial Space Exploration: Potential Contributions of Private Actors to Space Exploration Programmes* (SpringerBriefs in Applied Sciences and Technology, Springer International Publishing AG 2019)
194. Iacomino C, 'The Evolving Role of Private Actors in Space Exploration', (SpringerBriefs in Applied Sciences and Technology, Springer International Publishing 2019)
195. Iacomino C, 'Towards More Ambitious Commercial Contributions to Space Exploration', (SpringerBriefs in Applied Sciences and Technology, Springer International Publishing 2019)
196. International Court of Justice, History | International Court of Justice (2018) <https://www.icj-cij.org/en/history>
197. Irene Calboli and Delphine Marie-Vivien, "One Size Does Not Fit All: The Roles of the State and the Private Sector in the Governing Framework of Geographical Indications\*" [2018] *The Cambridge Handbook of Public-Private Partnerships, Intellectual Property Governance, and Sustainable Development*
198. Ishola FR, Fadipe O and Taiwo OC, 'Legal Enforceability of International Space Laws: An Appraisal of 1967 Outer Space Treaty' (2021) 9 *New Space* 33
199. Isnardi C, 'Problems with Enforcing International Space Law on Private Actors' (2019) 58 *Colum J Transnat'l L* 489
200. Isnardi C, 'Problems with Enforcing International Space Law on Private Actors' (2020) 58 *The Columbia journal of transnational law* 489
201. J Odermatt, *THE DEVELOPMENT OF CUSTOMARY INTERNATIONAL LAW BY INTERNATIONAL ORGANIZATIONS*, vol 66 (The International and comparative law quarterly, Cambridge University Press 2017)
202. Jack B. Chaben, "Extending Humanity's Reach: A Public-Private Framework for Space Exploration" (2020) 13 *J. Strateg. Secur*
203. Jack BC, 'Extending Humanity's Reach: A Public-Private Framework for Space Exploration' (2020) 13 *Journal of strategic security* 75
204. Jaehnichen T, 'The dynamics of economic action and the problems of its social embedding – Ethical challenges in view of the nascent commercial use of outer space' (2020) 76 *Hervormde theologiese studies* 1

205. James J. Butler, "Unearthly Microbes and the Laws Designed to Resist Them" [2006] Ga. L. Rev. 1357
206. Janez M, and Iztok B, 'Safety and Security in Space Tourism' (2016) 9 *Academica Turistica*
207. Jang J, McSparren J and Rashchupkina Y, 'Global governance: present and future' (2016) 2 *Palgrave communications*
208. Javier Solana and Saz-Carranza A, 'Treating Global Governance Seriously' (2015) 75 *Public Administration Review*
209. JAXA, '3-2-2-1 Settlement of Claim between Canada and the Union of Soviet Socialist Republics for Damage Caused by "Cosmos 954" (Released on April 2, 1981)' (1987) [https://www.jaxa.jp/library/space\\_law/chapter\\_3/3-2-2-1\\_e.html](https://www.jaxa.jp/library/space_law/chapter_3/3-2-2-1_e.html) accessed
210. JAXA, 'Contributing to the International Planetary Protection Policy for Martian Moon Exploration' (2022)
211. JD Rummel and Conley CA, 'Inadvertently Finding Earth Contamination on Mars Should Not Be a Priority for Anyone' (2018) 18 *Astrobiology*
212. JD Rummel and others, 'A New Analysis of Mars "Special Regions": Findings of the Second MEPAG Special Regions Science Analysis Group (SR-SAG2)' (2014) 14 *Astrobiology*
213. JD Rummel, Race MS and Horneck G, 'Ethical considerations for planetary protection in space exploration: a workshop' (2012) 12 *Astrobiology*
214. Jean-François M, 'The role of UNCOPUOS in the international regulation of non-governmental space activities', (Leuven Global Governance series, Edward Elgar Publishing 2017)
215. JL Kunz, 'The Nature of Customary International Law' (1953) 47 *The American journal of international law*
216. Johnson-Freese J, 'Build on the outer space treaty' (2017) 550 *Nature (London)* 182
217. JSJ Schwartz, *Where no planetary protection policy has gone before*, vol 18 (*International journal of astrobiology*, Cambridge University Press 2019)
218. Kammerhofer J, and de Hoogh A, 'All Things to All People? The International Court of Justice and its Commentators' (2007) 18 *European Journal of International Law* 971
219. Kassoti E, 'The Constitutionalization of International Law and the Challenge of Non-State Actors' (2017) 11 *Vienna online journal on international constitutional law: ICL-Journal* 177
220. Kathryn Gundersen, "Beyond the Tardigrades Affair: Planetary Protection, COSPAR, and the Future of Private Space Regulation" (2021) 53 *NYU J Int'l L & Pol*
221. Katrin N-M, 'National and international regulatory aspects of commercial space activities: self-regulation as the way forward?', (Leuven Global Governance series, Edward Elgar Publishing 2017)
222. Kehrer T, 'Closing the Liability Loophole: The Liability Convention and the Future of Conflict in Space' (2019) 20 *Chicago journal of international law* 178

