

REGULATING SPACE DEBRIS AS SEPARATE FROM SPACE OBJECTS

ARPIT GUPTA*

ABSTRACT

As the regulation of space debris becomes a more and more urgent concern, there are calls to include it in the space treaty regime as space objects. This paper will argue that while this inclusion would address issues of indemnity and liability, it would create problems with space debris removal. The paper will also look at existing law to regulate space debris even when they are not considered space objects and propose elements of a sui generis treaty regime which would address space debris.

* L.L.M., 2019, University of Pennsylvania Law School. All opinions expressed in this Comment are my own.

TABLE OF CONTENTS

1.	Introduction.....	225
2.	Historic Context.....	227
3.	Definitions of Space Object and Space Debris.....	230
4.	Space Debris as Space Object.....	233
5.	Debris Removal.....	238
6.	Regulating Space Debris Separately from Space Objects	241
	6.1. Principles in the Outer Space Treaty.....	242
	6.2. Customary Law Governing Space Debris.....	243
	6.3. Soft Law Approaches to Space Debris.....	245
7.	<i>Sui Generis</i> Legal Regime for Space Debris.....	246
8.	Conclusion.....	248

1. INTRODUCTION

On March 27, 2019, India destroyed a weather satellite using an anti-satellite (ASAT) missile, making it the fourth nation after the US, Russia, and China to have conducted such a test.¹ The test was criticized by many for creating space debris (although the Indian Government claimed that this debris would not last in orbit for long).² This action put the growing concern over orbital debris into perspective, since both the criticism and the defense of the ASAT test focused on the creation of space debris and the threat it could pose to the International Space Station.

The European Space Agency estimates that there are in the order of 670,000 pieces of space debris larger than 1 cm in orbit around the earth and over 170 million pieces between 1 cm and 1 mm.³ Debris from either size set is capable of causing considerable damage to objects launched from earth and result in the creation of more debris. This, it is predicted, will eventually lead to a cascading domino effect called the Kessler Syndrome, which is a runaway chain reaction of space debris collisions leading to creation of more and more debris and soon leaving human access to outer space severely restricted.⁴ Already, satellite launches have to be timed and delayed in order to avoid collisions with detectable debris.⁵ While tracking

¹ P.T.I., *Narendra Modi Announces Success of Mission Shakti, India's Anti-Satellite Missile Capability*, THE HINDU (Mar. 27, 2019), <https://www.thehindu.com/news/national/narendra-modi-announces-success-of-mission-shakti-indias-anti-satellite-missile-capability/article26651731.ece> [<https://perma.cc/LLJ8-8WGL>].

² See, e.g., Helen Regan, *India Anti-Satellite Missile Test a 'Terrible Thing,' NASA Chief Says*, CNN (Apr. 2, 2019), <https://www.cnn.com/2019/04/02/india/nasa-india-anti-missile-test-intl/index.html> [<https://perma.cc/ND29-RCK3>].

³ *How Many Space Debris Objects Are Currently in Orbit?* EUR. SPACE AGENCY, (last updated Jul. 25, 2013), http://www.esa.int/Our_Activities/Space_Engineering_Technology/Clean_Space/How_many_space_debris_objects_are_currently_in_orbit [<https://perma.cc/4KLQ-FL32>].

⁴ Donald J. Kessler and Burton G. Cour-Palais, *Collision Frequency of Artificial Satellites: The Creation of a Debris Belt*, 83 J. GEOPHYSICAL RES. 2637, 2640 (1978) (modeling the increase in space debris from collisions involving artificial satellites).

⁵ The Indian Space Research Organisation (ISRO) has had to delay its launches at least twice. See *PSLV C-32 Launch Time Delayed by One Minute to Avoid Space Debris*, THE ECON. TIMES (Mar. 10, 2016), <https://economictimes.indiatimes.com/news/science/pslv-c-32-launch-time-delayed-by-one-minute-to-avoid-space-debris/articleshow/51347118.cms> [<https://perma.cc/L8JH-78QA>]; see also *Isro's PSLV-C23 carrying French, German satellites successfully launched*, THE ECONOMIC TIMES (Jun. 30, 2014),

of space debris is an important priority for all space agencies,⁶ it is worth mentioning that the smaller pieces of debris mentioned above, while just as dangerous to satellites and launch vehicles, are not trackable;⁷ moreover, the recent re-entry of the Chinese Tiangong-1 demonstrated that even larger space objects can present significant problems with trajectory predictions.⁸ In such circumstances, it is more important than ever to formulate laws and policies to not only reduce the chances of debris creation, but also for the removal of debris already present in orbit so as to prevent future accidents.

Much of the existing scholarship over space debris argues for the coverage of space debris within the definition of “space object” in order to impose liability on the launching state. This paper will show the problems with this approach and argue that questions of liability should be balanced with those of debris removal. It will also show that the classification of space debris as space objects will lead to undesirable and absurd legal consequences and discourage debris removal.

The paper will begin by providing the historic context for space law and legal consideration of space debris. The second section will focus on the definitions of “space object” and “space debris.” The third section will provide an overview of the arguments for and against the inclusion of space debris within the definition of space objects. The fourth section will look at the issue of debris removal

<https://economictimes.indiatimes.com/news/politics-and-nation/isros-pslv-c23-carrying-french-german-satellites-successfully-launched/articleshow/37507248.cms> [<https://perma.cc/HWN2-QQFF>].

⁶ See *ESA Makes Space Debris Software Available Online*, EUR. SPACE AGENCY (Jun. 25, 2014), http://www.esa.int/Our_Activities/Space_Safety/Space_Debris/ESA_makes_space_debris_software_available_online [<https://perma.cc/52BV-2S8L>] (discussing a new ESA website providing updates for space debris analysis software); see also *Debris Measurements*, NASA ASTROMATERIALS RES. AND EXPLORATION SCI., <https://www.orbitaldebris.jsc.nasa.gov/measurements/> [<https://perma.cc/QLK6-P4JU>] (explaining how NASA measures and tracks orbital debris).

⁷ See Mark Garcia, *Space Debris and Human Spacecraft* (Sep. 26, 2013), https://www.nasa.gov/mission_pages/station/news/orbital_debris.html [<https://perma.cc/8PKZ-DBQN>] (stating that NASA has had to replace multiple space shuttle windows due to damage caused by mere paint flecks and that non-trackable debris poses the greatest threat to space missions).

⁸ See Andrew Fazekas, *A Space Station Is About to Fall from the Sky – But Where Will It Hit?*, NAT'L GEOGRAPHIC (Mar. 27, 2018), <https://www.nationalgeographic.com/news/2018/03/tiangong-1-chinese-space-station-fall-skylab-crash-science/> [<https://perma.cc/5VZU-YLLB>].

and show that regulating space debris as separate from active space objects is a better way to legally move forward with space debris remediation. Having established arguments to show that space debris should not be governed like space objects as defined by the space treaties, the next section will look into the legal means for regulating space debris. The last section will look at the suggested contours of a *sui generis* legal regime for space debris.

