

Space Situational Awareness: Key Issues in an Evolving Landscape

Written Testimony of

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Before the

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Space, and Technology United States House of Representatives**

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Chairwoman Horn, Ranking Member Babin, Members of the Committee:
Thank you for inviting me to address the key legal and liability issues related to space situational awareness (SSA). I am delighted to respond. I thank the Subcommittee for giving me this opportunity.

I. The Legal Environment

I was invited today to provide a brief overview of the legal environment for SSA. Currently, the law applicable to SSA is an amalgam of treaties, contracts, and national law and regulation. One key element is orbital debris. Therefore, I will briefly address the existing international and national legal regimes and the available juridical fora for the adjudication of conflicts regarding debris. I will conclude by raising two crucial SSA issues for which new law is needed, 1.) the need to formulate international agreements to establish internationally recognized norms and to prevent small conflicts from escalating and, 2.) the gap in United States regulations regarding U.S. private sector on-orbit activities.

A. Space Treaty Regime, International Law, and National Law

Space is governed by an inter-related collection of space specific treaties.¹ The first, and most important of these is the Outer Space Treaty and it recognizes that space use and exploration “shall...[be]...in accordance with international law, including the Charter of the United Nations...”². This means that space is also governed by Public and Private International Law and includes International Humanitarian Law and important legal principles like the “inherent right of individual or collective self-defence”.³

Under the Outer Space Treaty the United States has “international responsibility” for space activities by “governmental agencies or by non-governmental agencies”.⁴ What constitutes “responsibility” is part of a growing

¹ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, opened for signature Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty];

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

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

Convention on Registration of Objects Launched into Outer Space, opened for signature Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention]; and,

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

² Outer Space Treaty, *supra* Note 1, at Art. III.

³ U.N. Charter art. 51.

⁴ Outer Space Treaty, *supra* Note 1, at Art. III.

body of law that has strengthened and matured in recent years⁵ The United States Government will ultimately be responsible for reparation if it is deemed necessary because of events arising from United States governmental or nongovernmental space activities.

The Outer Space Treaty also provides that a State Party has the obligation to “avoid...harmful contamination” and if a Party “has reason to believe that an activity...by it or its nationals in outer space...would cause potentially harmful interference...” with the space activities of other Parties “it shall undertake appropriate international consultations.”⁶

Regarding SSA and debris, the Liability Convention is of particular relevance. It codifies two liability regimes: a fault-based (negligence) regime applicable in space;⁷ and, an absolute liability regime for harm caused on Earth and to aircraft in flight.⁸ The first regime requires proving that the party that caused the harm knew, or should have known, its actions would lead to the harm. The second regime requires proving only that the responsible party’s object caused the harm. It is irrelevant that the responsible party was not negligent. The two different liability standards are based on the fact that if objects in space cause harm, the entities that placed the objects in space will be best situated to determine what caused the harm and who is the responsible party. In contrast, if the harm is caused on Earth or to an aircraft in flight, the injured party has no

⁵ James Crawford, Jacqueline Peel, Simon Olleson, *The ILC’s Articles on Responsibility of States for Internationally Wrongful Acts: Completion of the Second Reading*, 12 EJIL 963 (2001).

⁶ Outer Space Treaty, *supra* Note 1, at Art. IX.

⁷ Liability Convention, *supra* Note 1, at Art. III.

⁸ Liability Convention, *supra* Note 1, at Art. II.

way of knowing what did or did not happen in space to cause the harm. Therefore it would be unjust to require the harmed party to prove something it would be impossible to know.