223. Keren Shahar and Dov Greenbaum, "Lessons in space regulations from the lunar tardigrades of the Beresheet hard landing" (2020) 4 *Nature Astronomy*
224. Khaniejo N, 'Outer Space Treaty: 50 years later' (2017)
225. Kirchberger T, and Stadlmeier S, 'Irmgard Marboe (ed.), *Soft Law in Outer Space: The Function of Non-binding Norms in International Space Law* (Thomas Kirchberger and Sigmar Stadlmeier)' (2015) 2015 *Austrian review of international and European law* 489
226. Kish J, and Turns D, *International Law and Espionage* (Springer Netherlands 1995)
227. Kminek G, and others, *Report of the COSPAR Workshop on Refining Planetary Protection requirements for human missions* (2018)
228. Kminek G, and Rummel JD, 'COSPAR's planetary protection policy' (2015) 193 *Space Research Today* 7
229. Kminek G, BC, CA Conley, MA Jones, M Patel, MS Race, MA Rucker, O Santolik, B Siegel & JA Spry, *Report of the COSPAR Workshop on Refining Planetary Protection Requirements for Human Missions* (2008)
230. Kminek G, COSPAR SSAP Working Group Report (43rd COSPAR Scientific Assembly Held 28 January-4 February, 2021)
231. Kminek G., M. A. Meyer, D. W. Beaty, B. L. Carrier, T. Haltigin and L. E. Hays **Mars Sample Return (MSR): Planning for Returned Sample Science** *Astrobiology* 2021 Vol. 22 Issue S1 Pages S-1-S-4 DOI: 10.1089/ast.2021.0198 <https://doi.org/10.1089/ast.2021.0198>
232. Kobzar O, and Danylenko A, 'International and National Provisions of Space Law Regulating the Use of Outer Space' (2019) 3 *Advanced space law* (Online) 48
233. Koenig-Archibugi M, 'Chapter 19: Global Governance
234. Koh HH, and others, 'Why Do Nations Obey International Law?' (1997) 106 *2599*
235. Kopal V, 'TREATY ON PRINCIPLES GOVERNING THE ACTIVITIES OF STATES IN THE EXPLORATION AND USE OF OUTER SPACE, INCLUDING THE MOON AND OTHER CELESTIAL BODIES' (2008) United Nations Audiovisual Library of International Law
236. Koscieljew M, 'Public libraries and the UN 2030 Agenda for Sustainable Development' (2020) 46 *IFLA journal* 328
237. Koskenniemi M, 'Fragmentation of international law: difficulties arising from the diversification and expansion of international law: Report of the study group of the international law commission' (2014)
238. Kunz JL, 'The Nature of Customary International Law' (1953) 47 *The American journal of international law* 662
239. KW Plaxco and Gross M, *Astrobiology: An Introduction* (Johns Hopkins University Press 2021)
240. Kyriakopoulos GD, and Manoli M, *The Space Treaties at Crossroads: Considerations de Lege Ferenda* (Springer International Publishing 2019)

241. L Lebedev and A Romanov, *Rendezvous in Space: Soyuz-Apollo* (Central Books 1979)
242. Lafleur C, 'Costs of US piloted programs' (2010) accessed
243. Lafont C, 'Accountability and global governance: challenging the state-centric conception of human rights' (2010) 3 *Ethics & global politics* 193
244. Lambright W H, 'Administrative Leadership and Long-Term Technology: NASA and the International Space Station' (2019) 47 *Space policy* 85
245. Larsen PB, 'Outer Space: How Shall the World's Governments Establish Order among Competing Interests' (2019) 29 *Wash Int'l LJ* 1
246. Lehmann M, 'Regulation, global governance and private international law: squaring the triangle' (2020) 16 *Journal of private international law* 1
247. Lerner DJ, and Gorog JM, Jr., 'How "Rad" Is a Trip to Space? A Brief Discussion of Radiation Exposure in Suborbital Space Tourism' (2021) 18 *J Am Coll Radiol* 225
248. Leshinsky R, 'Situating real estate law for the new outer-space economy' (2021) 13 *Journal of property, planning and environmental law* 152
249. Li S, 'The role of international law in Chinese space law and its relevance to Pacific Rim space law and activities' (2009) 35 *Journal of space law* 539
250. Libman A, and Obydenkova AV, 'Global governance and Eurasian international organisations: lessons learned and future agenda' (2021) 33 *Post-communist economies* 359
251. Lihua Yang, Zhuan Du and Cheng C, 'Building a compound and collaborative governance framework to improve international space sustainability' (2021) *Global Public Policy and Governance*
252. Lits M, 'International Space Law' (2017) 4 *BRICS Law Journal* 135
253. LITS M, SERGEI STEPANOV,, 'INTERNATIONAL SPACE LAW' (2017) Volume IV (2017) *BRICS LAW JOURNAL*
254. Lits M, Stepanov S and Tikhomirova A, 'International Space Law' (2017) 4 *BRICS law journal* 135
255. Loff S, 'SpaceX' (2011) <https://blogs.nasa.gov/spacex/author/sloff/> accessed
256. Losch A, 'The need of an ethics of planetary sustainability' (2019) 18 *International journal of astrobiology* 259
257. M Burnay,, & Chaisse, J. (2020). Global Commons as an Emerging Arena of Contestation of Global Governance Structures and Norms. *International Community Law Review*, 22(5)
258. M Hofmann and Blount PJ, *Innovation in Outer Space: International and African Legal Perspective: 5th & 6th Luxembourg Workshops on Space and Satellite Communication Law* (Nomos Verlag 2018)
259. M Huynh, 'Astrobiology Science Strategy for the Search for Life in the Universe ' (2017)
260. M Lehmann, 'Regulation, global governance and private international law: squaring the triangle' (2020) 16 *Journal of private international law*
261. M Race and others, 'Astrobiology and Society: Building an Interdisciplinary Research Community' (2012) 12 *Astrobiology* 958

