SPACE LAW FOR THE LOUISIANA PRACTITIONER

37 YEARS LATER

By Zachary S. Miller

Throughout undergraduate studies and law school, I developed a niche interest in the field of space law — that is, the body of domestic and international laws that govern the use and exploration of outer space. It is unlikely that many other practicing attorneys in Louisiana have even heard of this field, much less written articles about it. As a result, you can imagine my surprise to discover that not only has an attorney written an article on space law as it relates to Louisiana, but that attorney is a retired partner at my own firm.

In December 1985, Anthony P. Dunbar (now a retired partner at Chaffe McCall, LLP) penned an article for Volume 33 of the *Louisiana Bar Journal* titled "Space Law for the Louisiana Practitioner." He discussed recent space activities and their relevance for Louisiana before delving into a review of the various treaties, statutes and regulations which make up the *corpus juris spatialis* — the body of space law. He concluded that opportunities for commercial space activity were promising and the demand for attorneys with a working knowledge of space would increase alongside the risk of conflict amongst governments and corporations alike.

Now, on the 37th anniversary of Dunbar's article, the time is ripe to check his predictions and to reexamine the relevance of space law to the Louisiana practitioner. What changes have occurred in the space industry since 1985? What is Louisiana's role in the space industry? How did space law evolve over the past 37 years and how will it evolve in the future?

A QUICK PRIMER ON SPACE LAW

Space law is unique in that its domestic origins lie in international law. The development of this field was reverse-engineered, beginning with a broad set of international norms and principles and culminating in domestic regulations and statutes interpreting those international principles.

International Space Law

In 1967, the Outer Space Treaty (OST) entered into force as the keystone of the field of space law.[1] Based on multiple declarations from the United Nations General Assembly at the height of the Cold War, the OST is largely driven by ideas of disarmament and conflict de-escalation. Fifty-five years later, the OST is widely considered to be a success, having been ratified or signed by 125 countries. The Articles of the OST contain wide-sweeping principles pertaining to many aspects of the use and exploration of space, such as the following highlights:

► **Article I** establishes the freedom of use and exploration of outer space for all countries, especially freedom of scientific investigation.

► **Article II** forbids national appropriation and claims of sovereignty in outer space and on celestial bodies.

► **Article IV** prohibits the placement of nuclear weapons in outer space.

► **Articles VI** and **VII** establish state responsibility and liability for space activities by public and private entities.

► **Article IX** obligates states parties to cooperate and assist each other in conducting space activities and prohibits harmful contamination and harmful interference.

The principles of the OST were expanded upon in subsequent treaties. The Astronaut Rescue and Return Agreement increased the protections afforded to astronauts as "envoys of all mankind" and obligates states parties to rescue astronauts in distress.[2] The Liability Convention of 1972 fleshes out the liability scheme amongst states for various types of damage that might occur in conducting space activities.[3] The Registration Convention of 1974 elaborates on the state's obligation to register its space objects with the United Nations.[4] The Moon Agreement of 1979 is the most expansive space treaty since the OST, building upon the OST's existing principles and incorporating new ones as well.[5]

U.S. Space Law

In 1957, Sputnik I shocked the United States and marked the beginning of the Space Race. Throughout the next decade, humans were also sent into outer space, reaching a pinnacle with the lunar exploration saga of the Apollo missions throughout the late 1960s and 1970s. As space activities increased, so did the need for regulation.

Based in part on its international obligations, the United States developed a licensing scheme for various space activities. The Commercial Space Launch Act (CSLA) was enacted in 1984 for the purposes of not only regulating private industry, but also incentivizing commercial space launch activity. Under the CSLA, the Federal Aviation Administration (FAA), through the Secretary of Transportation, possesses the authority to issue launch and reentry licenses for launches conducted in U.S. territory or by U.S. citizens anywhere. The FAA regulations implementing the CSLA establish certain criteria for obtaining launch and reentry licenses, including regulations on space debris, financial responsibility, insurance, liability waivers, payload requirements, environmental protections, and foreign policy/national security issues.