An event involving the Outer Space Treaty and the Liability Convention and the creation of debris by a United States space object was the 2008 launching of the USA 193—an “engagement of an inoperable National Reconnaissance Office (NRO) satellite, which [was] in a decaying orbit.”⁹

The United States acted in accordance with the Outer Space Treaty and Liability Convention. “In the interests of transparency...consistent with the provisions of the 1967 Outer Space Treaty...” the United States informed the international community of the engagement. The U.S. further acknowledged that a party to the Convention “will be ‘absolutely liable’ for damages ‘caused by its space object on the surface of the Earth or to aircraft in flight.’ The U.S. is a party to that convention, so any liability to other treaty parties would be determined in accordance with its terms.”¹⁰

B. The IADC

The Inter-Agency Space Debris Coordination Committee (IADC) Mitigation Guidelines¹¹ is a non-treaty based source of guidance regarding orbital debris.

⁹ Statement by Ambassador Christina Rocca, Permanent Representative of the United States to the Conference on Disarmament, Geneva, February 15, 2008.

¹⁰ *Id.*

¹¹ United Nations, Report of the Scientific and Technical Subcommittee on its thirty-seventh session, held in Vienna from 7 to 18 February

These are a set of voluntary orbital debris mitigation guidelines that were formulated by the IADC—an international governmental forum comprised of the space agencies of satellite operating nations—for “the worldwide coordination of activities related to the issues of [human]-made and natural debris in space”. The guidelines were adopted in the UN General Assembly.¹² Although not legally binding, they provide persuasive authority for addressing orbital debris mitigation.

C. National Law

At the national level, orbital debris is slowly evolving as a matter of law. It is specifically addressed in the national laws of Austria, China, France, Japan, and the United States.¹³ Some of these laws address orbital debris as a distinct subject.¹⁴

In the United States, orbital debris is addressed as part of licensing space-based applications.¹⁵ These include telecommunications satellites licensed by

2000, A/AC.105/736, 2000,
http://www.unoosa.org/oosa/oosadoc/data/documents/2000/aac.105/aac.105736_0.html.

¹² United Nations, International Cooperation in the Peaceful Uses of Outer Space, A/RES/62/217, Office for Outer Space Affairs, 2007,
http://www.unoosa.org/oosa/oosadoc/data/resolutions/2007/general_assembly_62nd_session/ares62217.html.

¹³ UN Committee on the Peaceful Uses of Outer Space, *General exchange of information on national legislation relevant to the peaceful exploration and use of outer space*, A/AC.105/C.2/2012/CRP.8 (March 16, 2012).

¹⁴ Austrian Federal Law on the Authorization of Space Activities and the Establishment of a National Space Registry (Austrian Outer Space Act), entered into force on 28 December 2011. (Requires compliance with the “state of the art” and “internationally recognized guidelines for the mitigation of space debris”.) *Id.*, at 3.

¹⁵ 51 U.S.C.; 14 C.F.R. 400-499; NPR 8715.6A; NASA-STD 8719.14;

the Federal Communications Commission; commercial launches and re-entries licensed by the Department of Transportation; and, commercial remote sensing satellites licensed by the Department of Commerce National Oceanic and Atmospheric Administration.¹⁶

Telecommunication satellites license applications require including end-of-life disposal plans involving atmospheric reentry and surviving debris. Remote sensing satellites must be disposed of in a manner acceptable to the President.

II. Available juridical fora for the adjudication of conflicts regarding debris and SSA

A. Existing Options

There are a number of forum options available for bringing an orbital debris case. The Liability Convention recognizes that diplomatic channels are the first and preferred option.¹⁷ The Liability Convention has provisions for establishing a special Claims Commission in the event a settlement has not been reached through diplomatic channels.¹⁸ The courts, tribunals or agencies of the State responsible for launching the space object are also available.¹⁹ And, of course, any agreements between and among States outside of the treaties that provide for conflict resolution are also available.

U.S. Government Orbital Debris Mitigation Standard Practices; 47 U.S.C.; 47 C.F.R. Parts 5, 25, and 97; Order, FCC 04-130; 47 C.F.R. 25.160-162.

¹⁶ 47 C.F.R. Parts 5, 25, and 97; Order, FCC 04-130; 47 C.F.R. 25.160-162.

