



Space Law for the Future

Student Perspective

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Space Law for the Future

For millennia, human beings all across the globe have been exploring outer space. Looking up at the stars, building tools and sharing the discoveries those tools have enabled, and searching for more as new questions arise seem to be universal constants for humans from all cultures and places. It was not until the second half of the 20th century, however, that this will to explore the stars became a major priority for nations, implicating national security, political and foreign relations actors, and establishing the foundation for massive growth in private access to outer space.

The birth of the Space Age required with it the birth of many new legal standards to govern activities in space. As defined by Milton Smith, distinguished J.D. in the field, space law is “the collection of international and national laws governing space-related activities. Space law addresses a wide assortment of matters, such as the freedom of use and exploration of outer space by all nations, protection of the space and Earth environments, liability for damages caused by space objects, dispute resolution, rescue and return of astronauts and space objects, sharing of information about potential hazards in outer space, prevention of harmful interference, use of space-related technologies, licensing of satellite launches, and international cooperation”¹. This paper will synthesis and discuss the international and domestic schema of “space law”, its

¹ Smith, M. “A Space Law Primer for Colorado Lawyers”. *Colorado Lawyer*. May 2018. (pp. 43-49).

application to commercial activities in space, and address some of the potential gaps within the field.

International Laws

Internationally, there exists a foundational body of United Nations (UN) treaties that governs the activities in space of those states parties to the treaties. Considered the “*magna carta*” of space law, the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies², conveniently dubbed the **Outer Space Treaty**, was entered into force by the UN in 1967 and serves as a foundation for subsequent international and domestic policy. It broadly establishes freedom of use, non-appropriation, state responsibility, registration provisions, communication, and cooperation guidelines, amongst other things. A key provision of the Outer Space Treaty is the extension of the UN Charter and customary international law to space, allowing any gaps to be filled with other legislation. The treaty is very broad and has required much interpretation. One contentious point of interpretation is the designation of space as “province of all mankind”, with astronauts being considered “envoys of mankind”. This provision has sparked controversy over the concept of *res communis* as it relates to private ownership in space. This concept will be further elaborated in the discussions of the Moon Agreement, Space Mining, and the section on Application to Business and Private Research.

The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space³, known as the **Rescue and Return Agreement** exists to

² Outer Space Treaty, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205, www.state.gov/t/isn/5181.htm.

³ Rescue and Return Agreement, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119, www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/rescueagreement.html .

provide protections for personnel of a spacecraft. If personnel or objects land in a party state's territory, it requires the state to take all "possible" steps to return personnel to their launching state and, upon request of a launching state, requires them to take all steps "practicable" to return objects. In the event that personnel land in the high seas, the Agreement also requires that all parties that are able to help do so in aiding the rescue and return of personnel.

To address issues of liability, the UN has adopted the Convention on International Liability for Damage Caused by Space Objects⁴, or the **Liability Convention**, with the objective being "full and equitable compensation for damage caused by space objects"⁵. This Convention provides more specific terms than the Outer Space Treaty and establishes absolute liability of launching state(s). It also established a Claims Commission to mediate claims of liability between states parties to the Convention. The Claims Commission, however, is seldom used because proving liability due to fault of the launching state can be difficult due to space's limited "rules of the road". Likewise, in joint launching efforts involving multiple states, the states are jointly and severally liable for damages caused by their object, further complicating liability assignment and collection of potential damages.

The Convention on Registration of Objects Launched into Outer Space⁶, or the **Registration Convention**, established National and UN registries for space objects, detailing basic information of each object including launching nation, date and location, orbital parameters and general function. Per the Convention, the registration must be made as soon as is "practicable" after launch. The Convention does not require that information about objects be

⁴ Liability Convention, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187, www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/liability-convention.html.

⁵ Smith, M. "A Space Law Primer for Colorado Lawyers". *Colorado Lawyer*. May 2018. (pp. 53).