262. M Rhimbassen, L., & Rapp, L. (2021). New space property age: at the crossroads of space commons, commodities and competition. *Journal of Property, Planning and Environmental Law*.
263. M Senjuti and Rajeswari Pillai R, If space is 'the province of mankind', who owns its resources?, (2019)
264. M Wall,. (2019). The biggest spacecraft ever to fall uncontrolled from space. Available: <https://www.space.com/13049-6-biggest-spacecraft-falls-space.html>
265. M Wall. (2020). SpaceX's Starlink Satellites Will Soon Get Glare-Reducing "Sunshades," Elon Musk Says, Space.Com. <https://www.space.com/spacexstarlink-satellites-sunshades.html>.
266. Madi M, and Sokolova O, *Space Debris Peril: Pathways to Opportunities* (CRC Press 2020)
267. Man PD, 'State practice, domestic legislation and the interpretation of fundamental principles of international space law' (2017) 42 *Space policy* 92
268. Mann A, 'Crewed launch deepens ties between NASA and SpaceX' (2020) 368 *Science* (American Association for the Advancement of Science) 811
269. Marboe I, *Soft Law in Outer Space: The Function of Non-binding Norms in International Space Law* (V&r Academic 2012)
270. Maria Lucas Rhimbassen and Rapp L, 'New space property age: at the crossroads of space commons, commodities and competition' (2021) 13 *Journal of property, planning and environmental law*
271. Mark J. Sundahl, "Returning to the Moon: Legal Challenges as Humanity Begins to Settle the Solar System" (2021) 9 *Global Bus. L. Rev.* 1
272. Marsh M, 'Ethical and medical dilemmas of space tourism' (2006) 37 *Advances in space research* 1823
273. Martinez LF, 'Legal regime sustainability in outer space: theory and practice' (2019) 2 *Global Sustainability* e26
274. Martinez P, 'The UN COPUOS Guidelines for the Long-term Sustainability of Outer Space Activities' (2021) 8 *Journal of Space Safety Engineering* 98
275. Martins Z, and others, 'Earth as a Tool for Astrobiology : A European Perspective' (2017) 209 *Space science reviews* 43
276. Masson-Zwaan T, 'New States in Space' (2019) 113 *AJIL unbound* 98
277. Matjaž V, 'ON THE PRACTICES OF RISK RE-NORMALISATION: 'KNOWING' THE KNOWN UNKNOWN IN PUBLIC DISCOURSE ON OUTER SPACE EXPLORATION', *Teorija in praksa*, vol 56 (University of Ljubljana, Faculty of Social Sciences 2019)
278. Maurice M, 'The Subjective Element in Customary International Law', *British Yearbook of International Law*, vol 66 (1996)
279. Mazzucato M, and Robinson DK, 'Co-creating and directing Innovation Ecosystems? NASA's changing approach to public-private partnerships in low-earth orbit' (2018) 136 *Technological Forecasting and Social Change* 166
280. Mazzucato M, and Robinson DKR, 'Co-creating and directing Innovation Ecosystems? NASA's changing approach to public-private partnerships in low-earth orbit', *Technological forecasting & social change*, vol 136 (Elsevier 2018)