¹⁷ Liability Convention, *supra* Note 1, at Art. IX.

¹⁸ Liability Convention, *supra* Note 1, at Art. XIV, XV.

¹⁹ Liability Convention, *supra* Note 1, at Art. XI.

Recently, formal arbitration has been added to the roster of conflict resolution options. In 2011, the Permanent Court of Arbitration in The Hague developed *Optional Rules for Arbitration of Disputes Relating to Outer Space Activities*²⁰ and has added arbitration of space disputes to its dispute resolution services.²¹

III. Practical Considerations

As a practical matter, the existing legal regime and juridical fora, briefly outlined above, are unlikely to be used either by Nation-States or non-governmental space actors. And, if they do, they are likely to encounter a number of legal uncertainties, including the accepted definition of basic terms of art like “fault.”²²

As for Nation-States, seeking conflict in a juridical forum of any kind means rendering control of the situation to the forum. Nation-States are sovereigns and giving up control is anathema to their nature. Additionally, the possibility of exposing acutely sensitive technological and operational information is antithetical to national interests.

Nongovernmental entities have concerns about insurance. Potentially large losses and high levels of uncertainty regarding how losses occur, means

²⁰ <https://pca-cpa.org/wp-content/uploads/sites/6/2016/01/Permanent-Court-of-Arbitration-Optional-Rules-for-Arbitration-of-Disputes-Relating-to-Outer-Space-Activities.pdf>

²¹ Permanent Court of Arbitration, <https://pca-cpa.org/en/home/>.

²² Swiss Reinsurance Company Ltd., *Space Debris: On Collision Course for Insurers?* (2011) https://www.swissre.com/dam/jcr:b359fb24-857a-412a-ae5c-72cdf0eaa94/Publ11_Space+debris.pdf

rising insurance costs that can be a significant portion of overall launch costs.²³ Exposing information about intellectual property and technological vulnerabilities also present causes for concern. All of these are incentives for governmental and nongovernmental actors to seek settlement outside of available juridical fora.

In fact, the only case in which the Liability Convention was formally invoked by two of its States-Parties was in the 1978 *Cosmos 954* case. Canada claimed 6 million Canadian dollars for damage caused by radioactive debris from the re-entry of the malfunctioning Soviet satellite on Canadian Territory. Ultimately, Canada and the Soviet Union settled the claim for 3 million Canadian dollars.²⁴ The case demonstrates the Liability Convention worked by providing a formal forum for dispute resolution. The existence of a formal mechanism, and wanting to avoid it, provided, in part, the incentive to settle.

IV. Crucial SSA issues for which new law is needed

Space is not lawless. But the law is unclear. The changing nature of space operations and technology, and the ever-increasing reliance on space assets, has evolved into a legal environment in which there are serious legal gaps that must be addressed.

A. International Agreements to Establish Internationally Recognized Norms and to Prevent Small Conflicts from Escalating

²³ *Id.* at 23. “The drafters of the treaty shed little light on the meaning of ‘fault’ and the term as it appears in the treaty has never been tested in a formal way. Carl Christol, in *The Modern International Law of Outer Space*, suggests that if the drafters (representing many different countries and legal systems) had tried to define this term, they would still be working on the Convention.”

²⁴ Canada-Union of Soviet Socialist Republics: Protocol on Settlement of Canada’s Claim for Damages Caused by “Cosmos 954,” 20 I.L.M. 689 (1981).

As the amount of orbital debris continues to grow, it becomes increasingly necessary be able to detect the difference between active space objects and debris. For overall SSA, it is also increasingly necessary to share relevant information with appropriate entities in order to prevent relatively minor events from escalating into major conflicts. Currently, specific agreements with specific rules to do so are lacking.