The United States not only regulates the launches that take objects to outer space, but also the space objects themselves. While the FAA issues licenses pertaining to launch services, the National Atmospheric and Oceanic Administration (NOAA) issues licenses for remote sensing (that is, the use of space objects to gather data about Earth from space). The NOAA's licensing authority is delegated by the Secretary of Commerce and is derived from the Land Remote Sensing Policy Act. Requirements for obtaining a remote sensing license include the sharing of unenhanced data, maintenance of control of operations for the space object, allowing for government inspection of the space system, "shutter control" (restricting imaging of certain areas), and notification to the Secretary of Commerce for agreements with foreign parties.

The United States has also passed laws pertaining to other aspects of international space law. The Commercial Space Launch Competitiveness Act of 2015 permits U.S. citizens to use and exploit space resources. The Federal Communications Commission regulates nongovernmental radio communica-

tions based on its authority under the Communications Act of 1934 as amended. In the Executive Branch, the National Space Council was re-established in 2017 to assemble high-ranking public officials and private sector leaders for the purpose of coordinating federal space policy. The National Space Council has issued Space Policy Directives on issues such as space situational awareness (tracking space objects to eliminate space debris hazards), streamlining commercial regulations, human exploration of the Moon, formation of the U.S. Space Force, and cybersecurity in space systems.

A major element of domestic space law is the International Traffic in Arms Regulation (ITAR), which is designed to control exportation of certain components, technologies and services with significant national security and foreign policy concerns.[6] The ITAR contains the United States Munitions List (USML) identifying these components and technologies. The ITAR is the counterpart to the Export Administration Regulations, which regulates commercial exports under the Commerce Control List.[7] Under the ITAR, companies must obtain the authorization of the Directorate of Defense Trade Controls to export defense articles and services on the USML. Export control is particularly relevant for the space industry; consider the technological components of a launch vehicle, which is, in common terms, a rocket. In-space habitats, earth observation systems and communications technologies also implicate ITAR.[8]

Many other fields touch upon the domain of "space law," including telecommunications, insurance, contracts, labor and employment, and even constitutional law.

COMMERCIALIZATION OF SPACE ACTIVITY

In his 1985 article, Dunbar remarked that "NASA now launches ten or so [expendable launch vehicles] annually." At the time, only one commercial launch had been attempted, and it was unsuccessful. To say that the industry has changed since then would be a drastic understatement. Currently, the Space Launch System is in development, but there is no operational national launch system. Every launch undertaken in the United States today is commercial.

The year 2021 saw more space launches occur than any other year in history. In 2019, U.S. entities accounted for 45 total launces. SpaceX — the massively successful launch company founded by Elon Musk — accounts for a whopping 31 launches. Five were performed by United Launch Alliance (ULA), a joint operation between Boeing and Lockheed Martin). Rocket Lab successfully launched six missions, and Astra successfully reached orbit for the first time. The NASA rover Perseverance landed on Mars in February 2021, having been launched by ULA in July 2020.

Another change since Dunbar's article concerns the term "expendable." SpaceX completed the first landing of an orbital launch vehicle in December 2015, when a Falcon 9 rocket successfully landed at Cape Canaveral Air Force Station. SpaceX also landed a Falcon 9 rocket on the drone ship "Of Course I Still Love You" in April 2016. Since then, SpaceX has launched reused rockets 46 times, revolutionizing the space launch industry and decreasing the cost of space launches.