⁶ Registration Convention, Nov. 12, 1974, 28 U.S.T. 695, 1023 U.N.T.S. 15, www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/registration-convention.html.

updated after their initial launch. The UN also administers the International Telecommunications Union (ITU) which keeps the Master International Frequency Register (MIFR) that helps track and protect communications satellites orbiting Earth.

Unlike the previous treaties, conventions and agreements, the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies⁷, or the **Moon Agreement**, only has 17 Parties, none of which are major space powers, so it is considered more of an academic resource than a legal one. It largely expands upon Articles I and II of the Outer Space Treaty regarding freedom of use and non-appropriation of celestial bodies. Additionally, it states that no state may claim ownership or property rights to the Moon, any of its surface or subsurface, or the natural resources “in place”, though whether ownership of such resources once they are extracted is prohibited or not is left to be interpreted. The Moon and other celestial bodies, and resources thereupon are defined in the Agreement as the “common heritage of mankind”, a term that, like “province of all mankind” in the Outer Space Treaty, has triggered a debate on its interpretation. One of the arguments is that this “common heritage of mankind” principle means that ownership of potential resources extracted from the Moon are commonly owned by all states, therefore entitling each to the economic benefits of the resources, even those states that do not contribute to the extraction efforts. This interpretation is favored among states in the developing world. The other argument follows the trend of *res communis* that we see in previous space law doctrines and would allow the exploitation of celestial bodies for gain by private and state actors, much as we see with the use of the high seas and its resources. This interpretation, naturally, is preferred by states with sophisticated space technologies and healthy participation from the private sector.

⁷ Moon Agreement, Dec. 18, 1979, 1363 U.N.T.S. 3, www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/moon-agreement.html.

As the issue of appropriation of celestial bodies has yet to become a thoroughly explored topic, there is considerable space here for more universally consistent and actionable law to guide this area of space advancement as it develops.

Each of these international doctrines is important in establishing a foundational understanding of the legal scheme that govern activities in space. As such, these doctrines serve as a basis for the policies and regulations of individual states that utilize space. Here we will examine the key domestic laws in the United States.

Domestic (US) Laws

While much of the policy work is accomplished by these UN treaties and agreements, their regulatory administration is accomplished largely by individual states. The United States has the most robust domestic legal environment for space law and oftentimes acts as a model for other states in developing legal regimes. As we will see upon further review of domestic law, the US tends to favor the commercialization of space activities, meaning its laws need to be relevant and accessible to private firms involved in such activities. The simplest way to study the network of US laws that impacts space activities will be by looking at each area of law separately. We will examine the policy, regulation and statutes that govern space launch, remote sensing and communications satellites, NASA activities and space mining. Much of the regulatory law stems from policies such as the Commercial Space Launch Act (CSLA) and is focused on implementation of policy, so these two aspects can be examined closely. There are additionally relevant US statutes, however, that are not directly based on space policy, but are important in understanding the legal regime as a whole.

Space Launch

The United States pushes a pro-commercial stance in its exploration of outer space. This is exemplified in the Commercial Space Launch Act (CSLA) of 1984⁸. This policy requires persons (be they individuals or corporation) to be properly licensed and in compliance with all Federal law prior to launching any payload into outer space from within US territory or, for US citizens, outside of it. It allows the use of government property for conducting commercial launch activities and requires liability insurance. The CSLA also designates regulatory authority to the Secretary of Transportation and allows the Secretary to revoke licenses and suspend any launch operations for failing to comply or if there is risk to public safety, national security of foreign policy⁹. Commercial launch is regulated by the Federal Aviation Administration's (FAA) Office of Commercial Space Transportation under the Secretary of Transportation.