The global community has little political will for making new legally binding treaties. Since the end of World War II non-binding agreements have proliferated: MOUs, declarations, guidelines, principles, codes of practice, recommendations, programs, charters, and terms of reference. The now stalled draft Code of Conduct for Outer Space Activities indicates that support for non-binding options is also faltering.²⁵

Nonetheless, new agreements—both binding and nonbinding—are needed. Some of the issues that must be addressed include the balancing of the national security value of data and the need to share data; applicable conflict resolution mechanisms; legitimacy of nongovernmental data providers; mistrust issues between governmental and nongovernmental providers; commercialization of SSA data; whether or not the Outer Space Treaty's obligation to avoid harm²⁶ includes providing information about the space

²⁵ Michael J. Listner, The International Code of Conduct: Comments on changes in the latest draft and post-mortem thoughts, *The Space Review*, (Oct. 26, 2015), <https://www.thespacereview.com/article/2851/1>.

²⁶ Outer Space Treaty, *supra* Note 1, at Art. IX.

environment; and, which technical and scientific standards will be recognized; among others.

B. Regulatory Gap in United States Regulations

At the national level, the United States has a profound regulatory gap regarding authorizing private sector on-orbit activity.²⁷ No federal regulatory agency has jurisdiction to “authorize and continually supervise”²⁸ private sector on-orbit activities. This is occurring at the same time the United States is planning to increase its reliance on the public sector in space.²⁹

In 2015, Congress required a report from the Office of Science and Technology Policy (OSTP) on how the United States could authorize and

²⁷ See, for example, Subcommittee on Space of the Committee on Science, Space and Technology, U.S. House of Representatives, Hearings on Space Traffic Management: How to Prevent a Real Life “Gravity,” May 9, 2014, <https://science.house.gov/legislation/hearings/space-subcommitteehearing-space-traffic-management-how-prevent-real-life>; and Hearings on Exploring Our Solar System: The ASTEROIDS Act as a Key Step, September 10, 2014, <https://science.house.gov/legislation/hearings/subcommittee-space-exploring-our-solar-system-asteroids-act-key-step>.

²⁸ Outer Space Treaty, *supra* Note 1, at Art.VI.

²⁹ NASA, Forecasting Future NASA Demand in Low-Earth Orbit: Revision Two – Quantifying Demand, Forecasting Future NASA Demand in Low-Earth Orbit: Revision Two – Quantifying Demand. (2019). https://www.nasa.gov/sites/default/files/atoms/files/forecasting_future_nasa_dem_and_in_low-earth_orbit_revision_two_-_quantifying_demand.pdf; and, NASA, NASA Plan for Commercial LEO Development to achieve a robust low-Earth orbit economy from which NASA can purchase services as one of many customers. (2019). https://www.nasa.gov/sites/default/files/atoms/files/commleodevt_plan_6-7-19_final-links-new.pdf

continually supervise private sector on-orbit activities to meet its Outer Space Treaty obligations.³⁰ OSTP proposed legislation that would establish “an interagency process in which designated agencies would review a proposed mission in relation to specified government interests, with only such conditions as necessary for fulfillment of those government interests.”³¹ To date, this has not been done. Due to political forces that attempted to eliminate most authorizing legislation, no legislation has been promulgated for on-orbit activities. Since 2015, only one payload review has been conducted and it is not a precedent for future reviews.³² If the private sector will participate in future on-orbit SSA activities, it will be necessary to have a clear regulatory regime that protects them and United States national interests.

³⁰ U.S. Commercial Space Launch Competitiveness Act, P.L. 114-90. (2015), Section 108.

³¹ Executive Office of the President, Office of Science Technology Policy, Report submitted in fulfillment of a requirement contained in the U.S. Commercial Space Launch Competitiveness Act, April 4, 2016 (“Section 108 Report”). https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/csla_report_4-4-16_final.pdf.

