

# The Future of Space as Global Commons from the Perspective of International Law

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## Space as a Domain for Dual-use Purposes

More than six decades have passed since the first successful launch of an artificial satellite, Sputnik I, and today there is no place on Earth where the benefit of the utilization of space has not been provided. Without a variety of communications satellites, we cannot enjoy 24-hour automatic teller machine (ATM) services. Nor could there exist car navigation systems, High Frequency Trading (HFT) markets, or Google Maps without global positioning, navigation and timing (PNT) satellites such as US GPS constellations. Further, for disaster mitigation and climate change observation, the combination of application satellites play a pivotal role. Outer space has truly become a domain which provides safety, welfare and wealth to humanity.

Research and development of outer space started, however, primarily for military purposes just after World War II. While it was not until 1978 when US President Jimmy Carter officially acknowledged the use of military satellites, it was an open secret that both the United States and the Soviet Union extensively relied on various space assets for their national security. Without such reliable satellite monitoring systems, so-called “national technical means of verification” (e.g., Article 12 of the 1972 ABM Treaty and Article 10 of the 2010 New START Treaty), a series of US-Soviet/Russia nuclear arms control agreements could have never been successfully adopted. During the Cold War, approximately 75% of all satellites worldwide were operated exclusively for military purposes. Outer space was far more military-focused than the high seas, another area beyond the limits of national jurisdiction of any State.

The ratio has since decreased to about 20% today, but it does not mean the decreased importance of the military aspects of space use, for this is only caused by the disappearance of the dichotomy of military and civil/commercial use of space. GPS satellites originally developed for the precision targeting of ballistic missiles are now also widely contributing to land, sea and air civil traffic management, and private high-resolution remote sensing satellite data is commercially available for the armed forces. Outer space is a highly dual-use domain, critically important both for military/security and civil/commercial purposes.

## Space Activities Carried Out by an Exclusive Club

Any new domain needs a world order for maintaining peace and

security. Outer space is no exception, but the uniqueness of space activities including its strongly embedded dual-use nature makes the way of international rule-making also rather peculiar.

If “spacefaring nation” is defined as a State that owns/operates at least one satellite, even today only about 70 States belong to this category. Then, as of 2018, only 10 countries have launching sites and their own rockets within their territories, and enjoy independence in deciding when to launch what through outer space. They may be called autonomous spacefaring States. When it comes to independent human space activity, the number is even more limited — only three: Russia, the US and China. Coincidentally or not, it is these three countries that have explicitly demonstrated their anti-satellite (ASAT) capabilities.

It may well be said that full-fledged space activity is more or less reserved for the exclusive club members. While the benefit of space-based data and information is shared with all of humankind, only the club members can truly decide the direction of space activity, which inevitably involves the direction of future space law and order.

## Coordination of Freedom & Common Interests in Space Activities

International space law has been developed in the Committee on the Peaceful Uses of Outer Space (COPUOS) of the United Nations General Assembly. Among the five treaties adopted up until now, it is the 1967 Outer Space Treaty that provides the basic principles of international space law. These include: 1) the right of any State to conduct an exploration and use of outer space (freedom of space activities); 2) the obligation to explore and use outer space for the benefit and in the interests of all countries; 3) the prohibition of the national appropriation of outer space (non-colonialization); 4) the prohibition of weapons of mass destruction (WMD) placed in orbit around Earth or otherwise stationed in outer space; and 5) substantial non-militarization of the celestial bodies. It is difficult to strike a balance between the pursuit of freedom and common interests in the exploration and use of space. But by the end of the 20th century, this has been in most part addressed in increased internationally cooperative space projects and open and free space-based data services.