2. HISTORIC CONTEXT

Space law emerged at the height of the Cold War through a set of international treaties which form the basis of space law to this day. The Outer Space Treaty (OST)⁹ was formed at the height of the Cold War and was primarily concerned laying down principles to ensure that any conflict on the surface of the earth did not spread to space, while at the same time ensuring that technology and personnel landing in the territory of opposing parties are promptly returned and a rudimentary regime is set up for state responsibility, liability, and equality of access to space. The Rescue Agreement (ARRA),¹⁰ the Liability Convention,¹¹ the Registration Convention,¹² and the Moon Treaty¹³ were formed later, in order to elaborate on particular provisions of the OST and deal with the immediately foreseeable issues regarding space exploration. The ARRA provides for all possible help and assistance to astronauts and reiterates the duty of prompt return,¹⁴ while the liability convention provides regimes for liability caused by damage in outer space or on the

⁹ See Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies art. 6, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty or OST].

¹⁰ See Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119 [hereinafter ARRA].

¹¹ See Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter Liability Convention].

¹² See Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention].

¹³ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec 18, 1979, 18 U.S.T. 2410, 1363 U.N.T.S. 21 [hereinafter Moon Treaty].

¹⁴ See ARRA, *supra* note 10.

surface of the Earth (including airspace).¹⁵ The Moon Treaty does not concern itself with orbital space and will therefore not be important for the purposes of this paper, and the Registration Convention is largely procedural and not relevant to the current discussion.¹⁶

The space treaties were formed at a time when space exploration was in its early stages, with the OST signed even before the first moon landing. As a result, none of the treaties expressly deal with space debris, and it has become clear over time that existing treaty law is not sufficient in and by itself to regulate an issue as complex and contentious as the duties and rights of states with regard to space debris.

In 1994, the UNCOPUOS¹⁷ first considered space debris as a specific item on its agenda.¹⁸ Since then, the committee considered the issue almost every year till, in 1999, they adopted a technical report on the issue; the committee was, however, unable to draft a new binding instrument on space debris.¹⁹ Instead, focus shifted to drafting a set of non-binding guidelines for debris mitigation, which focus on preventing the creation of further space debris.²⁰

In 2003, another intergovernmental body, the Inter-Agency Debris Mitigation Committee, submitted a draft version of guidelines to the UNCOPUOS.²¹ Based on these recommendations, the Technical Subcommittee came up with a set of guidelines²²

¹⁵ See Liability Convention, *supra* note 11.

¹⁶ See Moon Treaty, *supra* note 13; see also Registration Convention, *supra* note 12.

¹⁷ United Nations Committee on the Peaceful Uses of Outer Space

¹⁸ See Comm. on the Peaceful Uses of Outer Space, Rep. of the Scientific and Technical Subcomm. on Its Thirty-First Session, U.N. Doc. A/AC.105/571, at 2, 12-13 (1994).

¹⁹ See Comm. on the Peaceful Uses of Outer Space, Technical Rep. on Space Debris Adopted by the Scientific and Technical Subcomm., U.N. Doc. A/AC.105/720 (1999).

²⁰ See Comm. on the Peaceful Uses of Outer Space, Rep. of the Scientific and Technical Subcomm. on Its Thirty-Eighth Session, U.N. Doc. A/AC.105/761, at 19-22 (2001).

²¹ See Comm. on the Peaceful Uses of Outer Space, Rep. of the Scientific and Technical Subcomm. on its Fortieth Session, U.N. Doc. A/AC.105/804, at 24-26 (2003).

²² See Comm. on the Peaceful Uses of Outer Space, Scientific and Technical Subcomm. Forty-Third Session, Progress Rep. of the Working Group on Space Debris, U.N. Doc. A/AC.105/C.1/L.284, at 3-5 (2006) [hereinafter UNCOPUOS Guidelines].

which were adopted by the UNCOPUOS in June 2007.²³ Recently, the organization has come up with another set of guidelines aimed at ensuring long-term sustainability of space activities.²⁴ The guidelines were developed solely by the Scientific and Technical Subcommittee and should be seen as technical prescriptions rather than legal solutions, especially since the Legal Subcommittee was not involved in this process.²⁵

Since development has been stalled on making hard law, academics decided to take charge by means of legal interpretation and policy proposals. Years before the UNCOPUOS began its consideration of the issue, the International Institute of Space Law (IISL) considered the issues relating to space debris under the heading “Legal Aspects of Outer Space Environmental Problems” in 1987.²⁶ Space debris became a specific topic in the Scientific-Legal Roundtable in 1990.²⁷ The IISL conferences from 1991 through 1993 further focused on defining and addressing the issue of space debris.²⁸ In 1994, the International Law Association adopted The Instrument on the Protection of the Environment from Damage caused by Space Debris, which will be discussed in more detail later in the comment.²⁹

The Cosmos-Iridium crash in 2009 brought the dangers of space debris back into limelight, leading to renewed calls for a clearer and more rigorous legal regime governing space debris.³⁰ In more recent times, this effort has been spearheaded by the Czech Republic, who has argued for the legal subcommittee to use the guidelines

²³ See Comm. on the Peaceful Uses of Outer Space, Rep. of the Scientific and Technical Subcomm. on its Forty-Fourth Session, U.N. Doc. A/AC.105/890, at 17-20 (2007).

²⁴ See Comm. on the Peaceful Uses of Outer Space, Guidelines for the Long-Term Sustainability of Outer Space Activities, U.N. Doc. A/AC.105/2018/CRP.20 (2018).

²⁵ See Josh Wolny, *The UNCOPUOS Guidelines on the Long-Term Sustainability of Outer Space Activities* 1-2, SECURE WORLD FOUNDATION (Aug. 2018), https://swfound.org/media/206227/swf_un_copuos_its_guidelines_fact_sheet_august_2018.pdf [<https://perma.cc/2Q26-7Y74>] (discussing the status of the current COPUOS guidelines as voluntary and non-binding under international law).

²⁶ See Carl Q. Christol, *Scientific and Legal Aspects of Space Debris*, 34 ACTA ASTRONAUTICA 367, 367 (1993).

²⁷ *Id.*

²⁸ *Id.*

²⁹ See *Space Law Committee*, 66 INT’L L. ASS’N REP. CONF. 305, 325 (1994) [hereinafter *ILA Draft Instrument*].

³⁰ See Maureen Williams, *Space Debris as a ‘Single Item for Discussion’*, 54 PROC. INT’L INST. SPACE L. 327 (2011).

mentioned above and transform them into stronger legal principles, which should then be forwarded for adoption by the General Assembly.³¹

3. DEFINITIONS OF SPACE OBJECT AND SPACE DEBRIS

Activities in space are bound to be conducted in accordance with the space treaties, including the OST, The Rescue Agreement, and the Liability and Registration Conventions. The provisions of these treaties are understood to apply to space objects, a concept which, together with the concept of "launching state" (whose definition also refers to the term 'space object'),³² forms the basis for imposing liability for damage caused during space exploration,³³ for registration of objects launched into outer space,³⁴ and for the return of launched objects when they descend to earth.³⁵ The phrase "object launched into outer space," used in Article VIII of the OST, is also understood as referring to space objects.³⁶ This is the article which deals specifically with the registration, jurisdiction over, and ownership of these objects.³⁷

It therefore becomes essential to ascertain whether the definition of space object also applies to space debris, and to that end arrive at broadly accepted definitions of both the terms. These definitions will determine if states retain control over space debris, whether they are liable for damage caused by debris, and whether they can protest its removal by third parties or demand its return upon such removal.³⁸

³¹ See Comm. On the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on Its Fiftieth Session, U.N. Doc. A/AC.105/C.2/L.283 (2011).