Title 14 of the Code of Federal Regulations (CFR) contains details on the process of obtaining a license to launch (part 415); to operate a launch site (part 420); for the launch and reentry of reusable vehicles (part 431); to operate a reentry site (part 433) and; for the reentry of vehicle other than reusable launch vehicle (part 435)¹⁰. At present and in spite of proposals to assign responsibility to the FAA, there remains a regulatory gap in monitoring on-orbit operations by any US agency¹¹.

⁸ Commercial Space Launch Act of 1984, as amended (CSLA) and re-codified in 51 USC Ch. 509 §§ 50901 to 50923.

⁹ Akaka, D. (1984, October 30). H.R.3942 - 98th Congress (1983-1984): Commercial Space Launch Act. Retrieved June 01, 2020, from <https://www.congress.gov/bill/98th-congress/house-bill/3942>

¹⁰ 14 CFR §§ 413.1 to 413.23.

¹¹ Smith, M. "A Space Law Primer for Colorado Lawyers, Part 2". *Colorado Lawyer*. May 2018. (pp. 45).

Satellites- Remote Sensing

Remote sensing using satellites in Earth's orbit has become a vital part of modern sciences and is integral to many of the technologies used by military, humanitarian, economic and business organizations on a daily basis. Like most activities in space, the US has taken a pro-commercial stance in how this utilization of space is policed. The US Commercial Remote Sensing Space Policy¹², passed in 2003, outlines the government's commitment to rely on commercial providers of remote sensing wherever economically possible and safe for national security in order to develop a long-term and sustainable relationship between the commercial remote sensing industry and the government. The policy also outlines the US's commitment to providing a responsive regulatory environment and supporting the industry in its endeavors to be competitive in foreign markets. Commercial remote sensing activities are policed under the Land Remote Sensing Policy Act (LRSPA), which encourages accessibility of data, and commercial and scientific cooperation among nations.

The LRSPA gives authority to the Secretary of Commerce to provide licenses to private systems, and unenhanced data to foreign nations and other actors¹³. This authority has been delegated to the National Oceanic and Atmospheric Administration (NOAA). Like commercial launch, the CFR contains specific provisions to regulate the remote sensing industry. According to the Title 15 of the CFR, licensees must give complete orbital information to NOAA and send immediate notification in the event of a deviation. Likewise, licensees must dispose of defunct satellites in "a manner satisfactory to the US President"¹⁴. The unenhanced data collected via

¹² Office of Space Commercialization. (n.d.). U.S. Commercial Remote Sensing Space Policy. Retrieved June 01, 2020, from <https://www.space.commerce.gov/policy/u-s-commercial-remote-sensing-space-policy/>

¹³ Land Remote Sensing Policy Act, as amended, 51 USC §60101 to §60162.

¹⁴ 15 CFR § 960.3.

remote sensing that must be shared with foreign entities, per UN Principles on Remote Sensing, but may be withheld for reasons of national security and on terms that data be used solely for noncommercial purposes. In addition, the holders of remote sensing licenses must continuously maintain control of their systems from within the US and permit US agents to monitor and ensure compliance of operations¹⁵.

Remote sensing is a massive part of the Earth activities that occur in outer space. Likewise, it is a major example of international collaboration and cooperation in regards to space activities. This and communications satellites are two areas that are informing the future of international relations in space, and are aspects of the space industry that have the power to meaningfully impact life on Earth.

Satellites- Communications

Communications satellites are the most common commercial use of outer space. Internationally, satellite communications systems are regulated through the International Telecommunication Union (ITU)¹⁶, which provides licensure to operators of communications satellites. The Telecommunications Act of 1996 created the Federal Communications Commission (FCC), which is tasked with regulating non-governmental use of radio communications and whose authority is applied to outer space. The FCC regulates geo-stationary and non-geostationary orbiting communications satellites and participates in the reporting and regulation of the ITU, including filing on behalf of US parties for licenses. It has also put forth orbital debris mitigation rules to preserve affordable, safe, and reliable use of space-based

¹⁵ The Principles Relating to Remote Sensing of the Earth from Space, G.A. Res. 41/65 (Dec. 3, 1986), www.unoosa.org/pdf/gares/ARES_41_65E.pdf.