281. McCorquodale R, 'The Rights of Peoples . Edited by James Crawford. Oxford: Clarendon Press, 1988. 236 (1989) 59 British Yearbook of International Law 245
282. McDonald N, 'THE ROLE OF DUE DILIGENCE IN INTERNATIONAL LAW' (2019) 68 International and Comparative Law Quarterly 1041
283. McKeon N, 'Transforming Global Governance in the Post-2015 Era: Towards an Equitable and Sustainable World', *Globalizations*, vol 14 (Routledge 2017)
284. McSweeney C, 'The Colonization of Mars: What Legal Issues Will Arise out of a Multi-Planetary Existence?' (2018) Journal of High Technology Law
285. ME Villiger, Customary international law and treaties: a study of their interactions and interrelations, with special consideration of the 1969 Vienna Convention on the Law of Treaties, vol 7 (Brill 1985)
286. Meissner D, 'Public-Private Partnership Models for Science, Technology, and Innovation Cooperation', *Journal of the knowledge economy*, vol 10 (Springer US 2015)
287. Meltzer M, *When Biospheres Collide: A History of NASA's Planetary Protection Programs* (United States Government Printing Office 2011)
288. Michael R. Migaud, Greer RA and Bullock JB, 'Developing an Adaptive Space Governance Framework' (2021) 55 Space policy 101400
289. Michie J, *The Handbook of Globalisation, Second Edition* (Edward Elgar Publishing 2011)
290. Michie J, *The Handbook of Globalisation, Third Edition* (Edward Elgar Publishing 2019)
291. Moltz J, *The politics of space security: strategic restraint and the pursuit of national interests* (Stanford University Press 2011)
292. Moon Inc, 'Redefine Possible' (2022) <https://moonexpress.com/> accessed
293. Morin JF, and Richard B, 'Astro-Environmentalism: Towards a Polycentric Governance of Space Debris', *Global policy*, vol 12 (Wiley Subscription Services, Inc 2021)
294. Morss JR, *Good global governance: custom, the cosmopolitan and international law*, vol 3 (International journal of law in context, Cambridge University Press 2007)
295. Mueller T, Christopher Daniel Johnson, Space 2030: Space for the future, space for all (Final Report Southern Hemisphere Space Studies Program 2019, 2019)
296. Müllerson R, 'Sources of International Law. By V. D. Degan. [Dordrecht: Martinus Nijhoff. 1997. 564 pp. ISBN 90-411-0421-6.]', *International and Comparative Law Quarterly*, vol 47 (2008/01/17 edn, Cambridge University Press 1998)
297. Müllerson R, 'The Interplay of Objective and Subjective Elements in Customary Law in International Law: Theory and Practice: Essays in Honour of Eric Suy (K. Wellens (ed.), The Hague' (1998)
298. Muttakin MB, Mihret DG and Khan A, 'Corporate political connection and corporate social responsibility disclosures: A neo-pluralist hypothesis and empirical

- evidence', *ACCOUNTING AUDITING & ACCOUNTABILITY JOURNAL*, vol 31 (Emerald Group Publishing 2018)
299. Myres S. McDougal and W. Michael Reisman, *The prescribing function in world constitutive process: how international law is made*, vol 6 (Yale studies in world public order, Yale University, School of Law 1980)
  300. N Gallagher, (2013). International cooperation and space governance strategy: Nancy Gallagher. In *Space Strategy in the 21st Century* Routledge.
  301. N Rachel, 'Artemis accords: A new path forward for space lawmaking?' (2021) 42 *Adelaide law review* 569
  302. Nancy W. Gallagher and Zhao Y, 'Rules of the" Space Road:" How Soft Law Principles Interact with Customary International Law for the Regulation of Space Activities' (2020) 44 *J Space L* 405
  303. NASA, "List of Active Domestic Space Act Agreements Signed After July 31, 2017 Citing NASA's "Other Transactions Authority" under the Space Act (51 U.S.C. § 20113(e)) (report as of December 31, 2021)" (NASA.GOV 2021)
  304. NASA, *Artemis Accords* (2020)
  305. NASA, List of Active Domestic Space Act Agreements (NASA's "Other Transactions Authority" under the Space Act (51 USC § 20113(e)), 2017)
  306. NASA, NASA Astrobiology Institute, 2017) <https://astrobiology.nasa.gov/nai/articles/2017/11/17/astrobiology-science-strategy-for-the-search-for-life-in-the-universe-call-for-white-papers/>
  307. NASA, Planetary Protection Provisions for Robotic Extraterrestrial Missions, 2011 [https://nodis3.gsfc.nasa.gov/main\\_lib.cfm](https://nodis3.gsfc.nasa.gov/main_lib.cfm)
  308. NASA, Planetary Protection Provisions for Robotic Extraterrestrial Missions, 2021)
  309. NASA, 'The Global Exploration Strategy Framework: Executive Summary' The Global Exploration Strategy: (nasa.gov), accessed 14/02/22
  310. NASA, The Global Exploration Strategy Framework: Executive Summary, 2007)
  311. National Academies of Sciences E and Medicine, *Assessment of the Report of NASA's Planetary Protection Independent Review Board* (2020)
  312. National Academies of Sciences E and Medicine, *The Goals, Rationales, and Definition of Planetary Protection: Interim Report* (2017)
  313. National Academies of Sciences EM and others, *Review and Assessment of Planetary Protection Policy Development Processes* (National Academies Press 2018)
  314. Nations U, PRINCIPLES FOR COOPERATION IN THE CIVIL EXPLORATION AND USE OF THE MOON, MARS, COMETS, AND ASTEROIDS FOR PEACEFUL PURPOSES, 2020)
  315. Newman C, 'The new space ethics: COSPAR, Planetary Protection and beyond - Room: The Space Journal' (2015) [https://room.eu.com/article/The\\_new\\_space\\_ethics\\_COSPAR\\_Planetary\\_Protection\\_and\\_beyond](https://room.eu.com/article/The_new_space_ethics_COSPAR_Planetary_Protection_and_beyond) accessed