³² See Liability Convention, *supra* note 11, at I(c) (defining launching state as "launches or procures the launch of a space object" or "from whose territory a space object is launched").

³³ See *id.* at II, III, IV.

³⁴ See Registration Convention, *supra* note 12, at II.

³⁵ See ARRA, *supra* note 10, at Article V.

³⁶ See COLOGNE COMMENTARY ON SPACE LAW: VOL. 1 151 (Stephan Hobe, Bernard Schmidt-Tedd & Kai-Uwe Shrogi eds., 2009) [hereinafter *Cologne Commentary Vol. 1*].

³⁷ See OST, *supra* note 9, at Article VIII (providing that the registering state has jurisdiction and ownership over the objects and that this provision is unaffected by their presence in space or on earth).

³⁸ See Matthew Schaefer, *Analogues Between Space Law and Law of the Sea/International Maritime Law: Can Space Law Usefully Borrow or Adapt Rules from*

However, the definition of space object itself remains unclear. The only definition in treaty law is the definition found in the Liability Convention and the Registration Convention, the definition (which is identical in both treaties) refers back to itself, stating that the term includes the component parts of a space object as well as its launch vehicle and the components thereof.³⁹ The treaties seem to expect a broad understanding of what constitutes a space object, which they then seek to refine.

The definition of a space object agreed upon by scholars such as Prof. Kopal⁴⁰ and Judge Lachs⁴¹ is that it is any object designed to be launched into outer space. The definition includes objects launched into space as well as those simply intended for launch.⁴² It is clear that space objects include spacecrafts and satellites, as well as their components and launch vehicles. It is also clear that the definition is not contingent on the successful launch of said object, since the definition does not require an object to be *in* space to be a space object. The definition makes it clear that a space object is born with an attempted launch, but does not contemplate a possibility where something may cease to be a space object.⁴³ It is at the end of its functional or structural life that the definition of a space object begins to overlap with the concept of space debris, and we have to ask if there is a clear point where a space object becomes space debris, or if there is even any difference between the two categories.

While the definition of space object is more or less clear, space debris has no single widely accepted definition. It is known to refer to expended space objects, fragments, and even some natural objects in orbit around the earth.⁴⁴ This broad understanding is not

these Other Areas of Public International Law?, 55 PROC. INT'L INST. SPACE L. 316, 326 (2012).

³⁹ See Liability Convention, *supra* note 11 at I(d); see also Registration Convention, *supra* note 12, at 1(b) (including launch vehicle and its components in the definition of a space object).

⁴⁰ See Vladimir Kopal, *Issues Involved in Defining Outer Space, Space Objects and Space Debris* 34 PROC. ON L. OUTER SPACE 38, 40–41 (1991).

⁴¹ See MANFRED LACHS, *THE LAW OF OUTER SPACE: AN EXPERIENCE IN CONTEMPORARY LAW MAKING* 113 (Tanja Masson-Zwaan & Stephan Hobe eds., Martinus Nijhoff, 2010) (1972).

⁴² See Cologne Commentary Vol. 1, *supra* note 36, at 151 (arguing that the registration convention differs from this definition, and only obligates the registry of objects that are successfully launched into space).

⁴³ See Stephen Gorove, *The Recovery and Return of Objects Launched into Outer Space: A Legal Analysis and Interpretation*, 4 THE INT'L LAW. 682, 685–686 (1969–1970).

⁴⁴ See Hamid Kazemi et al., *Liability For Space Debris In The Framework Of Private International Space Law*, 56 PROC. INT'L INST. SPACE L. 367, 368–9 (2013).

particularly helpful in most legal or technical senses and is sought to be narrowed in two major ways.

The first approach focuses on the structural aspects of the relevant objects. Debris, it has been observed, "generally implies something that is broken up."⁴⁵ It has been argued that space objects, once disintegrated, become space debris.⁴⁶ This approach would preclude any question of an overlap between the two concepts and provide a clear line of demarcation. However, it creates a somewhat arbitrary distinction between objects a state has lost control over, especially if debris is treated separately from space objects for liability purposes. It is partly for this reason that this approach has mostly been abandoned in favor of the functionality approach.⁴⁷

The functionality approach argues that the characteristic attribute of debris is its non-functionality.⁴⁸ The definition of space debris should therefore stress on functionality rather than just size or origin.⁴⁹ This functionality definition has been adopted by the UNCOPOUS Debris Mitigation Guidelines, which includes all non-functional man-made objects in space or re-entering the atmosphere, "including fragments and elements thereof."⁵⁰ This definition is criticized for being too narrow and ignorant of the interests states retain in controlling some of their non-functional space objects.⁵¹

The broad definition in the UNCOPUOS Guidelines is contrasted by a more nuanced definition found in the ILA Draft Instrument. Article 2 adopts the functionality approach in that it includes man-made objects which are non-functional and not useful, and in whose condition no change is to be reasonable expected.⁵² The distinction can be chalked to the fact that unlike the

⁴⁵ I. H. Ph. Diederiks-Verschoor, *Harm Producing Events Caused by Fragments of Space Objects (Debris)*, 25 PROC. ON L. OUTER SPACE 1, 1 (1983).

⁴⁶ See *Summary of Discussions*, 25 PROC. ON L. OUTER SPACE 67 (1983).

⁴⁷ See COLOGNE COMMENTARY ON SPACE LAW: VOL. 3 618 (Stephan Hobe, Bernard Schmidt-Tedd & Kai-Uwe Shrogl eds., 2015) [hereinafter *Cologne Commentary Vol. 3*].

⁴⁸ See Lubos Perek, *Technical Aspects of the Control of Space Debris* 33 PROC. ON L. OUTER SPACE 400 (1991).

⁴⁹ See Christol, *supra* note 26, at 171.

⁵⁰ See UNCOPUOS Guidelines, *supra* note 22, at 2.

⁵¹ See LOTTI VIKARI, *THE ENVIRONMENTAL ELEMENT IN SPACE LAW* 33 (Frans G. von der Dunk ed., 2008).

⁵² See ILA Draft Instrument, *supra* note 29, art 2.

UNCOPOUS Debris Mitigation Guidelines, the ILA Draft Instrument is largely framed by legal experts.⁵³

Most accepted definitions of both space objects and space debris are broad, and as such overlap between them is inevitable.⁵⁴ This brings us back to the question of whether space debris is merely a sub-category of space objects, or if the overlap between the concepts needs to be addressed and eliminated.