¹⁶ Smith, M. "A Space Law Primer for Colorado Lawyers, Part 2". *Colorado Lawyer*. May 2018. (pp. 46).

communication services, which have been recently update in April 2020 to account for the number of non-geostationary systems expected to join existing satellites in the already-crowded low Earth orbit (LEO)¹⁷. This recent update includes more specific guidelines for debris mitigation disclosure plans, numerical calculation of collision risk, extended tracking and post-mission disposal, re-entry casualty risk, and new disclosure requirements for protecting inhabitable spacecraft with the specific goal of preserving the space environment for “continued investment, deployment, and innovation in space-based services”¹⁸.

NASA Activities

The Space Act of 1958 birthed the National Aeronautics and Space Administration (NASA) and designated its many objectives and operational activities. Per the Space Act, NASA has the power to enter into Space Act Agreements¹⁹. This power allows for NASA to form relationships with a vast network of private and public sector actors to accomplish its missions and further the development of space research internationally. There are provisions in the Space Act that delegate US liability obligations of Article VII of the Outer Space Treaty and the Liability Convention to NASA, giving NASA the authority to provide liability insurance to any user of a space vehicle. Understandably, to the extent that they are compensated by insurance, NASA may indemnify a user against claims, but such claims may not extend to the user’s actual neglect or willful misconduct²⁰.

¹⁷ Federal Communications Commission. (2020, April 24). In the Matter of Mitigation of Orbital Debris in the New Space Age. Retrieved June 01, 2020, from <https://docs.fcc.gov/public/attachments/FCC-20-54A1.pdf>

¹⁸ Federal Communications Commission. (2020, April 23) FCC Updates Satellite Orbital Debris Mitigation Rules. Retrieved June 01, 2020, from <https://docs.fcc.gov/public/attachments/DOC-363947A1.pdf>

¹⁹ Osbourn, C. (2015, June 24). Authority to Enter into Space Act Agreements. Retrieved June 01, 2020, from <https://www.nasa.gov/offices/ogc/about/samanual.html>

²⁰ National Aeronautics and Space Act of 1958, as amended, 42 USC §§ 2451 to 2484 (Pub. L. No. 85-568 (1958)); re-codified in 51 USC §§ 20102 to 20164.

Space Mining

Space mining, though not a practice today, is a major area of interest as humans become more active in space, particularly for commercial actors. The Commercial Space Launch Competitiveness Act of 2015 contains extensive provisions on space mining, indicating that the president shall “facilitate commercial exploration for commercial recovery of space resources by United States citizens” and that a “United States citizen engaged in commercial recovery of an asteroid or space resource...shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell..., in accordance with applicable law, including international obligations of the United States”²¹. As no space mining has occurred to date, the application of these policies has yet to be tested. It will be curious, therefore, to see how the future of this area of the space industry develops when activity does begin occurring. Particularly, the contentious (though largely academic) debate over the *res communis* concept that is so salient in UN doctrines as a function of the common heritage of mankind principle. To date, very little international objection has arisen against US policies regarding the appropriation of resources from celestial bodies.

Relevant Statutes

There of course exist statutes that may prove relevant to activities in space, but are not specifically written for application in space. A general rule of thumb when applying non-space-related statutes to outer space activities is to treat them similarly to the high seas, because space law is considerably based on customary aviation and maritime law. For domestic application, the Federal Tort Claims Act (FTCA) is relevant in that it establishes guidelines for suing federal

²¹ Commercial Space Launch Competitiveness Act of 2015. Pub. L. 114-90, 129 Stat. 704 (2015).

government entities for wrongful or negligent actions of employees or independent contractors who are treated as employees²². The FTCA would extend to damages caused by NASA research or objects, and potentially to those private contractors that work so closely with NASA.