316. News B, 'Canada pulls out of Kyoto accord' (2011) <https://www.bbc.com/news/world-us-canada-16151310> accessed
317. Nguyen T, and others, 'Space 2030: Space for the future, space for all' (2019)
318. Nie M, 'The Growth of China's Non-governmental Space Sector in the Context of Government Support for Public-Private Partnerships: An Assessment of Major Legal Challenges' (2022) 59 Space policy 101461
319. NW Gallagher, 'Space Governance and International Cooperation' (2010) 8 Astropolitics
320. O Fioretos and Tallberg J, 'Politics and theory of global governance' (2021) 13 International Theory
321. O Sokolova, & Madi, M. (2020). Space Sector Resilience and Ways to its Governance. In Space Debris Peril: Pathways to Opportunities (pp. 185). CRC Press.
322. Oded Aharonson and others, "The science mission of SpaceIL's Beresheet lander" (2020) 194 Planetary and Space Science
323. Odermatt J, *THE DEVELOPMENT OF CUSTOMARY INTERNATIONAL LAW BY INTERNATIONAL ORGANIZATIONS*, vol 66 (The International and comparative law quarterly, Cambridge University Press 2017)
324. Oellers F, 'Elias, Taslim O.: The International Court of Justice and some Contemporary Problems (Book Review)' (1985) 45 589
325. Oleksandr S and Diana Levchenko, 'Commercialization of Space Activities: Correlation of Private and Public Interest in the Pursuit of Outer Space Exploration' (2019) 4 Advanced space law (Online) 80
326. P Pattberg, *Global governance: Reconstructing a contested social science concept* (2006)
327. Palmroth M, and others, 'Toward Sustainable Use of Space: Economic, Technological, and Legal Perspectives' (2021) 57 Space policy 101428
328. Pankakoski T, and Vihma A, 'Fragmentation in International Law and Global Governance' (2017) 12 Contributions to the history of concepts 22
329. Pattberg P, *Global governance: Reconstructing a contested social science concept* (2006)
330. Paul Stephen Dempsey, "National Laws Governing Commercial Space Activities: Legislation, Regulation, & Enforcement" (2016) 1 Northwest. J. Int. Law Bus
331. Pekkanen SM, 'Governing the New Space Race' (2019) 113 AJIL unbound 92
332. Pelton J, and Jakhu RS, *Global Space Governance: An International Study* (Space and Society, Springer 2017)
333. Pelton SJRaJN, 'Space Safety and Global Space Governance' (2019)
334. Pershing AD, 'Interpreting the Outer Space Treaty's Non-Appropriation Principle: Customary International Law from 1967 to Today' (2019) 44 The Yale journal of international law 149
335. Persson E, 'Ethics and the Potential Conflicts between Astrobiology, Planetary Protection, and Commercial Use of Space' (2017) 8 Challenges (Basel) 12



336. Peters A, 'The refinement of international law: From fragmentation to regime interaction and politicization', *International journal of constitutional law*, vol 15 (Oxford Univ Press 2017)
337. Petrovici G, 'Satellite Constellations and the Sustainable Use of Outer Space: Long-Term Sustainability Guidelines as an Incentive Towards more Responsible Behaviour in Outer Space', (Studies in Space Policy, Springer International Publishing 2021)
338. Philip De Man, "State practice, domestic legislation and the interpretation of fundamental principles of international space law" (2017) 42 *Space Policy*
339. Phillips CR, *The Planetary Quarantine Program: Origins and Achievements, 1956-1973* (2013)
340. Pippo SD, 'To Space2030 and beyond: space as a driver for sustainable development' (2017) 29 <http://www.friendsofeurope.org/publication/space2030-and-beyond-space-driver-sustainable-development>, accessed in October 2018
341. Plaxco K.W, and Gross M, *Astrobiology: An Introduction* (Johns Hopkins University Press 2021)
342. Price J, and Cybulski J, 'Consensus Making in Requirements Negotiation: the communication perspective' (2005) 13 *AJIS Australasian journal of information systems*
343. Public Opinion and Public Policy: Complexities of the Democratic Mandate (2013) <https://migrationobservatory.ox.ac.uk/resources/primers/public-opinion-and-public-policy-complexities-of-the-democratic-mandate/> accessed
344. R Deplano, (2021). The Artemis Accords: Evolution or Revolution in International Space Law?. *International & Comparative Law Quarterly*
345. R Leshinsky, (2021). Situating real estate law for the new outer-space economy. *Journal of Property, Planning and Environmental Law*.
346. Race MS and others, 'Astrobiology and Society: Building an Interdisciplinary Research Community' (2012) 12 *Astrobiology* 958
347. Race MS, and others, 'Astrobiology and society: building an interdisciplinary research community' (2012) 12 10 *Astrobiology* 958
348. Race MS, *Policies for Scientific Exploration and Environmental Protection: Comparison of the Antarctic and Outer Space Treaties* (2011)
349. Rajagopalan RP, 'Space Security in the Asia-Pacific' (2019) *Handbook of Space Security*
350. Ram SJ, Chen K-W and Goswami B, 'Threats to Peaceful Purposes of Outer Space: Politics and Law' (2020) 18 *Astropolitics* 22
351. Ram SJ, *Sixty Years of Development of International Space Law* (2016)
352. Ranganathan S, 'Global Commons' (2016) 27 *European journal of international law* 693
353. Reddy VS, 'The SpaceX Effect' (2018) 6 *New Space* 125
354. Reinsberg B, and Westerwinter O, 'The global governance of international development: Documenting the rise of multi-stakeholder partnerships and identifying

underlying theoretical explanations' (2019) 16 Review of International Organizations 59