The modern space industry also includes new startup launch service providers like Rocket Lab, which operates out of New Zealand. This year, Blue Origin — a launch service provider founded by Amazon's Jeff Bezos — began operations of New Shepherd, which brought space tourists like William Shatner on suborbital space flights. Blue Origin is also developing a promising orbital launch vehicle, New Glenn. Virgin Orbit began operation of its single-use expendable launch vehicle in 2020, with two launches in 2021, and its sister company, Virgin Galactic, also began operation of its reusable suborbital space plane that carries space tourists. Relativity Space is an auspicious startup whose Terran 1 rocket will be 95% 3D-printed, with production and assembly within 60 days. Firefly Aerospace in Austin, Texas, performed a test launch of its Alpha rocket for the first time in September 2021 and plans to send its Blue Ghost lunar lander to the Moon in 2023.

Startups also exist outside of the launch services market, such as Astroscale, which aims to clean up orbital debris. Orbit Fab wants to build the first "gas stations in space" and extend the life of satellites. Analytical Space is developing laser communications technologies to dramatically expand the capability of telecommunications satellites using optical relay systems. Axiom Space in Houston, Texas, has booked its first private spaceflight crew for February 2022, with additional missions planned through 2023, and will soon begin building Axiom Station, the successor to the International Space Station.

If the present state of the space industry is not exciting enough, then look to the future. SpaceX is testing Starship, a reusable super-heavy lift launch vehicle.[9] In addition to being used as a launch system of its own, Starship will have the capability of being mounted atop the Super Heavy booster. The Starship system will be capable of deep-space launches and will be completely reusable. Starship will also have a variety of configurations for human spaceflight, lunar cargo payloads and satellite launches. The Starship Human Landing System configuration was selected by NASA in 2020 for potential use in long-duration lunar landing missions in the Artemis program.

The space industry is also undergoing a dramatic shift in corporate structures. Virgin Galactic became the first public "new space" company in October 2019. This has catalyzed a wave of companies going public through Special Purpose Acquisition Companies, including Momentus, Astra, Planet, Redwire and Rocket Lab.

Artemis is NASA's flagship human exploration program with the goal of landing humans on the moon by 2024. While predominately led by NASA and U.S. commercial space companies, Artemis will have significant involvement from international partners such as the European Space Agency, the Japanese Aerospace Exploration Agency and the Canadian Space Agency. Components of the Artemis program include the Orion spacecraft, the Space Launch System, the Lunar Gateway space station, and commercial lunar payload and human landing services.

EVOLUTION OF SPACE LAW

NASA's James Webb Space Telescope, or JWST, launched aboard Arianespace's Ariane 5 rocket on Saturday, Dec. 25, 2021, from the ELA-3 Launch Zone of Europe's Spaceport at the Guiana Space Centre in Kourou, French Guiana. JWST is an infrared telescope with a 21.3 foot (6.5 meter) primary mirror. The observatory will study every phase of cosmic history—from within our solar system to the most distant observable galaxies in the early universe. *Photo courtesy NASA/Bill Ingalls*

The field of space law has also changed since Dunbar's article.

On the international level, there has been much discussion on the use and exploitation of space resources. Asteroid mining remains conceptual, but resource extraction technologies are being developed for lunar exploration. While some scholars assert that exploitation of space resources would violate the provisions of the OST and its progeny, most (including the International Institute of Space Law) contend that doing so is lawful under the international space law regime. The Hague Space Resources Governance Working Group, a multi-stakeholder organization with government, commercial and scientific members, published the Building Blocks for the Development of an International Framework on Space Resource Activities, seeking to influence future international legal development on this issue.

The International Space Station Intergovernmental Agreement (ISS IGA) was signed in 1998 by 15 countries, replacing its predecessor agreement from 1988. The ISS IGA governs the partner countries' rights and responsibilities pertaining to the operation of the ISS and it serves as the basis for future memoranda of understanding between partner countries for more specific tasks. Highlights include the retention of jurisdiction of ISS components by the respective country, duties and responsibilities of crew members, authorities prescribed to the ISS commander, and liability regimes amongst partner countries.

Domestically, in October 2020, the FAA published the final version of a new rule that streamlines its launch and reentry license rules to accommodate the modern launch services industry. One such revision allows for launch service providers to obtain a single license covering multiple launches of the same vehicle from multiple launch sites.