Internationally, a US statute that is important to consider is the Foreign Sovereign Immunities Act (FSIA).

The FSIA arises in questions of legal liability between foreign states and the US or US parties that occur in US territory as a result of space activities, or that impact US people and property in space. Such actions have occurred in Earth's orbit, as states may choose to destroy, move or deorbit objects. While states, private entities and private citizens can all be damaged by outer space activities, the Liability Convention and other doctrines tend to favor sovereign states. In cases that involve the US, or where the US may be the forum, some aspects of FSIA exceptions may apply, allowing legal action to be taken in the US against foreign sovereign states. These exceptions include waiver of foreign state sovereign immunity in the following cases: of agreements that dictate such; commercial activities of foreign states that cause a direct effect in the US; if the taking of property in violation of international law is in question; for the enforcement of arbitration agreements; additionally, the FSIA contains exceptions for certain maritime liens against vessels or cargo involved in commercial activity that, like much of maritime law, may be the basis for similar exceptions related to spacefaring vehicles. Ultimately, the court will determine applicability of FSIA exceptions in cases regarding space, where no foreign law is applicable.

²² United States House of Representatives. (n.d.). Federal Tort Claims Act. Retrieved June 01, 2020, from <https://www.house.gov/doing-business-with-the-house/leases/federal-tort-claims-act>

Application to Business and Private Research

The Commercial Space Launch Competitiveness Act (see section on Space Mining) contains provisions and legal interpretations that are particularly applicable to commercial activities in space. Namely, it represents a *res communis* interpretation of the “province of all mankind” and non-appropriation principles of the Outer Space Treaty and Moon Agreement that have been so academically contentious. Though little by way of actual exercise of these provisions by US citizens has occurred since the passage of the Act in 2015, there has been very little international objection to it while other states work to adopt similar policy stances.

The US’s CSLA is particularly favorable to the development of a robust private space sector and contains provisions that protect private spaceflights from additional regulatory oversight until October of 2023, except in cases involving death or serious injury²³. This allows additional freedoms for companies like SpaceX, Virgin Galactic and others to invest significantly in research and development of spacefaring technologies without fear that governmental regulators will play a substantial or burdensome role in such activities.

The parallel development of public and commercial endeavors in space has allowed for substantial marriage of the two, particularly in projects requiring massive financial and scientific resources such as the Commercial Orbital Transportation System and the Commercial Crew Program. These were funded Space Act Agreements and were instrumental in efficiently expanding capabilities for US space launch. Many space companies including SpaceX, Orbital ATK and Sierra Nevada Corporation have benefitted from these partnerships²⁴ and proven the

²³ 51 USC § 50905(c)(9).

²⁴ Smith, M. (2019, December). United States - The Space Law Review - Edition 1 - TLR. Retrieved June 01, 2020, from <https://thelawreviews.co.uk/edition/the-space-law-review-edition-1/1211979/united-states>

importance of such to the future success of the space program. Just this May 2020, the first ever commercial flight of humans was successfully executed by SpaceX in conjunction with NASA's Launch America²⁵ program.

There are many organizations moving into the space industry as it experiences a second wave of public importance and technological evolution. Much of the success of private actors in the field is contingent upon fruitful governmental relationships, particularly with space agencies globally. Those US companies that have succeeded thus far have done so by winning Space Act Agreements and other forms of partnerships with NASA, sometimes before proving fully capable. These contracts are hugely important to NASA and to the viability of the companies that win them. As efficiency continues to be key while the industry widens in scope, these will provide opportunities for companies to become involved in the industry.

Addressing Gaps

The argument exists that there is an insufficient legal regime to properly regulate activities in space. Conversely, there is evidence that the opposite is true. Generally, there is a large base upon which laws can be interpreted as is necessary, and most of the activities that are now occurring and are soon to occur will be adequately monitored. However, there are some areas of the field that present significant challenges, if not gaps outright, due to the unique nature of space activities. In reality, it is likely that these gaps will be addressed as legal problems arise and a body of case law develops to set precedent, particularly for individual states that involve themselves in the utilization of outer space.