355. Reservations to the Convention on Genocide International Law Reports (Cambridge University Press) DOI 10.1017/CBO9781316151457.156 <https://www.cambridge.org/core/article/reservations-to-the-convention-on-genocide/D61D138689E45557ADE51CD21374E7C4>
356. Rettberg P, and others, 'Planetary Protection and Mars Special Regions--A Suggestion for Updating the Definition' (2016) 16 Astrobiology 119
357. Rhimbassen ML, and Rapp L, 'New space property age: at the crossroads of space commons, commodities and competition' (2021) 13 Journal of property, planning and environmental law 88
358. Rinaldi A, 'Research in space: in search of meaning: Life science research aboard the International Space Station has come under scrutiny for its costs and apparent lack of returns' (2016) 17 EMBO reports 1098
359. Robert E. Bitten, Shinn SA and Emmons DL, *Challenges and Potential Solutions to Develop and Fund NASA Flagship Missions* (IEEE 2019)
360. Rosemary Foot and Walter A, 'Global norms and major state behaviour: The cases of China and the United States' (2013) 19 European journal of international relations 329
361. Ross Harper, "Planetary Protection: A New Launch Pad for the Regulation of the Commercial Space Industry" (2019) 50 Cal W Int'l LJ
362. Rummel JD and Billings L, 'Issues in planetary protection: policy, protocol and implementation' (2004) 20 Space policy 49
363. Rummel JD and Conley CA, 'Inadvertently Finding Earth Contamination on Mars Should Not Be a Priority for Anyone' (2018) 18 Astrobiology 18
364. Rummel JD and others, 'A New Analysis of Mars "Special Regions": Findings of the Second MEPAG Special Regions Science Analysis Group (SR-SAG2)' (2014) 14 Astrobiology 887
365. Rummel JD, 'Ethical Considerations for Planetary Protection in Space Exploration: A Workshop (vol 12, pg 1017, 2012)' (2012) 12 Astrobiology 1165
366. Rummel JD, 'Planetary Protection in Planetary Exploration Missions', (University of Arizona Press 2020)
367. Rummel JD, Race MS and Horneck G, 'Ethical considerations for planetary protection in space exploration: a workshop' (2012) 12 Astrobiology 1017
368. Rummel JD, 'Seeking an international consensus in planetary protection: COSPAR's planetary protection panel' (2002) 30 Advances in space research 1573
369. S Bhatt, International Environmental Law (APH Publishing Corporation 2007)
370. S Ram. Jakhu and others, "Threats to Peaceful Purposes of Outer Space: Politics and Law" (2020) 18 Astropolitics
371. S Ranganathan, 'Global Commons' (2016) 27 European journal of international law
372. Saadia M. Pekkanen, "Governing the New Space Race" (2019) 113 AJIL Unbound

373. Sachdeva G, 'Outer Space Treaty: An Appraisal' (2020) FIFTY YEARS OF THE OUTER SPACE TREATY 24
374. Salmeri A, and Villegas MC, *A Social License to Operate for Lunar Resources Activities: Towards a Fair and Sustainable Era of Space Exploration* (International Astronautical Federation 2020)
375. Salmeri A, *Developing and Managing Moon and Mars Settlements in Accordance with International Space Law* (International Astronautical Federation 2020)
376. Salmeri A, *Houston We Have a Law. A Model for National Regulation of Space Resources Activities* (International Astronautical Federation 2019)
377. Sanderson K, 'Budget restrictions bite for Europe's space mission hopefuls' (2015) *Nature* (London)
378. Schafer BC, and Wang Z, 'High-Level Synthesis Design Space Exploration: Past, Present, and Future' (2020) 39 *IEEE transactions on computer-aided design of integrated circuits and systems* 2628
379. Schwartz JSJ, *Where no planetary protection policy has gone before*, vol 18 (International journal of astrobiology, Cambridge University Press 2019)
380. Senjuti M, and Rajeswari Pillai R, 'If space is 'the province of mankind', who owns its resources?', (2019)
381. Shahr K, and Greenbaum D, 'Lessons in space regulations from the lunar tardigrades of the Beresheet hard landing' (2020) 4 *Nature Astronomy* 208
382. Shaw MN, *International Law* (Cambridge University Press 2017)
383. Shih C-y, 'Transcending hegemonic international relations theorization: Nothingness, re-worlding, and balance of relationship', vol 1 (1 edn, Routledge 2018)
384. Simoni S, 'Understanding NATO in the 21st Century. Alliance Strategies, Security and Global Governance. Edited by Graeme P. Herd and John Kriendler. New York: Routledge, 2013' (2013) 6 124
385. Sinclair MR, 'To Fight to Save..in Space: A Legal Argument that a Space 'Coast Guard' Is Increasingly Necessary for Effective Twenty-First Century Space Governance' (2018) *Air and Space Law*
386. Solana J, and Saz-Carranza A, 'Treating Global Governance Seriously' (2015) 75 *Public Administration Review* 776
387. SS Board and Council NR, *Preventing the forward contamination of Mars* (National Academies Press 2006)
388. Statute of the Court | International Court of Justice' (2019) <https://www.icj-cij.org/en/statute> accessed
389. Stefanik K, 'Rise of the Corporation and Corporate Social Responsibility: The Case for Corporate Customary International Law' (2017) 54 *Canadian yearbook of international law* 276
390. Steinberg A, 'Space policy responsiveness: The relationship between public opinion and NASA funding' (2011) 27 *Space policy* 240
391. STELMAKH OS, 'GLOBAL SPACE GOVERNANCE FOR ENSURING RESPONSIBLE USE OF OUTER SPACE, ITS SUSTAINABILITY AND ENVIRONMENTAL SECURITY: LEGAL PERSPECTIVE' (2015)