Space debris has quickly risen to the forefront of policymaking priorities. The Inter-Agency Space Debris Coordination Committee (IADC) was organized to facilitate cooperation of space debris management efforts amongst member space agencies. In 2007, the IADC published Space Debris Mitigation Guidelines in an effort to minimize or eliminate generation of space debris. Over a decade later, Space Policy Directive 3 from the National Space Council in 2018 catalyzed legislative development attempting to mitigate space debris by bolstering the country's space traffic management system.

In a similar vein, there is much debate about the NOAA's remote sensing licensing authority and its applicability to new, non-traditional space activities like orbital debris removal and satellite life extension. Revisions of the remote sensing licensing regime have been suggested, as have new licensing authorities housed in the Commerce Department.

The past two decades have seen dramatic increases in small satellite (SmallSat) technologies, or satellites with less than 180 kilograms of mass. CubeSats are satellites ranging between 1 and 10 kilograms in mass with a standard size and form. SmallSats and CubeSats reduce economic costs of launch and construction while accomplishing the majority of desired functions compared to large satellites. While satellite constellations — groups of satellites that provide global coverage — have existed since the spy satellites of the 1960s, SmallSats and CubeSats permit the existence of "megaconstellations." Megaconstellations present new legal issues in the arenas of space debris, right of access and astronomical pollution.

Developments have also been made in the military domain — the "dark side" of space activities. Two years prior to Dunbar's article, President Reagan announced the "Star Wars" program intended to develop a large-scale missile defense system, which included anti-satellite (ASAT) capabilities. The Soviet Union and the United States both had conducted ASAT tests and designed systems for demolishing enemy space systems as early as the 1950s — this is why the OST forbids orbital weapons and use of nuclear weapons in outer space. Throughout the 1980s and 1990s, U.S. ASAT technologies progressed significantly, and in 2007, China successfully used an ASAT weapon to destroy an old weather satellite. The United States responded to China in 2008 with its own ASAT test, and in 2019, India successfully conducted an ASAT weapon test. Russia followed suit with an ASAT test in 2021 that caused astronauts aboard the ISS to take shelter. China's ASAT test generated more space debris than any other space activity and provided the impetus for later space debris mitigation efforts.[10]

Perhaps the most significant legal or political development in the past 37 years is NASA's announcement of the Artemis Accords, which seek to establish principles guiding exploration of the Moon.[11] Many principles in the Artemis Accords reflect

existing international space law, but the Accords also contain some interesting additions, including:

- ► Interoperability of space systems;
- ► Preservation of outer space heritage;
- ► Permitting extraction and utilization of space resources; and
- ► Disposal of orbital debris.

The Artemis Accords were signed in 2020 by eight countries — Australia, Canada, Italy, Japan, Luxembourg, the United Arab Emirates, the United Kingdom and the United States of America.

CONCLUSION: LOUISIANA'S NASCENT SPACE INDUSTRY

While space law and the national space industry have changed in the 37 years since Dunbar's article, Louisiana's space industry has remained somewhat stagnant. The Louisiana Nuclear and Space Authority mentioned in Dunbar's article was abolished, and its functions were transferred to the State Board of Commerce and Industry.

Michoud Assembly Facility, the NASA complex housed in New Orleans East, continues its role of manufacturing and assembly of NASA exploration and discovery missions. Michoud remains under the auspices of NASA's Marshall Space Flight Center in Alabama. However, since Dunbar's article, Michoud has transitioned from its role in the Space Shuttle program and now plays a part in the construction of Orion and the Space Launch System.

The best opportunities for Louisiana are still to come. SpaceX plans to launch Starship from our neighbor to the west, Texas. If SpaceX's use of marine vessels for offshore landings continues for the Starship system, Louisiana's presence on the Gulf of Mexico may result in increased private sector activity. Stennis Space Center in Mississippi, right across the Louisiana border, houses many commercial tenants, one of which is Relativity Space who tests its rockets at the facility, and Michoud recently announced plans for the Louisiana Space Campus with 50 acres of business space for commercial use.