4. SPACE DEBRIS AS SPACE OBJECT

Perhaps the simplest argument for considering space debris to be within the definition of space object is that the definition explicitly includes “component parts” of space objects.⁵⁵ Man-made debris in space must necessarily originate from space objects, and will therefore either be a complete space object, or would at some point have been part of a complete space object.⁵⁶ It is also argued that the use of the term “includes” in the definition of space object indicates an inclusive interpretation of the definition.⁵⁷ The argument would appear valid under Article 31 of the Vienna Convention on the Law of Treaties, which instructs one to interpret treaty language based first on the ordinary meaning of the words in light of the treaty’s object and purpose.⁵⁸ The UNCOPUOS definition of space debris includes all non-functional objects and their parts.⁵⁹ Since this broader interpretation of space debris is complimentary to the treaty definition of space object, which does not exclude non-functional objects, it is argued that an inclusive definition of “space object” would cover space debris.⁶⁰

⁵³ See Williams, *supra* note 30.

⁵⁴ See generally I. H. PH. DIEDERIKS-VERSCHOOR & VLADIMIR KOPAL, AN INTRODUCTION TO SPACE LAW 128 (2008) (describing the difficulty associated with differentiating space objects from space debris using conventional definitions).

⁵⁵ Liability Convention, *supra* note 11, art. 2.

⁵⁶ Stephen Gorove, *Definitional Issues Pertaining to “Space Object”*, 37 PROC. ON L. OUTER SPACE 87, 88–89 (1994).

⁵⁷ See PETER STUBBE, STATE ACCOUNTABILITY FOR SPACE DEBRIS: A LEGAL STUDY OF RESPONSIBILITY FOR POLLUTING THE SPACE ENVIRONMENT AND LIABILITY FOR DAMAGE CAUSED BY SPACE DEBRIS 374 (2018).

⁵⁸ Vienna Convention on the Law of Treaties art. 31, 1155 U.N.T.S. 331 (entered into force Jan. 27, 1980)

⁵⁹ UNCOPUOS Guidelines, *supra* note 20.

⁶⁰ Gorove, *supra* note 52, at 89–90.

The problem with simply reading space debris into the definition of space object in the Liability and Registration Conventions, however, emerges from a more careful look at the definition. The definition qualifies the word “parts” with “component.”⁶¹ A distinction here needs to be drawn between “component parts” and “parts.” Component parts have been understood to mean parts that facilitate the objective of the launch or are conducive to the “useful operation” of the object.⁶² Here we must remember that not all debris is created equal – the functional definition includes objects as diverse as whole satellites and fragments of broken machinery, and there is often an attempt to differentiate the smaller fragments from non-functional objects and their component parts when dealing with practical issues regarding space debris.⁶³ While the larger and relatively intact pieces of space debris would have been ‘component parts’ at some point, smaller fragments or paint flakes would fall outside the scope of this definition.⁶⁴ William Wirin and H.E. Qizhi have argued that component parts should be distinguished from space debris which is non-functional and mostly fragmented.⁶⁵ Accordingly, the ILA’s definition includes a list of sources for space debris, covering everything from abandoned satellites to the result of collisions and explosions, while at the same time providing a clear point of distinction between objects and debris and eliminating any overlap with space objects.⁶⁶

When the space treaties were formed in the 1960s and 70s, space was not accessible except to the superpowers of the day, and the possibility of collisions in the vast expanse of space was considered remote.⁶⁷ Space debris only began to be discussed as an issue in the late 1980s, almost a decade after the treaties were framed.⁶⁸ There is little reason, then, to conclude that the use of “space object” in the

⁶¹ Liability Convention, *supra* note 11, art. 1(d).

⁶² See HE Qizhi, *Review of Definitional Issues in Space Law in Light of Development of Space Activities*, 34 PROC. ON L. OUTER SPACE 32, 35 (1991).

⁶³ See Kopal, *supra* note 40, at 42.

⁶⁴ See Qizhi, *supra* note 62, at 35.

⁶⁵ William B. Wirin, *Space Debris and Space Objects*, 34 PROC. ON L. OUTER SPACE 45, 49 (1991); Qizhi, *supra* note 62, at 35.

⁶⁶ ILA Draft Instrument, *supra* note 25, at 310.

⁶⁷ See Lubos Perek, *Management Issues Concerning Space Debris*, Proceedings of the 4th European Conference on Space Debris 587, 587 (2005).

⁶⁸ Christol, *supra* note 28, at 367.

space treaties should have an ordinary meaning that includes ‘space debris’.

Some people who seek to cover damage caused by space debris under the Liability Convention rely on a form of treaty interpretation called the argument from evolutive or evolving interpretation.⁶⁹ This form of interpretation involves reading the terms of treaties as dynamic and evolving, rather than static. This means that treaties should be read in light of new developments and the contemporary understandings of the terms used in the treaty.⁷⁰ The ICJ has applied this principle in multiple cases, including the case of *Legal Consequences for States of the Continued Presence of South Africa in Namibia*,⁷¹ as well as the *Aegean Sea Continental Shelf Case*.⁷² The second case is especially pertinent, since the court rejected Greece’s argument that the treaty in question would not govern the continental shelf, a concept not widely known or understood when the treaty was signed and not part of the text. The argument is that the broad wording of a definition may suggest such an interpretation even if there is no express intention of the parties to that effect.⁷³ A dynamic and evolving definition is also said to be supported by the *travaux préparatoires* for the Liability Convention.⁷⁴ Such interpretation means reading the definition in such a way as to account for new developments, which in the present instance suggests that damage caused by space debris be covered under the Liability Convention.⁷⁵

However, the evolutive interpretation has earlier been applied to concepts such as territory and continental shelf, whose evolution has been clear and the position of law relating to them was not

⁶⁹ See e.g., Elena Carpanelli & Brendan Cohen, *Interpreting “Damage Caused by Space Objects” under the 1972 Liability Convention*, 56 PROC. INT’L INST. SPACE L. 29, 36–37 (2013).

⁷⁰ *Id.*

⁷¹ *Legal Consequences for States of the Continued Presence of South Africa in Namibia (South West Africa) notwithstanding Security Council Resolution 276 (1970)*, Advisory Opinion, 1971 I.C.J. 16 (June 21).

⁷² *Aegean Sea Continental Shelf (Greece v. Turkey)*, Judgment, 1978 I.C.J. 3 (Dec. 19).

⁷³ See Sandre Torp Helmersen, *Evolutive Treaty Interpretation: Legality, Semantics and Distinctions*, 6.1 EUR. J. LEGAL STUD. 161, 170–171 (2013).

⁷⁴ See U.N. General Assembly, *Report of the Committee on Peaceful Uses of Outer Space*, U.N. GAOR, 7th Sess., at 30, UN Doc. A/AC.105/C.2/SR.92 (June 4–13, 1968) (Canadian delegate) (suggesting that the definition look to the future and that space objects would include “falling fragments”).