392. Stephen MD, 'Emerging Powers and Emerging Trends in Global Governance' (2017) 23 *Global governance* 483
393. Stonehouse B, 'EXPLORING POLAR FRONTIERS: A HISTORICAL ENCYCLOPEDIA. William James Mills. 2003. Santa Barbara, CA: ABC-CLIO. 2 vols: xliii + 388 p and x + 409 p, illustrated, hard cover. ISBN 1-57607-422-6.' (2004) 40 *Polar Record* 367
394. Stubbe P, 'State Accountability for Space Debris: A Legal Study of Responsibility for Polluting the Space Environment and Liability for Damage Caused by Space Debris' (2018) 2018
395. Sullivan R, 'On the Interpretation of Treaties: The Modern International Law as Expressed in the 1969 Vienna Convention on the Law of Treaties. By Ulf Linderfalk. Dordrecht, The Netherlands: Springer, 2007. 440 pages' (2010) 47 *Canadian yearbook of international law* 661
396. Sundahl MJ, 'Returning to the Moon: Legal Challenges as Humanity Begins to Settle the Solar System – Full Transcript' (2021) 9 *The Global Business School*
397. Swenson G, 'Corrigendum to “Legal Pluralism in Theory and Practice”' (2018) 20 *International Studies Review* 342
398. Taghdiri A, 'Flags of convenience and the commercial space light industry: the inadequacy of current international law to address the opportune registration of space vehicles in flag states' (2013) 19 *Boston University journal of science & technology law* 405
399. Tanja Masson-Zwaan, "New States in Space" (2019) 113 *AJIL Unbound*
400. Tatar U, Gheorghe A and Keskin O, *Space Infrastructures: From Risk to Resilience Governance*, vol 57 (IOS Press 2020)
401. Tennen LI, 'Evolution of the planetary protection policy: conflict of science and jurisprudence?' (2004) 34 *Advances in space research* 2354
402. Tennen LI, 'The Role of COSPAR for Space Security and Planetary Protection' (2020) 1559
403. Tepper E, 'Polycentric Governance in Global Affairs: The Case of Space Governance' (2019) *Decision-Making & Management Science eJournal*
404. The Guardian, 'Little evidence' public-private finance can plug development funding gap' (2016) <https://www.theguardian.com/global-development/2016/nov/17/little-evidence-public-private-finance-can-plug-development-funding-gap> accessed
405. The Handbook of Globalisation, Second Edition', (Edward Elgar Publishing 2011)
406. The Independent, 'Flight to Mars cancelled as war in Ukraine makes mission ‘impossible’' (2022) <https://www.independent.co.uk/space/mars-european-space-agency-russia-ukraine-b2038062.html> accessed
407. Thérien JP and Pouliot V, 'Global governance as patchwork: the making of the Sustainable Development Goals' (2020) 27 *Review of International Political Economy* 612

408. Thomas Cheney and others, "Planetary Protection in the New Space Era: Science and Governance" (2020) 7 Front. Astron. Space Sci
409. Tim R. Bowler, "A New Space Race" [2018] Deep Space Commodities
410. Ting Wang, "Analysis of Debris from the Collision of the Cosmos 2251 and the Iridium 33 Satellites" (2010) 18 Science & Global Security
411. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (United Nations Office for Outer Space Affairs 1967)
412. Trevor Kehler, "Closing the Liability Loophole: The Liability Convention and the Future of Conflict in Space" (2019) 20 Chic. J. Int. Law
413. Tronchetti F, *Fundamentals of Space Law and Policy* (Springer New York 2013)
414. Trur A, 'Governance aspects of space sustainability: The role of epistemic actors as enablers of progress' (2021) 180 Acta Astronautica 451
415. Tzevelekos V, and Lixinski L, 'From the internationalisation of national constitutions to the "constitutionalisation" of international law: the role of human rights', *Fragmentation vs the Constitutionalisation of International Law* (Routledge 2016)
416. Uhran B, Catharine Conley and Spry JA, 'Updating Planetary Protection Considerations and Policies for Mars Sample Return' (2019) 49 Space policy 101322
417. UK Space Agency, Annual Report and Accounts, 2021) ISBN 978-1-5286-2652-1
418. United Nations About Us | United Nations accessed 20/04/23
419. United Nations office for Outer Space Affairs (UNOOSA) COPUOS (unoosa.org) accessed 20/04/23
420. United Nations office for Outer Space Affairs (UNOOSA) COPUOS (unoosa.org) accessed 20/04/23
421. United Nations Office for Outer Space Affairs Space 2030 agenda: Space as a driver for peace (unoosa.org) accessed 20/04/23
422. United Nations Office of Outer Space Affairs (UNOOSA) About us (unoosa.org) accessed 20/04/23
423. Upadhyay DK, and Ooi GS, 'Chapter 19 - Enhancing Quality of Patient-Centered Care Services in Developing Countries: Pharmaceutical Care Approach' in Ibrahim MIM, Wertheimer AI and Babar Z-U-D (eds), *Social and Administrative Aspects of Pharmacy in Low- and Middle-Income Countries* (Academic Press 2018)
424. Urrutia DE, 'India's Anti-Satellite Missile Test Is a Big Deal. Here's Why.' (2019) <https://www.space.com/india-anti-satellite-test-significance.html> accessed
425. Vernile A, *The Rise of Private Actors in the Space Sector* (SpringerBriefs in Applied Sciences and Technology, Springer International Publishing 2018)
426. Villiger ME, *Customary international law and treaties: a study of their interactions and interrelations, with special consideration of the 1969 Vienna Convention on the Law of Treaties*, vol 7 (Brill 1985)