²⁵ NASA. (n.d.). Launch America - a partnership between NASA and private space companies – will help open the space above Earth to people besides government astronauts. Retrieved June 01, 2020, from <https://www.nasa.gov/specials/dm2/>

It is important to note that while the CSLA and FAA regulations apply to the launch and reentry of space objects, there is no regulation of on-orbit operations by the FAA or any agency. Although there have been proposals to assign responsibility for on-orbit transportation to the FAA or another agency, this regulatory gap remains²⁶. Similarly, the international regulation of on-orbit objects, as established in the Registration Convention, does not contain specifics for regulation or manipulation of objects once they are in orbit. This gap in regulation is evermore impactful as Earth's orbit becomes more crowded with satellites and debris. It proves to be an area of law that needs prompt clarification both domestically and internationally if Earth's orbit is to remain viable and persons and property are to remain safe in orbit.

States assume significant liabilities on behalf of their commercial actors. This has proven critical in creating domestic ecosystems that are safe for private investment in space technologies. However, it may not be a sustainable model for long-term viability of the industry. The Liability Convention, while giving legal preference to sovereign states, places much liability on states for damages caused by public and private efforts alike. While policies like the CSLA allow the US to release certain liabilities for personal and property risks associated with space flight, the US otherwise absorbs much of the potential international risk of such activities per its obligations to the Liability Convention and Article VII of the Outer Space Treaty. The system of NASA's providing liability insurance to users of space vehicles helps to mitigate the financial burden on private actors of potential claims by third parties but still requires that NASA use its resources to aid in resolving such claims. Likewise, sovereign governments are individually absolutely liable for any damages caused by private organizations operating within their authority, and how that liability is reassigned domestically depends on each state's legal

²⁶ Smith, M. "A Space Law Primer for Colorado Lawyers, Part 2". *Colorado Lawyer*. May 2018. (pp. 45).

infrastructure. This liability, and the potential limitations on scope and consistency, should be considered as private entities become more prevalent, more powerful and more international in the scope of their operations.

Domestically, an area of critique within the industry is that regulatory bodies are often very slow to review applications for things like space launch and satellites²⁷. This has been cited as a burden on the private sector and will need to evolve with it. Additionally, there is limited expertise, from a legal perspective, to navigate the regulations that exist and shape those that are proposed or need to be²⁸. This is an area of lag more so than a gap, as more lawyers are moving into the field as the demand for them grows.

An important differentiation between space law and typical domestic law is the hyper-international and collaborative nature of outer space affairs. The legal regime that governs Earth-bound foreign policy may not be sufficient for establishing efficient and/or universally beneficial (be that a constant objective of using outer space) laws to govern Earth's orbit and beyond. Already, the system is fractured by state enforcement of domestic and international policies. We are seeing more of a transition to global consensus of the general purposes of space exploration, but are lagging in the effective and consistent facilitation of those purposes. Scholars such as Vladimir Mandl ("the father of space law") have advocated for this type of separate legal system since the early 20th century in anticipation of outer space becoming the next frontier for resource exploitation²⁹. Though unprecedented, an international legal regime might be more effective and

²⁷ Smith, M. "A Space Law Primer for Colorado Lawyers, Part 2". *Colorado Lawyer*. May 2018. (pp. 46).

²⁸ Smith, M. "A Space Law Primer for Colorado Lawyers, Part 2". *Colorado Lawyer*. May 2018.

²⁹ Stroud, J. "Space Law Provides Insights on How the Existing Liability Framework Responds to Damages Caused by Artificial Outer Space Objects". *Real Property, Probate and Trust Journal*, Vol. 37. 2002. (pp. 363-388).

efficient at enabling the safe use of outer space to the benefit of all humankind, empowering space to truly be the “province of all mankind”.