⁷⁵ *Aegean Sea Continental Shelf (Greece v. Turkey)*, Judgment, 1978 I.C.J. 3 (Dec 19); Carpanelli & Cohen, *supra* note 69, at 37.

particularly controversial at the time when the evolutive method was used in relation to them.⁷⁶ As many have demonstrated, the finer contours of the definition of space object are not subject to such clear development in definition.⁷⁷

Another line of reasoning proposes the use of deterrent value arising from the Liability Convention for debris mitigation, arguing that states would be under greater pressure to engage in debris mitigation if space debris is included in the definition of space object.⁷⁸

However, reduction of space debris is not the purpose of the Liability Convention.⁷⁹ For this reason, the goal of debris mitigation should not be used to justify a treaty interpretation which runs against one of the foundational principles of space law—the promotion of activities in outer space.⁸⁰ Imposing liability for damage caused by space debris caused without the fault of the launching state would increase the risk and costs of space exploration, which would disproportionately affect the access of the poorer developing nations to outer space in violation of the express the unanimous declarations of UN member states.⁸¹

A different kind of argument for the inclusion of space debris within the definition of space objects comes from the victim-centric nature of the Liability Convention.⁸² Christol argues that the purpose of providing compensation to victims would be better served by the broad interpretation of space object which includes space debris within its ambit.⁸³

The problem for this approach arises in cases like the Cosmos Iridium crash where an inactive space object collides with an active

⁷⁶ See Helmersen, *supra* note 73, at 170–171.

⁷⁷ See Stephen Gorove, *Toward a Clarification of the Term "Space Object": An International Legal and Policy Imperative?*, 21 J. SPACE L. 11, 12 (1993).

⁷⁸ See *Cologne Commentary Vol. 3*, *supra* note 47, at 113.

⁷⁹ Kelly A. Gable, *Rules Regarding Space Debris: Preventing a Tragedy of The Commons* 50 PROC. ON L. OUTER SPACE 257, 259 (2008).

⁸⁰ See G.A. Res. 18, at 15 (Dec. 13, 1963) [hereinafter 1962 Declaration].

⁸¹ See G.A. Res. 51/122, 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, Preamble (Feb. 4, 1997) [hereinafter 1997 Declaration].

⁸² Liability Convention, *supra* note 11, Preamble.

⁸³ See Carl Q. Christol, *International Liability for Damage Caused by Space Objects*, 74 AM. J. INT'L L. , 346, 359 (1980).

one and creates debris.⁸⁴ The space debris from the active satellite would be considered space objects under this argument, and the victim state, while having received compensation, would now be liable for damage caused on the surface of the earth or the airspace by debris created by the fault of another state.⁸⁵ This possibility is in direct contradiction to the provisions of the Liability Convention, a result which is manifestly absurd and unreasonable under Article 32 of the VCLT.⁸⁶ In such a situation, the Article requires us to look at the preparatory work of the treaty.⁸⁷

The secondary sources make it clear that the guiding principle to ascribe liability under the convention is the assumption of risk by the victim.⁸⁸ It was understood that nations assume a certain risk when they undertake operations in outer space, and therefore the standard of liability for damage caused to them should be different from that for damage caused to someone in airspace or the surface of the earth.⁸⁹ This is clearly embodied in the treaty, which provides for fault liability in outer space and absolute liability for damage caused in the airspace or on the surface of the earth.⁹⁰ As already mentioned, including all space debris within the definition of space objects results in muddling this distinction based on risk assumption, making states liable due to mere ownership of an object in direct contradiction to the drafters' intentions.⁹¹ If the ILA Draft's definition is used as a point of departure, the state can have some control over what space objects are considered space debris by determining their usefulness. An objectively inactive satellite may still retain value in the eyes of the launching state as a reserve for future activities or contain classified information.⁹² In such cases, the launching state may still call some non-functional space objects

⁸⁴ See Brian Weeden, *2009 Iridium-Cosmos Collision Fact Sheet*, SECURE WORLD FOUNDATION, https://swfound.org/media/6575/swf_iridium_cosmos_collision_fact_sheet_up_dated_2012.pdf [https://perma.cc/K8EP-HGC6].

⁸⁵ See Christol, *supra* note 83, at 359 (1980).

⁸⁶ Liability Convention, *supra* note 11, art. II.

⁸⁷ See VCLT, *supra* note 58, Art. 32.

⁸⁸ See LACHS, *supra* note 41.

⁸⁹ U.N GAOR, Rep. of the Comm. on Peaceful Uses of Outer Space, 7th Sess., at 20, UN Doc. A/AC.105/C.2/SR.94 (Jun. 4, 1968) (French delegate).

⁹⁰ Liability Convention, *supra* note 11, Arts. II, III.

⁹¹ *Id.*

⁹² See Lubos Perek, *Management Issues Concerning Space Debris*, Proceedings of the 4th European Conference on Space Debris 587, 588 (2005).

“useful,”⁹³ so that it is not space debris under the ILA definition.⁹⁴ The distinction between space debris and space objects fulfils the purpose of providing compensation to victims while holding states liable based on the risk they assume.

5. DEBRIS REMOVAL

It must be remembered that the definition of “space object” in the Liability and Registration Conventions also forms an important part of the OST and the ARRA.⁹⁵ Art. 5 of the Rescue Agreement requires state parties to return space objects found in their territory to the launching states, and the inclusion or exclusion of space debris in this definition would determine what objects states are required to return to the launching states.⁹⁶ Similarly, Art. VIII of the OST provides for perpetual jurisdiction and ownership over ‘space objects’.⁹⁷ Under a regime where all space debris are space objects, all launching states would retain jurisdiction over their space objects indefinitely, and any interference with it would require their permission.⁹⁸

Most discussions on definitional aspects of space objects and debris so far have focused on liability attribution, victim compensation, and debris mitigation. However, it has become increasingly clear that debris mitigation alone is not sufficient and debris remediation or removal of space debris is required, especially from the commercially valuable Low Earth and Geosynchronous orbits.⁹⁹ This section will explore how the definition of space debris in relation to space objects and the interpretations of Article VIII of the OST would affect proposals for debris remediation.

⁹³ See VIKARI, *supra* note 51.

⁹⁴ ILA Draft Instrument, *supra* note 29, Art. 1(c).

⁹⁵ See Gorove, *supra* note 77, at 13; see also OST, *supra* note 9, Art. VIII; see also ARRA, *supra* note 10, Art. 5.

⁹⁶ ARRA, *supra* note 10, art. 5.

⁹⁷ OST, *supra* note 9 Art. VIII.

⁹⁸ See National Research Council Committee for the Assessment of NASA’s Orbital Debris Programs Summary Report, *Limiting Future Collision Risk to Spacecraft: An Assessment of NASA’s Meteoroid and Orbital Debris Programs*, (2011) [hereinafter, NRC Report], http://www.nap.edu/catalog.php?record_id=13244 [<https://perma.cc/QCX8-RVMK>].

⁹⁹ See VIKARI, *supra*, note 51, at 33.

It has been argued that we should look at the creation of space debris itself as “fault” in the context of the Liability Convention if the debris was created as a result of failure to comply with codes of conduct such as the UNCOPUOS Debris Mitigation Guidelines.¹⁰⁰ This would allow a nation to consider the removal of space debris as a countermeasure, accepting that it is wrongful but justifying it in relation to the violation of an international norm to not create space debris.¹⁰¹ In order to justify such a course of action, the state attempting to remove the debris will either have to show specific harm or appeal to the right of third states to take countermeasures.¹⁰² This justification would work in a regime where space objects included space debris.

