

# **Sovereignty and Jurisdiction in Space Law**

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## **Abstract**

This memo analyses the issues of sovereignty and jurisdiction in outer space. The first part briefly reviews the evolution of space exploration and why it became necessary to discuss sovereignty and jurisdiction in space. The second part examines the issues of sovereignty and jurisdiction in outer space as currently defined by international laws and treaties. The third part provides a critique of the current treaties on outer space, whether they provide adequate incentives for protection, but at the same time whether they provide any incentive for the continuation of exploration. Lastly, part four provides a number of recommendations on space law that can lead to a better outcome for humanity.

## **1. Brief history of space exploration**

Since Antiquity, people have been fascinated by what lies beyond the limits of their known world. Due to its proximity to Earth and the fact that it can be seen with the naked eye, the Moon has been the most studied space object in history. As far back as the 5th century BC, Babylonian astronomers recorded lunar eclipses and introduced the idea of the 18-year Saros cycle to predict lunar and solar eclipses. Astronomy became one of the earliest sciences. Multiple ancient civilizations, including the [Babylonians](#), the [Greeks](#), the [Chinese](#), the [Indians](#), the [Iranians](#) and the [Maya](#) performed systematic observations of the [night sky](#), and others, such as the Egyptians and the Nubians, erected astronomical artefacts that still exist today. As a field, astronomy made a quantum leap in the 17th century with the invention of the telescope which transformed astronomy into a modern science. Before this, all exploration had been limited to what could be seen with the naked eye.

In the early 20th century, humans' fascination with space entered a new era with the start of space exploration. This allowed humans not only to observe space from a distance but to experience it in an up-close manner. As early as 1942, German scientists succeeded in sending the first artificial or man-made object into outer space: the V-2 rocket. After World War II ended, using captured German scientists and rockets confiscated from Nazi Germany, both the USSR and the United States started their own comprehensive space exploration programs, which later led to the competition between the two called "the Space Race".

The USSR was the first to have a successful orbital launch, which consisted in sending an unmanned satellite called Sputnik 1 into orbit, 250 km from the Earth's surface. Sputnik 1 was not much more than a couple of radio transmitters, of 20 and 40 MHz respectively, and it burned up upon re-entry into the Earth's atmosphere. However, its successful launch sounded alarms in the U.S., which viewed Sputnik as evidence that America had fallen behind the USSR in science and was determined to catch up. The United States raced to launch its own satellite, Vanguard TV3, just two months later, but it exploded less than two seconds after lift-off. The Americans were eventually able to successfully orbit the Explorer 1 satellite in January 1958, but by that time, the USSR was already sending living organisms into space. In November 1957, the Soviet dog Laika had become the first animal to orbit the Earth.

Four years later, in April 1961, an entirely new domain of space exploration was initiated: that of human spaceflight. The USSR's Vostok 1 mission carried 27-year-old Russian [cosmonaut Yuri Gagarin](#) one orbit around the globe. The trip was short, lasting less than 2 hours, but had historic consequences. The US caught up a year later, sending John Glenn into orbit on the Mercury-Atlas 6. The Americans would eventually take the lead in the Space Race in 1969 by performing the first manned landing on another celestial body, the Moon. Spaceflight Apollo 11 landed the first human beings, American astronauts [Neil Armstrong](#) and [Buzz Aldrin](#), on the [Moon](#) in July of 1969. From that year on, the Space Race continued but it would not attract the same attention as before, primarily because all of the first extremely ambitious goals had been achieved (first orbital flight, first human in space, first human on the Moon etc.), but also because the competition between the world's two prominent superpowers moved gradually from the space realm more to the economic and military realm.

This did not mean an end to space exploration by any means, but it did slow it down. Successful flybys of Venus, Mars, Jupiter, Mercury, Saturn, Uranus, and Neptune were achieved at different points by 1989. Particular aspects of space exploration kept on developing much more than others. Satellite technology was one field that kept expanding and it brought immense economic benefits. At the same time, other countries that had not been part of the original Space Race developed their own spaceflight missions. In October 2003, China launched [Yang Liwei](#) aboard the [Shenzhou 5](#), marking its first human spaceflight. As of 2018, human spaceflight missions have been conducted by three countries: the USSR/Russia, the United States, and the People's Republic of China. Several other countries have begun human spaceflight programs including [India](#), [Japan](#), [Iran](#), and [Malaysia](#), which are in different stages of development. Additionally, private manned spaceflights have been successfully achieved by Scaled Composites Company from California.

In recent years, space exploration has become a much more collaborative venture than it used to be. One good example is the European Space Agency (ESA), an intergovernmental organisation dedicated to space exploration that received funding from 20 member states and has over 2000 international staff. Another example is the International Space Station (ISS), a habitable artificial satellite whose creation is the result of extended Russian, American, Japanese, European, and Canadian cooperation.