As for the fruit of space activities, interestingly it is often more clearly appreciated in developing countries, because one communication satellite can make a difference in the life standards of

the citizenry in a remote area compared with a country where terrestrial communication networks have been fully developed. This explains the bigger responsibility of spacefaring nations to share the results of space application, and in fact exclusive club members have been actively engaging in many cooperative projects. Those States have various motivations for such cooperation including marketing their space business, space diplomacy and not making “space divide” an issue between spacefaring and non-spacefaring nations. To a certain degree, this applies. However, the history of space cooperation seems to indicate that the purely good intentions to diffuse space benefits to humankind should not be underestimated. In this respect, the UN Office for Outer Space Affairs (UNOOSA) has been effectively working as a driving force to facilitate benefit sharing of space activities.

### Non-legally Binding Recommendations over Legally Binding Treaties

As mentioned above, up until now there have been only five treaties made in the COPUOS: 1) the 1967 Outer Space Treaty, 2) the 1968 Rescue and Return Agreement, 3) the 1972 Liability Convention, 4) the 1975 Registration Convention, and 5) the 1979 Moon Agreement (*Chart 1*). Since then, for about four decades, no new treaty or legally binding agreement between States in a written form has been adopted at the UN.

Why is the number of UN space treaties so small? The simple answer is that this is a result of the consensus system taken since 1962 in the COPUOS. The more member States, the more difficult it is to accomplish a consensus. When the fifth and last treaty was opened for signature in 1979, the number of COPUOS members was 47. As of 2018, it is 87. In addition, during the Cold War, a legally binding agreement was possible so long as the US and Soviet Union thought it beneficial to each side. This condition has long since gone.

As the States belonging to the exclusive club can adopt their own treaties, such as the 1988/1998 International Space Station Agreement, this stalemate does not seem to have substantially compromised their space activities. On the contrary, it may be said

CHART 1

### UN space treaties

Signature/entry into force	Name of the treaty	Number of states parties
1967	Outer Space Treaty (OST)	107
1968	Rescue and Return Agreement	96
1972	Liability Convention	95
1975 1976	Registration Convention	67
1979 1984	Moon Agreement	18

Source: Compiled by the author based on document (A/AC.105/C.2/2018/CRP.3, April 9, 2018) from the UN Office for Outer Space Affairs (<http://www.unoosa.org>)

that such stalemate is less inconvenient than the cases where stringent rules proposed by non-spacefaring nations are made into a treaty. In some respects, not only a consensus system, but also, or more inherently, the unique nature of space activities may better explain the reason for the paucity of legally binding international space law.

Since the 1980s, non-legally binding UN General Assembly resolutions and COPUOS guidelines have been adopted to address new issues, ranging from the data distribution rules of remote sensing satellites to the safe use of nuclear power sources necessary for deep space exploration, to further enhancing registering systems of space objects, and to space debris mitigation measures.

Because such non-legally binding instruments are recommendatory and international responsibility is not imposed if a State does not abide by the rule, consensus building is possible. Legally binding or not, spacefaring nations are to observe international instruments, because these rules are assessed to be effective to promote safe and stable use of outer space.

### Space Debris Mitigation

Currently, the biggest challenge concerning space as a global commons seems to be increasing space debris, which will threaten the safe, stable and sustainable use of space in the future (*Chart 2*). Thus, international rule-making in combating debris is important to consider the future rules for outer space. The 2007 COPUOS Space Debris Mitigation Guidelines was also made as a non-legally binding instrument.