The ICJ has held that countermeasures should be reversible and should not simply be a reaction to the wrongful act but should intend to bring the offending state back into compliance with international law.¹⁰³ Another problem would be to ascribe blame to all launching states which have debris. For instance, in the aforementioned instance of the Cosmos-Iridium collision, it would be hard to consider the United States to be both victim and a wrongful state subject to countermeasures.

A possible way to deal with space objects without invoking countermeasures could be to apply the maritime principles of salvage and abandonment to space law.¹⁰⁴ This regime allows private individuals other than the owner of an object to claim financial benefits for ‘salvaging’ it.¹⁰⁵ The designation of an object as “derelict” arises from two related concepts – *sine spe recuperandi*, meaning there is no hope of the object being recovered, and *sine animo revertendi*, meaning the owner does not intend to return to said object.¹⁰⁶ The definition is similar to the ILA’s proposed definition of debris, since both focus on non-functionality of the object in question as well the intentions of its owner. A salvage claim requires that the property in question should have been at risk of loss, that

¹⁰⁰ See HOBE, SCHMIDT-TEDD, & SCHROGL, *supra* note 47, at 133.

¹⁰¹ See STUBBE, *supra* note 57, at 374.

¹⁰² *Id.*

¹⁰³ See Gabčíkovo-Nagymaros Project (Hungary v. Slovakia), Merits, 1997 I.C.J. Rep. 56 (Sep. 25).

¹⁰⁴ See R. Cargill Hall, *Comments on Salvage and Removal of Man-Made Objects from Outer Space*, 33.2 J. AIR L. & COM. 288, 289 (1967).

¹⁰⁵ See N. Jasentuliyana, *Regulation of Space Salvage Operations: Possibilities for the Future*, 22 J. SPACE L. 5, 16–20 (1994).

¹⁰⁶ *Id.*

the salvage operation was conducted voluntarily and not because of any existing duty, and that the property have been successfully retrieved (“no cure, no pay”).¹⁰⁷ In the context of space debris, the first and third requirements pose problems—it would usually be hard to establish fear of loss, and debris removal often simply focuses on de-orbiting debris rather than retrieving it.¹⁰⁸ Over the last few decades, the concept of environmental salvage has emerged, wherein a salvor can require payment for a salvage operation that prevents damage to the environment even when the object in question has not been retrieved.¹⁰⁹

Similarly, a number of aspects of the recently formalized wreck removal regime bear similarities to space debris and related issues. The definition of a wreck includes ships that are stranded or sunken including its components and objects on board.¹¹⁰ A wreck would have to be removed if it is blocking a nautical lane or presents a hazard to navigation or the marine environment. States are required to have insurance to pay for such removal, to report wrecks to the relevant states, and to remove wrecks within deadlines set by the state immediately affected by the wreck.¹¹¹ If they fail to remove the wreck within the deadline, the “affected state” can remove the wreck at the owner’s expense and without their permission.¹¹² Martha Mejía-Kaiser has suggested that a regime for space debris can take a similar form, with an international body playing the role of declaring a wreck hazardous and setting deadlines for removal.¹¹³ Under this regime, any spacefaring state would be allowed to remove the debris after the deadline expires, at the cost of and without the permission of owners and launching states.¹¹⁴

¹⁰⁷ See THOMAS SCHOENBAUM, *ADMIRALTY AND MARITIME LAW*, VOL. 2 324 (1994).

¹⁰⁸ See *id.*; see also C. Priyant Mark, *Surekha Kamath, Review of Active Space Debris Removal Methods*, 47 *SPACE POLICY* 194, 195–202 (2019) (presenting an overview of the proposed methods of ADR); Loren Grush, *Satellite Uses Giant Net to Practice Capturing Space Junk*, *THE VERGE* (Sept. 19, 2018); Loren Grush, *Watch a Satellite Spear Space Debris With a Harpoon*, *THE VERGE* (Feb. 15, 2019).

¹⁰⁹ See Olavo de O. Bittencourt Neto, *Chasing Ghost Spaceships: Law of Salvage as Applied to Space Debris* 57 *I.I.S.L. PROC.* 153 (2014).

¹¹⁰ International Maritime Organization, *Nairobi International Convention on the Removal of Wrecks*, art. 1, IMO/LEG/CONF.16/19 (Apr. 14, 2015) [hereinafter *Nairobi Wreck Convention*].

¹¹¹ *Nairobi Wreck Convention*, arts. 2, 5, 9.

¹¹² *Nairobi Wreck Convention*, art. 9.

¹¹³ See Martha Mejía-Kaiser, *Removal of Non-Functional Space Objects Without Prior Approval*, *PROC. ON L. OUTER SPACE* 293, 295–296 (2007).

¹¹⁴ *Id.*

These regimes offer solutions based on a distinction between active vessels on one hand and wrecks or derelicts on the other. The success of the application of their principles to space law would depend on whether a similar distinction is made with respect to man-made objects in space—especially with respect to Article VII of the OST.

As discussed above, if space debris is included under the definition of space object, Article VIII of the OST makes removal of space debris much more legally problematic than salvage in law of the seas.¹¹⁵ States retain control as well as ownership over space objects, and there are no provisions to declare these objects as derelicts or wrecks. Even when a state removes the space debris of another state from orbit due to the danger posed by it to active space objects or even astronauts, the action may be considered against international law, and may even be considered an act of piracy.¹¹⁶

There is a need to keep salvage or wreck removal like operations in space outside the scope of Article VIII.¹¹⁷ A simple way to do this is to exclude space debris from the definition of space objects so that it can be subject to a separate regime rather than being governed by the space law treaties like active space objects.

6. REGULATING SPACE DEBRIS SEPARATELY FROM SPACE OBJECTS

If we argue that space debris does not fall within the definition of space object and is therefore not regulated by the current treaty regime, does it mean that it is not regulated by law? This section provides three ways to enforce states to engage in debris mitigation—the first is based on principles contained in the OST, the next concerns customary international law, and the third pertains to soft law.

¹¹⁵ See Brian Weeden, *Overview of the legal and policy challenges of orbital debris removal*, 27.1 SPACE POLICY 38, 41 (2011).

¹¹⁶ See HOWARD A BAKER, SPACE DEBRIS: LEGAL AND POLICY IMPLICATIONS 153–155 (May 1988) (unpublished LL.M. thesis, McGill University) (on file with the McGill University Library system).

¹¹⁷ See Melissa K. Force, *Legal Implications of Debris Removal* 55 I.I.S.L. PROC. 727, 734–736 (2012).