Another question that arises, particularly as a result of the contentious topics discussed in the Moon Treaty is whether or not there should be a legal structure to ensure (or at least encourage) more equitable access to space internationally. When we consider the policies that declare outer space the province of all mankind, which most nations adhere to, there may be political reason to regard this notion more seriously and develop space law in a way that more tangibly manifests it. Furthermore, as an international community that largely considers space exploration and utilization a beneficial component of development, and one that contributes to all UN Sustainable Development Goals (UNSDGs), there is something to be said that more equitable access to space may lead to better utilization of it and an increased wealth of knowledge for its leverage as a benefit to all humankind.

Conclusions

Space law is a developing and intricate area of international legal work, governing everything from LEO to celestial bodies within our solar system and, as far as we know, beyond it. Though much has been done over the past century to prepare the international community for the increased human presence in outer space, the jury is still out on some questions ranging from the fundamental (what does property mean on celestial bodies?) to the operational (how can one sovereign state seek damages of another for dangerous commercial activities?). While these questions will be answered as case law and a better understanding of the uses of space emerge, the current legal frameworks prove mostly adequate for regulating today’s activities in space. Since the Outer Space Treaty was ratified, the international goal of space exploration tends to be in making space a peaceful, beneficial place for all people, particularly here on Earth.

Where public agencies used to dominate the research and development of the space industry, private actors are moving in with efficiency and, eventually, profit in mind. Space law is evolving to reflect these developments and anticipate what the next will be. The blending of public and private work, and the blending of space law with international and domestic law will make this field particularly interesting and particularly challenging as the next chapter of the space age continues. Ultimately, this is a complex and growing field of law where there is much to learn and precedent to be made in order that space be harnessed to service the benefit of mankind.



Case Study: Mission Shakti

India's Antisatellite Test

Earth's orbit is getting crowded- dangerously so. And, with record numbers of applications for remote sensing and communications satellite launch licenses, it is expected to become more crowded each year. In April 2019, India joined the United States, China, and Russia as a nation capable of destroying objects in space as it successfully executed an anti-satellite (ASAT) mission in lower Earth orbit (LEO) completely by indigenous (domestic) means. While this is a major accomplishment for India's space program, the mission, titled

“Mission Shakti”, shakti being the Hindi word for “power”, garnered significant dissent from the international community. Most notably, NASA’s administrator, Jim Bridenstine, publicly spoke out against the act, calling it “[in]compatible with the future of human spaceflight” and claiming it was riskier than Indian officials led the public to believe (Schultz, 2019).

There are two major concerns resultant from this test mission: space security and orbital debris. The test was executed by India’s military and successfully shot down a satellite from Earth at about 300 kilometers away. Prime Minister Narendra Modi announced the mission’s success, a convenient two weeks prior to parliamentary elections, and noted that “India stands tall as a space power!” (Schultz, 2019). The Indian government also released a number of media publications and broadcasts, highlighting “the Government of India’s responsibility to defend the country’s interests in outer space” (Gouyon Matignon, 2019). Many critics see this move and subsequent broadcast of its success as political opportunism, especially as India is typically less overt with the goings on of its space program.

The type of ASAT used in the Shakti mission, a “kinetic-kill” ASAT, destroys its target by colliding into it in the atmosphere, much as a torpedo would a submarine in the sea. These types of ASAT maneuvers often result in a cloud of debris that could exist in LEO for up to a year before disintegrating or falling back to Earth, which is exactly what happened with Mission Shakti. According to Bridenstine, NASA identified 400 pieces of orbital debris, including 60 or

so trackable pieces of at least ten centimeters. In addition, two dozen pieces were identified above the ISS's highest orbital point. The ISS had six astronauts on board at the time. These pieces of debris travel at incredible speeds and even the smallest collision with the ISS could jeopardize the lives of its crew and the critical research that is being accomplished onboard.