427. W Nancy. Gallagher and Zhao Y, 'Rules of the" Space Road:" How Soft Law Principles Interact with Customary International Law for the Regulation of Space Activities' (2020) 44 J Space L 405
428. Wakimoto T, 'Ensuring the Safety of Commercial Space Transportation through Standardization: Implications of the Chicago Convention and ICAO Standards' (2019) 49 Space policy 101326
429. Walden RM, 'The Subjective Element in the Formation of Customary International Law' (1977) 12 Israel Law Review 344
430. Wall M, 'Bigelow Aerospace Launches New Company to Operate Private Space Stations' (2018) <https://www.space.com/39752-bigelow-space-operations-private-space-stations.html> accessed
431. Wall M, 'Biggest Spacecraft to Fall Uncontrolled From Space' (2019) <<https://www.space.com/13049-6-biggest-spacecraft-falls-space.html>> accessed
432. Wall M, 'SpaceX's Starlink satellites will soon get glare-reducing 'sunshades' (2020) <https://www.space.com/spacex-starlink-satellites-sunshades.html> accessed
433. Walljasper J, 'Elinor Ostrom's 8 Principles for managing a commons' (2011) On the Commons
434. Wang H, 'New Multilateral Development Banks: Opportunities and Challenges for Global Governance' (2017) 8 Global policy 113
435. Wang T, 'Analysis of Debris from the Collision of the Cosmos 2251 and the Iridium 33 Satellites' (2010) 18 Science & global security 87
436. Webster CR, and others, 'Mars methane detection and variability at Gale crater' (2015) 347 Science 415
437. Weeden BC, and Chow T, 'Taking a common-pool resources approach to space sustainability: A framework and potential policies' (2012) 28 Space policy 166
438. Weil P, 'Towards Relative Normativity in International Law?' (1983) 77 The American journal of international law 413
439. Weiss EB, and Shelton D, 'Conclusions: Understanding Compliance with Soft Law', (Oxford University Press 2003)
440. Whetsell TA, and others, 'Government as Network Catalyst: Accelerating Self-Organization in a Strategic Industry' (2020) Journal of Public Administration Research and Theory
441. Wise RD, 'Is there a space for counterhegemonic participation? Civil society in the global governance of migration' (2018) 15 Globalizations 746
442. Witte JM, and Reincke HW, *Challenges to the International Legal System Interdependence, Globalization, and Sovereignty: The Role of Non-binding International Legal Accords* (Oxford University Press 2003)
443. Wittke C, *Soviet theories of international law*, vol 4 (Soviet Studies, Routledge 1953)
444. Ximena C. Abrevaya and others, 'The Astrobiology Primer v2.0' (2016) 16 Astrobiology 561
445. Xu F, and Su J, 'New Elements in the Hague Space Resources Governance Working Group's Building Blocks' (2020) 53 Space policy



446. Yang L, Zhuan Du and Cheng C, 'Building a compound and collaborative governance framework to improve international space sustainability' (2021) *Global Public Policy and Governance*
447. Young A, 'NASA Commercial Partnership Programs' in Young A (ed), *The Twenty-First Century Commercial Space Imperative* (Springer International Publishing 2015)
448. Young A, *The Twenty-First Century Commercial Space Imperative* (Springer International Publishing 2015)
449. Z Martins and others, 'Earth as a Tool for Astrobiology : A European Perspective' (2017) 209 *Space science reviews*
450. Zhao Y, 'Space Commercialization and the Development of Space Law' (2018)
451. Ziarnick MBD, 'When Biospheres Collide: A History of NASA's Planetary Protection Program' (2014) 28 *Air & Space Power Journal* 183
452. Ziemblicki B, and Oralova Y, 'Private Entities in Outer Space Activities: Liability Regime Reconsidered' (2021) 56 *Space Policy* 101427
453. Zuern M, 'Contested Global Governance' (2018) 9 *Global policy* 138
454. Zwart Md, 'Developing Effective Space Traffic Management to Promote Sustainable Uses of Outer Space' (2020)