³² FAA, Fact Sheet—Moon Express Payload Review Determination, August 3, 2016, https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=20595. (“This determination does not extend to future missions by Moon Express, Inc. or similar missions from other entities. Any future requests for a payload determination from Moon Express, Inc. or another entity will be evaluated on a case-by-case basis...Future missions may require additional authority to be provided to the FAA to ensure conformity with the Outer Space Treaty.”)

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Prof. Gabrynowicz is Professor Emerita of space law, Director Emerita of the National Center for Remote Sensing, Air, and Space Law, Univ. of the Mississippi Law Center and the Editor-in-Chief Emerita, Journal of Space Law. She managed a faculty and staff of 6 - 8 people, 10 - 15 student workers, and a multi-million dollar budget.

Prof. Gabrynowicz has taught space law since 1987 and currently lectures at various universities around the world including the University of Vienna, the Univ. of Warsaw, the Univ. of Copenhagen, and the Beijing Institute of Technology School of Law, and Beijing University of Aeronautics and Astronautics. In 2014, 2015, and 2019 she was invited by the Subcommittee on Space of the U.S. House Committee on Science, Space, and Technology to testify regarding the legality of asteroid mining; remote sensing law; and, commercializing the *International Space Station*. She is currently a Fulbright Scholar and a member of the Ad-Hoc Remote Sensing Space Systems Advisory Committee for the Government of Canada, Global Affairs Canada. Prof. Gabrynowicz briefed former U.S. Secretary of the Interior Gayle Norton as part of the Secretary's preparation for the Earth Observation Summit. Prof. Gabrynowicz briefed Frank A. Rose, Deputy Assistant Secretary for Space and Defense Policy, U.S. Department of State on legal aspects of orbital debris. She was the organizer and chair of the U.S. Federal Advisory Committee for the National Satellite Land Remote Sensing Data Archive.

Prof. Gabrynowicz was a founding faculty member of the Space Studies Department at the University of North Dakota, where she also served as its Director of Graduate Studies. From 1992-94, Prof. Gabrynowicz was a member of The Congress of the United States Office of Technology Assessment Earth Observations Advisory Panel. From 1994-96, she was a member of the National Research Council Committee that produced *Bits of Power: Issues in Global Access to Scientific Data*. In 1994-95, Prof. Gabrynowicz was awarded a NASA/American Society of Engineering Education Summer Faculty Fellowship from Goddard Space Flight Center where she also served as the 1997 Dean of the NASA Space Academy. Prof. Gabrynowicz has been invited by the U.S. Dept. of Commerce/NOAA, the U.S. National Research Council, the NASA Public Health Applications Program on Confidentiality and Geospatial Data, the Univ. of Cologne Institute of Air and Space Law to participate in a number of studies. Prof. Gabrynowicz was the managing attorney of a NYC law firm. She is a member of the American Bar Association Forum on Aviation and Space Law.

Prof. Gabrynowicz is a Director of the International Institute of Space Law (IISL) and is an official observer for the IISL to the UNCOPUOS Legal Subcommittee and has made a number of presentations to that group on space law issues. She was a member of the Advisory Board for the Permanent Court of Arbitration for the Draft Arbitration Rules on Disputes Relating to Outer Space Activities and has presented to the UN Institute for Disarmament Research. The UN Office of Outer Space Affairs (UNOOSA) invited Prof. Gabrynowicz to lecture on space law at all of its space law capacity building workshops for government officials and policymakers and she is the lead author for UNOOSA's remote sensing law curriculum. In 1999, the IISL invited Prof. Gabrynowicz to write and present the remote sensing law position paper at UNISPACE III. In 2001 she was awarded the Women in Aerospace *Outstanding International Award*. In 2011 she was awarded the IISL *Distinguished Service Award*. In 2014, Prof. Gabrynowicz received the China Institute of Space Law *1st International Service Award*. In 2016, she was awarded the IISL *Lifetime Achievement Award*. In 2017, her work was recognized by the International Astronomical Union by naming an asteroid "(9002) Gabrynowicz"