The risk these types of maneuvers pose to the security and orbital debris issues in space are fairly clear from a practical standpoint, but what does this mean legally speaking? Space law is a complex branch of law that blends domestic, international and space specific laws to regulate activities in space and on Earth relating to space. The general consensus internationally is that space should be used only for peaceful purposes, to the benefit of all mankind. Here the term "peaceful" becomes a point of interpretation, and potential disagreement. While a broad interpretation would mean non-military, a narrower one would mean non-aggressive. Many states are engaged in military uses of space for peaceful purposes, such as observation and communication satellites in LEO, meaning that operations can be both military and peaceful. This has largely held true as the field has developed, yet major players, now including India, have all exercised military operations in space. While not necessarily a non-peaceful act, having successful ASAT capabilities is a bold military statement by any nation.

Per Article IV of the Outer Space Treaty, which India has ratified, no states parties to the treaty are able to place nuclear or other forms of weapons of mass destruction in orbit. Nor may

they install such on any celestial body or station them in outer space by other means. Likewise, the testing of any weapons and the establishment of military bases on celestial bodies is forbidden and military personnel are not allowed to perform scientific research or other peaceful activities on celestial bodies (Outer Space Treaty, 1967). Basically, this means that, while some areas of space are to be completely devoid of military activity and weapons, other areas may have some weapons, and certain weapons may not be in space at all. Mission Shakti was, legally speaking, an allowable military maneuver under Article IV of the Outer Space Treaty. This means that the US or any other state or private party that dissented to the mission would not be able to take legal action against India on grounds of the test's permissibility.

Article IX of the Outer Space Treaty may be where states opposed to the action could make a claim against India as it provides that states must exercise regard in corresponding with other state interests while conducting their own activities and that states that have reason to believe their activities may interfere with the peaceful activities of other states must seek consultation before executing the experiment (Outer Space Treaty, 1967). India defended the test by pointing out the risk to the ISS from debris existed for only ten days after the test, during which time no damage actually occurred. In space, however, where even the slightest variables in risk pose devastating threat, it is safe to imagine how different this conversation would be if, during that ten-day period, damage had been done to the ISS, which hosted astronauts from the US and Canada and cosmonauts from Roscosmos. Regardless of the result, Article IX of the

Outer Space Treaty is a provision obligating *conduct*, meaning that claims could be made against India for having violated the Treaty's requirements for disclosing the threat to the international community prior to the test.

Beyond the legality of these types of state-sponsored activities in space, there already exists an increasingly precarious environment as space powers engage in what could very well be called an arms race to achieve the strongest position in space internationally. Aside from India, we see this in China's continual improvement of its ASAT capabilities and the US's establishment of a space-faring branch of the military known as "Space Force". This situation is particularly pressing as space becomes more commercialized, adding to the uncertainty and safety of current and potential operations. History has shown that commercial involvement in space-faring endeavors may very well be the most efficient route for harnessing space's potential to benefit all of mankind. Recognizing this, China and Russia have both begun work on a disarmament treaty to stall the arms-race variety of tensions that are growing, with Russia having extended an invitation to India to join the effort. (Purohit, 2019). This would both protect public and private research endeavors in space, and set a strong expectation for international compliance with existing space law.

In conclusion, India's Shakti Mission demonstrated the uncertainties that exist in human activities in space. While legal guidance exists, there arise questions of interpretation and

application as nations become increasingly involved in LEO operations and beyond. Space presents mankind with vast opportunities: to threaten operations in space and international relations, but also to improve cooperation and scientific knowledge. In this case, where “all’s well that ends well”, India, those involved in ISS operations, and those with satellites in LEO got lucky. But, this situation has reengaged the attention of the international community in regards to the progress still to be made to protect Earth’s orbit and beyond for uses that benefit all humankind.

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