6.1. Principles in the Outer Space Treaty

Article II of the OST bars states from appropriating outer space by any means.¹¹⁸ This is in furtherance of the core principles of space as a province of all mankind and free and equitable access enshrined in Article I.¹¹⁹

“Appropriation” for the purposes of this article must mean something more than mere use in order to allow for satellites being placed in orbits.¹²⁰ Therefore, even the placement of long-lasting satellites would fit into the bracket of “use” and not “appropriation.”¹²¹

However, this should not allow for states to place objects perpetually in important orbits, since it would violate the right to equitable access of developing nations to these orbits in accordance with the Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries.¹²² It has been argued that indefinite use of orbit is appropriation of that orbit and therefore violates Articles I and II of the OST.¹²³

Another limitation to the free use of outer space in the OST is through Article IX. The article requires states to give “due regard” to the interests of other states and to “avoid harmful contamination” of outer space.¹²⁴ Harmful contamination is required to be construed in relation to the due regard principle and it should thus be understood to be an alteration of the space environment that affects its use by others.¹²⁵ Space debris is considered a form of harmful contamination since it is a man-made alteration to the environment

¹¹⁸ OST, *supra* note 9, Art. II.

¹¹⁹ OST, *supra* note 9, Art. I.

¹²⁰ See Stephen Gorove, *Major Legal Issues Arising from the Use of the Geostationary Orbit*, 5 MICH. J. INT'L L. 3 (1984).

¹²¹ *Id.*, at 6.

¹²² G.A. Res. 51/122, *supra* note 79.

¹²³ Force, *supra* note 115, at 734-37.

¹²⁴ OST, *supra* note 9, Art. IX.

¹²⁵ See I.H.P. Deideriks-Verschoor, *Environmental Law in Outer Space*, 30 GERMAN YEARBOOK ON INTL. L., 144 (1987); See also Sethu Nandkumar Menon & V. Gopala Krishnan, *State Responsibility and International Legal Consensus for a Debris-Free Environment*, 50 PROC. ON L. OUTER SPACE 273, 279-81 (2007)

of outer space that interferes with the access of other states to outer space.¹²⁶

The obligations of state under the OST are negative in nature, and in case of Article IX is not even absolute.¹²⁷ The OST requires states from creating space debris, but it provides no liability or damages after such debris has been created in order to provide a concrete deterrent.¹²⁸

6.2. Customary Law Governing Space Debris

The relative newness of space law appears to be a hindrance to the development international customary norms, especially in light of the relatively short period of time space debris has been a concern. The ICJ held that customary international law arises from “constant and uniform usage, accepted as law.”¹²⁹ The two components of this definition are ‘state practice’ and ‘*opinio juris*’, or opinion of the law.¹³⁰

Clear *opinio juris* for a norm against the creation of space debris is to be found in unanimously passed UN General Assembly Resolutions regarding space debris. The UN General Assembly unanimously passed resolutions numbered G.A. Res. 62/217¹³¹ and G.A. Res. 60/99,¹³² which resolve to reduce creation of space debris and provide support for debris mitigation given by the Inter Agency Debris Committee (IADC),¹³³ which are said to reflect “existing practices as developed by a number of national and international organizations.”¹³⁴ The guidelines present technical methods which aim to reduce creation of space debris, including those regarding

¹²⁶ STUBBE, *supra* note 57, at 164-166.

¹²⁷ See OST, *supra* note 9, Article IX (uses the term “avoid”); see also STUBBE, *supra* note 57, at 158.

¹²⁸ See Bin Li & Haifeng Zhao, *Environment Issues in International Dispute Settlement of Space Debris*, 12 62nd INT’L ASTRONAUTICAL CONGRESS 10338, 10339-42 (2011).

¹²⁹ *Asylum (Columbia v. Peru)*, Judgment, 1950 I.C.J. 266, 276-77 (Nov. 20).

¹³⁰ *Id.*

¹³¹ G.A. Res. 62/217, at 7 (Dec. 22, 2007).

¹³² G.A. Res. 60/99, at 29 (Dec. 8, 2006).

¹³³ IADC consists of 13 space agencies from around the world, including those of the US, Russia, China, India, and the EU.

¹³⁴ G.A. Res. 62/217, at 7 (Dec. 22, 2007).

construction of space objects and protocols on what to do when an object becomes non-functional.¹³⁵

According to Prof. Bin Cheng, the only requirement for custom is *opinio juris*.¹³⁶ He argues this by explaining the basis for customary norms in international law: states, being sovereign, are only bound by those norms which they believe to be law.¹³⁷ Thus, the presence of such opinion is sufficient for the creation of customary law. He argues that state practice is an unnecessary requirement and is at best a proof or expression of *opinio juris*.¹³⁸ From this understanding of customary international law flows Prof. Cheng's doctrine of instant custom. Since there is no requirement for state practice, customary law can materialize with little or no state practice. This requires no time and is therefore instant.¹³⁹

However, even if one rejects the idea of instant custom, state practice in the area is not lacking. A number of states have created debris mitigation policies and implemented them in their domestic legislation.¹⁴⁰ States have also taken care to justify potentially controversial actions like ASAT weapon tests by clarifying that debris created therein would not remain in orbit for long.¹⁴¹

The *opinio juris* and state practice establish a clear customary norm against the creation of space debris, although the question of assigning damages or liability for violation of the norm remains unaddressed.

¹³⁵ NCOPUOS Guidelines, *supra* note 20.

¹³⁶ Bin Cheng, *United Nations Resolutions on Outer Space: 'Instant' International Customary Law?*, STUDIES IN INT'L SPACE L. 125, 137 (1997).

¹³⁷ *Id.*

¹³⁸ *Id.* at 139.

¹³⁹ *Id.*

¹⁴⁰ See Gable, *supra* note 79, at 262.

¹⁴¹ Press Trust of India, *India Chose Lower Orbit to Avoid Debris Threat to Global Space Assets: DRDO*, NDTV (Apr. 07, 2019), <https://www.ndtv.com/india-news/india-chose-lower-orbit-to-avoid-debris-threat-to-global-space-assets-drdo-2019185> [<https://perma.cc/N5Q9-VR5R>].

6.3. *Soft Law Approaches to Space Debris*

'Soft law' is a norm under international law, which while non-binding, has significant normative value and affects the actions of states.¹⁴²

Soft law may include customary norms as well as declarations which the states make. These are 'norms' as opposed to binding 'rules,' but are nevertheless important. This is especially true in the present-day environment of international lawmaking, where countries seek to form legal frameworks but are unwilling to bind themselves to a rigid set of rules.¹⁴³

An interesting approach to measure the effectiveness of soft law is through the concept of network effects, which says that the effectiveness and value of the law would increase with the number of states or agencies accepting it.¹⁴⁴ This is especially true for the guidelines on debris mitigation given by the IADC, which includes all the leading space agencies of the world.¹⁴⁵

The debris mitigation guidelines of the IADC and the UNCOPUOS fulfill a niche which is unaddressed by more traditional space law in a number of ways—first, they provide a clear definition of space debris.¹⁴⁶ Secondly, they provide concrete measures to mitigate debris creation in outer space, thereby providing a measuring stick to ascertain whether a particular launching state has done enough to avoid creation of debris.¹⁴⁷ Lastly, they provide special status to the Low Earth Orbit (LEO) and

¹⁴² Alan Boyle, *Soft Law in International Law Making*, in INTERNATIONAL LAW 120 (Malcolm D. Evans ed., 2010).

¹⁴³ *Id.*

¹⁴⁴ Brian Druzin, *Why does Soft Law have any Power Anyway?*, 7 ASIAN J. INT'L L. 361, 363 (2017).