For the Louisiana entrepreneur, now is the time to delve into the commercial space industry. The global space economy reached $423.8 billion in 2019 and employs more than 183,000 people in the United States. In Louisiana, NASA's employment impact affects almost 2,500 jobs, and NASA has an economic impact in Louisiana of more than $425 million.[12] Morgan Stanley pins the commercial space as a $1 trillion industry by 2040.[13] With recent developments in global Internet services, orbital debris cleanup, satellite life extension systems, and communications technologies, the space industry is amidst a period of significant growth and investment in non-traditional space activities. Looking forward to national and commercial plans for human exploration, more submarkets and niche industries will continue to arise as space activity continues to become more prominent and as space becomes more accessible.

Dunbar concluded that "increased reliability and frequency of launching services, and government incentives, will open the sky to smaller players. International treaties . . . and domestic regulatory law [are] beginning to catch up with the technology." He was entirely correct. The modern space industry has experienced exponential growth in the decades since Dunbar's article, and the amount of startups in the industry each year evidences his prediction that smaller players would more easily surmount the space industry's barriers to entry.

If the past 37 years are to serve as precedent, then the next 37 years will see Louisiana's space industry begin to flourish. As the Gulf South space industry continues to grow, industry will flow into Louisiana due to its geographical presence on the Gulf of Mexico. Louisiana's existing infrastructure in marine and oil and gas industries will enable new and existing companies to innovate in services provided to launch companies and satellite operators. And 37 years is a long time. Perhaps Louisiana will find a way to leverage its advantages to take a leading role in human exploration of the Moon and Mars in the years to come.

As the space industry takes off in Louisiana, the need for lawyers across the spectrum of legal fields will arise. Dunbar's speculation that "it may not be uncommon for lawyers to encounter questions requiring some knowledge of space law" may still be true in the future, but it is certainly not far from the present.

FOOTNOTES

1. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 (entered into force Oct. 10, 1967).

2. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, April 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119 (entered into force Dec. 3, 1968).

3. Convention on International Liability for Damage Caused by Space Objects, March 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 (entered into force Sept. 1, 1972).

4. Convention on Registration of Objects Launched into Outer Space, Nov. 12, 1974, 28 U.S.T. 695, 1023 U.N.T.S. 15 (entered into force Sept. 15, 1976).

5. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 1363 U.N.T.S. 21 (entered into force July 11, 1984).

6. 22 C.F.R. § 120-130 (2021).

7. 15 C.F.R. § 730-774 (2021).

8. *See* Mike N. Gold and Christopher M. Hearsey, *Red Tape in the Final Frontier: Bigelow Aerospace's Adventures in Export Control* (Nov. 26, 2014).

9. *Starship*, SpaceX.com (last accessed Dec. 8, 2020), available at: *www.spacex.com/vehicles/starship/*.

10. While the United States produced 174 pieces of space debris with its ASAT test in 2008, and India produced about 400 pieces in 2019, China's ASAT test in 2007 produced more than 3,000 pieces of orbital debris. Brian Weeden, *History of Anti-Satellite Tests in Space* (Secure World Foundation, June 30, 2020), available at *https://swfound.org/news/all-news/2020/06/swf-releases-updated-compilation-of-anti-satellite-testing-in-space/*.

11. The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids for Peaceful Purposes, Oct. 13, 2020, available at *www.nasa.gov/specials/artemis-accords/index.html*.

12. NASA, Economic Impact Report – FY19 (2020), press release available at: *www.nasa.gov/press-release/nasa-report-details-how-agency-significantly-benefits-us-economy*.

13. *Space: Investing in the Final Frontier*, MorganStanley.com (July 24, 2020), available at *www.morganstanley.com/ideas/investing-in-space*.

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