## **2. How is sovereignty and jurisdiction in outer space currently defined?**

During the time when humans studied space from a distance, through astronomy, there was no issue of who owns what in space. It was obvious to everyone that space belonged to everyone and to no one at the same time. Nobody was prevented from looking up the sky and coming up with theories on how to understand what was up there. At the same time, people could not alter space in any way, shape or form. Once countries started sending objects and eventually humans into outer space, it became clear that the rules of space exploration needed to be delineated. These rules were all included under the term "space law". Officially, space law is defined by the United Nations as the area of law that deals with national and international law governing activities in outer space. Outer space begins at 100 kilometres/60 miles above sea level, the lowest altitude at which an object can orbit the [Earth](#). Outer space should not be confused with

national or international airspace, the portion of the atmosphere controlled by a country above its territory, but below the designated 100-kilometre altitude.

With the successful launch of the first satellite by the USSR in 1957, limiting the use of outer space to peaceful purposes became a priority for nations around the world. After bilateral US-USSR negotiations, in 1959 the United Nations established the [Committee on the Peaceful Uses of Outer Space](#) (COPUOS). To this day, the Committee has drafted five space law treaties: the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (the "[Outer Space Treaty](#)") in 1967, the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (the "[Rescue Agreement](#)") (1968), the Convention on International Liability for Damage Caused by Space Objects (the "[Liability Convention](#)") in (1972), the Convention on Registration of Objects Launched into Outer Space (the "[Registration Convention](#)") in 1975, and the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (the "[Moon Treaty](#)") in 1979.

The number of countries that have ratified each treaty varies drastically, from 100 in the case of the Outer Space Treaty to as few as 13 in the case of the Moon Treaty. Because it is the most widely accepted and ratified treaty, the Outer Space Treaty is considered the basic legal framework of international [space law](#). The most important principles of the Outer Space Treaty include: barring state parties from placing nuclear weapons or other types of weapons of mass destruction on the Earth's orbit or anywhere else in space; limiting the use of the Earth's natural satellite the Moon and of other celestial bodies to peaceful purposes and prohibiting their use for testing weapons or other military purposes. The treaty also stipulates that "exploration of outer space shall be done to benefit all countries and shall be free for exploration and use by all the States". Lastly, the treaty forbids governments from claiming a celestial body such as the Moon or a planet, stating that they are "the [Common heritage of mankind](#)." At the same time, however, "the State that launches a space object retains jurisdiction and control over that object". The State that launches a space object is also liable for damages caused by the space object that is sent and must prevent the contamination of outer space or of celestial bodies.

### **3. Benefits and limitations of current international treaties on outer space**

In order to appropriately evaluate the current international treaties on outer space, we must look at what potential benefits space exploration can bring. There is a wide range of arguments for space exploration that have been used over the years. The first is that research done for space exploration purposes brings general economic benefits from spin-offs. Multiple technologies developed by NASA have been used to improve life on Earth. These include: ultrasound technology now used in gynaecology, memory foam, freeze-dried food, emergency "space" blankets, fire fighting equipment, dust busters, racer swimsuits, cochlear implants etc. According to NASA, there are over 1650 spin-offs from its research that have been used in a variety of fields: computer technology, industrial productivity, environment, medicine, public safety, recreation, transportation, and agriculture. Besides the different spin-offs derived from research in technology, the use of outer space provides direct and tangible economic benefits every year, through its commercial use, which includes [satellite navigation systems](#), [satellite television](#), [satellite radio and other satellite-based technologies](#). Additionally, space tourism has also been developing in recent years.

Another often used argument for pushing space exploration forward is that humans will need another celestial body to live on should Earth become uninhabitable. This may have been the realm of science-fiction when space exploration first started, and people were not aware of phenomena such as global warming or how fast humans are damaging Earth and making it more inhospitable. However, in today's age, it is definitely a serious consideration. The reasons why mankind may be heading for extinction should it just stay on Earth are multiple and include lack of natural resources, nuclear war, comets, and worldwide epidemic. Stephen Hawking noted "I don't think the human race will survive the next thousand years, unless we spread into space. There are too many accidents that can befall life on a single planet."

But more generally, humans must keep exploring outer space in order for humanity to reach its full potential. Arthur Clarke explained as early as 1950 that humanity has a choice between cultural and biological stagnation on Earth and expansion into outer space. To put it in even simpler terms, the most important ways in which space exploration can help mankind the most are those we cannot think of right now. Our imagination is thus constrained by what we have experienced here on Earth. Given the infinity of the Universe and the fact that we have so far

explored less than 1% of it, trying to define the full potential of space exploration is futile, the arguments proposed here are just a place to start.