¹⁴⁵ List of member agencies of the IADC, available at <http://www.iadc-online.org/index.cgi?item=links> [<https://perma.cc/6LEX-D2R3>].

¹⁴⁶ Inter-Agency Space Debris Coordination Committee, *IADC Space Debris Mitigation Guidelines*, at guideline 3.1, IADC-02-01 (Sept. 2007), http://www.unoosa.org/documents/pdf/spacelaw/sd/IADC-2002-01-IADC-Space_Debris-Guidelines-Revision1.pdf; Committee on the Peaceful Uses of Outer Space [UNCOPUOS], *Guidelines for the Long-term Sustainability of Outer Space Activities*, at background, A/AC.105/2018/CRP.20 (June 27, 2018) [hereinafter IADC].

¹⁴⁷ IADC, *supra* note 141, at guideline 5; UNCOPUOS, *supra* note 141, at guideline 1–5.

the Geostationary Orbit (GO) which are scientifically and strategically the most valuable locations in outer space.¹⁴⁸

The debris mitigation guidelines have shown that space law need not always be in the form of binding treaty obligations but can also arise from concerted action with broad and general consensus¹⁴⁹ based around 'soft law' norms. These norms can eventually take a form which would impose duties and obligations on states by solidifying into customary international law.¹⁵⁰ This process of the soft law becoming increasingly widely followed is evident from states incorporating the 'non-binding' debris mitigation principles into their domestic laws¹⁵¹ or the policies of their national space agencies,¹⁵² evidencing clear acceptance of their normative value.

7. *SUI GENERIS* LEGAL REGIME FOR SPACE DEBRIS

Existing treaties, customs, and soft law focus only on preventing debris creation. They merely regulate the activities of states insofar as to prevent the creation of space debris, but they do not regulate what happens to space debris once it has been formed. With increasing privatization of space and a general rise in space exploration, there is a need for predictability and clear assignment of responsibilities in relation to space debris.¹⁵³

These requirements can only be solved with a separate, *sui generis* framework for space debris dealing with the liability for damage caused by space debris, damage caused due to debris remediation efforts, compensation for remediation, the right to remove debris, ownership of recovered material of different sizes

¹⁴⁸ IADC, *supra* note 141, at guideline 3.3.2; UNCOPUOS, *supra* note 141, at guideline 6.

¹⁴⁹ Elise Epperson Crow, *Waste Management in Space: Addressing the Challenge of Orbital Debris*, 18 SW. J. INT'L L. 707, 719 (2011).

¹⁵⁰ Luke Punnakanta, *Space Torts: Applying Nuisance and Negligence to Orbital Debris*, 86 S. CAL. L. REV. 163, 182-83 (2012).

¹⁵¹ See, e.g., Statute on Licensing Space Operations, No. 1996-104, art. 5(h) (Feb. 2, 1996) (Rus.), http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/russian_federation/decree_104_1996E.html [<https://perma.cc/LYW7-5KXP>].

¹⁵² See, e.g., NASA Technical Standards, *Process for Limiting Space Debris* NASA-STD-8719.14A, 4.5.4.2(d) (Dec. 8, 2011).

¹⁵³ José Monserrat Filho & Álvaro Fabrício dos Santos, *Is There A Future For Space Law Beyond "Soft Law"?*, 53 PROC. INT'L INST. SPACE L. 234, 241-242 (2010).

and an appropriate dispute resolution mechanism.¹⁵⁴ There have been proposals in the legal subcommittee of the UNCOPOUS to develop a separate binding legal framework for space debris.¹⁵⁵ In light of the discussion above, the law should have a few specific features to deal with issues particular to space debris and therefore untouched by the other space treaties.

The first task of such a treaty would be to define space debris. The contours for a definition already exist in the debris mitigation guidelines, both of which focus on a functional approach.¹⁵⁶ A legal instrument needs to have a more refined definition of space debris, and such a definition exists in the ILA Draft instrument.¹⁵⁷

There is a need to distinguish space debris according to size for the purposes of later provisions. This would clearly distinguish non-functional but otherwise intact space objects from fragments of erstwhile space objects, while also distinguishing pieces whose ownership can be ascertained from those whose ownership cannot be determined.

The proposed regime must also impose a duty on states to mitigate debris creation in accordance with the IADC or UNCOPUOS Guidelines.

The new instrument need not deal with the question of liability from scratch. It should defer to the Liability Convention for the most part. However, it should provide that debris creation due to violation of the guidelines provided already be seen as fault in case of collisions in outer space. It should also provide that a state shall not be held liable for damage under Article II of the Liability Convention if it had no responsibility for its space object turning into space debris.

For objects whose ownership cannot be ascertained, states which participate in space activities collectively reimburse for damage.

The law should also declare the important orbits of the Low Earth Orbit (LEO) and the Geosynchronous Orbit (GEO) to be protected regions from which satellites have to be removed near the end of their lives like the IADC and UNCOPUOS Guidelines have

¹⁵⁴ Michael Listner, *Addressing the Challenges of Space Debris, part 2: Liability*, THE SPACE REV. (Dec. 17, 2012), <http://www.thespacereview.com/article/2204/1> [<https://perma.cc/25WH-FW48>].

¹⁵⁵ G.A., Rep. of the Committee on the Peaceful Uses of Outer Space, on Its Sixty-Two Session, Supp. No. 20, at 17, U.N. Doc. A/62/20 18 (2007).

¹⁵⁶ Perek, *supra* note 44, at 400.

¹⁵⁷ ILA Draft Instrument, *supra* note 25, Art.2.

done.¹⁵⁸ These orbits are important for both scientific and commercial purposes, and it is important to prevent them from getting clogged with debris.

The law should also have a clear dispute settlement mechanism. The ILA Draft Instrument provides for such a mechanism in a tiered form, moving from consultations to binding dispute settlement through arbitration or adjudication.¹⁵⁹

Most importantly in today's world, the law should also require states to take responsibility for its non-governmental entities, similar to Art.VI of the OST. However, in light of growing privatization, this should be supplemented by a requirement for states to have domestic laws governing accidents, insurance and debris creation during private spaceflight.

8. CONCLUSION

Space debris is a real and rapidly growing concern, and while scientists and engineers come up with ways to deal with the problem, a robust legal framework is required.

However, it has been shown that the solution is not to extend the existing framework of space law to space debris, which it was never meant to regulate.

Rather, the solution is to use existing norms and apply them to the problem of space debris mitigation, which is the near-term problem. For a more sustainable solution to the problem of regulating space debris, a *sui generis* law needs to be formed, if not as a treaty, then as a model code endorsed by the UNCOPOUS. Such an instrument needs to arise from the Legal rather than Technical Subcommittee, and after adoption by the UNCOPOUS it should be presented for adoption by the General Assembly.¹⁶⁰

¹⁵⁸ IADC, *supra* note 141, at guideline 3.3.2; UNCOPOUS, *supra* note 20, at guideline 6.

¹⁵⁹ ILA Draft Instrument, *supra* note 25, art.9.

¹⁶⁰ Williams, *supra* note 26, at 332-34.