Given all these positive externalities, it might be worthwhile to ask whether the current sovereignty and jurisdiction treaties in space do enough to incentivise space exploration. The current space law treaties have been successful in incentivising some aspects of space exploration, such as space tourism and satellite technology development. Others, however, such as the exploration of distant celestial bodies have not been incentivised enough. More importantly, the kind of space exploration that could allow humans to move to another celestial body should Earth become uninhabitable or too overcrowded is just in its nascent form.

#### **4. Potential areas for improvement**

As mentioned, the Outer Space Treaty mentions that "exploration of outer space shall be done to benefit all countries and shall be free for exploration and use by all the States." At the same time, the Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space from 1963 mentions that "no one nation may claim ownership of outer space or any celestial body." The two may come into conflict and this is why. If no one owns a celestial body, not even partially, then the incentive to explore it is drawn to a minimum. In other words, states may be free to explore space, but if the legal system takes most incentives away from this activity, such as owning what you discover, then it is from a practical perspective close to the equivalent of banning the activity. One fact that clearly points to this is that NASA's funding has been drastically cut over the past few decades. It made sense for the United States to massively invest in space exploration during the Space Race due to the prestige externality that such an activity produced. However, once the Cold War ended, it became increasingly hard for governments to justify to their electorate the investment in space exploration.

The main driver for the geographic exploration of Earth, be it in the 15th century, when America was explored, or in the 19th century, when most of Africa's interior was mapped, was the possibility of declaring the new found land as part of the colonial empire of the country that discovered it. Given the positive externalities of space exploration, as previously discussed, the United Nations, through the treaties that it drafts, must do a better job at balancing the protection of outer space with incentivising its exploration at the same time.

European and other colonialisms are today seen as having been unfair and inhumane due to the treatment of native populations, be it the lack of political rights, the economic exploitation, or the human rights abuses. It is completely different, however, if a newly-found territory actually does not have any indigenous populations, as it is the case with most celestial bodies in the Universe or at least in our galaxy. Why should humanity forfeit the option of exploiting natural resources if no one would be negatively impacted by this activity?

A treaty should for example state that the country which establishes the first long-term base on a celestial body can claim half of the celestial body for itself, while the other half is to be divided equally among the rest of the Earth's countries. Although we can argue on what the actual wording should be (i.e. what does "long-term base" mean?; is 50% of the celestial body the right proportion to be given to the colonising state? etc.), adopting such a treaty would do a better job at incentivising space exploration, because most if not all countries would have a real incentive to sign it. For countries such as the United States, Russia or China, which already have highly advanced technology, the incentive is that they can claim half the territory of the celestial bodies they successfully colonise. At the same time, countries that have no prospect of sending spaceflight missions any time soon, such as Ethiopia, Uruguay, Mauritania, Nepal or any other developing country we can think of, have an incentive to sign such a treaty because they would potentially be getting something for free. The territory that they would claim on a celestial body could be either sold by the state, rented to other states, or simply preserved for a future time when the owning state could lead its own spaceflight mission.

It is important for outer space not to fall into a tragedy of the commons situation. It is easy to point to the situation of oceans today to understand the perils of what such a situation would entail for outer space. The oceans, like outer space, can be used by everyone, although they are owned by no one. This has led to overfishing and massive pollution making everybody worse off. Although some treaties trying to protect the world's oceans have been recently passed, there are still major issues with enforcement and with detection of those who break the law, simply because if no one owns any particular part of the ocean, then no one will have an interest in its protection.

Satellite technology developed so fast and brought us all the economic benefits that we enjoy today exactly because the states which launch satellites into space have complete jurisdiction

(ownership) over them. Had satellites been the common property of humanity, there is all the reason to believe that satellite technology would not be as advanced as it is today. By knowing that they would benefit more than others, countries had a real incentive to invest in satellite technology and send satellites into orbit. At the same time, the fact that some countries benefited more from satellites than others did not mean that the rest of the world did not benefit at all. In fact, everyone benefited from satellites and today almost all countries around the world have indirect access to the benefits derived from satellites, such as mobile phones, satellite TV etc., although the vast majority of them do not own satellites themselves.

Multiple development theories state that properly and clearly defining property rights is the foundation of any kind of development, be it social, economic or political development. For this reason, clearly defining who owns what in space is extremely important, should humanity want to tap into the full potential of outer space and its exploration. It is appropriate to conclude that current space law is inadequate and that the adoption of the motto that all celestial bodies are the common heritage of humanity, although very admirable from a philosophical perspective, does not serve the purposes of humanity well and, in fact, makes all of humanity worse off.