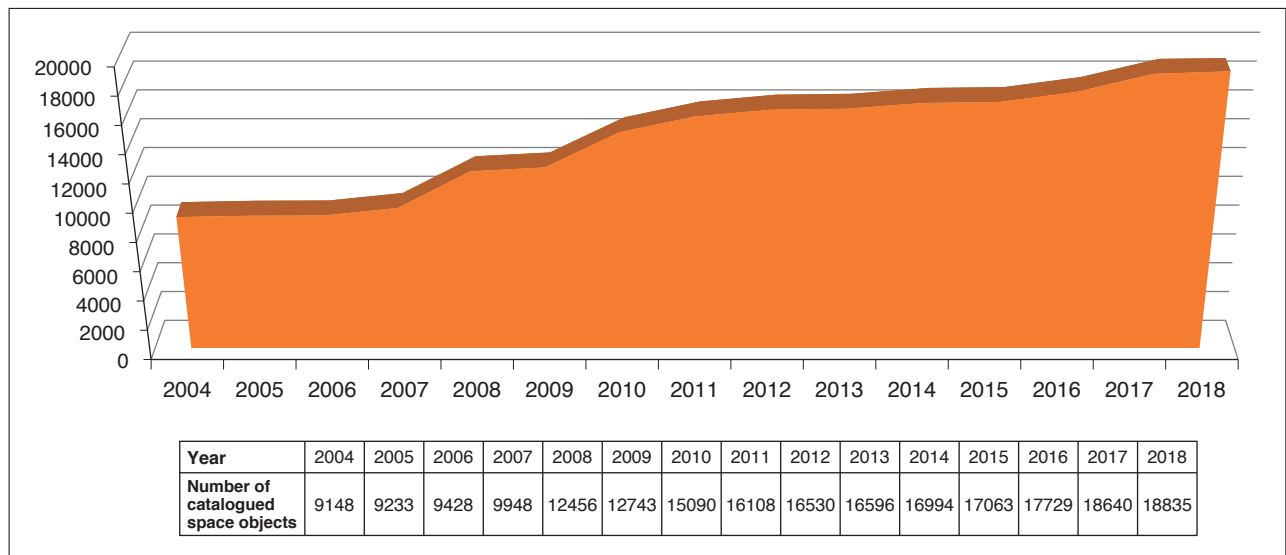
Since the 1990s, the space community has warned that urgent measures should be taken to limit the production of new space debris as much as possible. However, effective unilateral and voluntary efforts were not much expected due to the inevitably increased cost of space operations should such mitigation measures be taken. Then the Inter-Agency Space Debris Coordination Committee (IADC) was established in 1993 to collectively tackle space debris issues. Member agencies (as of 2018, 13 space agencies including one international intergovernmental organization) are implementing technically-based IADC space debris mitigation guidelines.

IADC guidelines were first adopted in 2002, and as a working document it has been amended and supplemented in accordance with newly identified knowledge and technologies. This shows another merit of non-legally binding instruments — being flexible enough to adjust new realities.

Space has ever been congested due to the increased number of actors, both States and private entities. This makes the role of COPUOS more important. Once rules have been adopted in the UN, even if they are non-legally binding, all UN Member States are under the political/ethical obligation to implement them, in contrast to the IADC guidelines applicable only to a small number of space agencies. Thus, the 2007 COPUOS Guidelines, modelled on the IADC guidelines and applicable to more than 190 States, was much welcomed as a truly effective instrument to mitigate space debris.

CHART 2

## Catalogued space objects by Space Surveillance Network (SSN)



Source: Compiled by the author based on information from *The Orbital Debris Quarterly News* by the NASA Orbital Debris Program Office, etc. (<https://www.orbitaldebris.jsc.nasa.gov/quarterly-news/newsletter.html>)

Currently, exchanging information on the measures taken for debris mitigation has been included in the agenda items of the COPUOS Legal Subcommittee (LSC). This may be said to be a benign reporting system which could be developed into a more systematic monitoring in the future.

In implementing the COPUOS Guidelines, another aspect has to be mentioned. For the concrete implementation of these somewhat abstract guidelines, reference to the latest version of the IADC guidelines and other supporting documents is needed, for practical methods are specified there. In fact, the last part of the COPUOS Guidelines explicitly requests referring to IADC documents. More concrete and practical measures provided by the IADC have been thus truly universally carried out through COPUOS.

### New Activities, New Challenges in International Space Law

Nearing the end of the second decade of the 21st century, space activities have certainly entered a new stage. This is already felt in at least three areas. First, private venture companies can now develop space transportation vehicles including those for manned flight. Previously, the capability of R&D of advanced launch vehicles was only in the hands of governmental agencies. Still embryonic, private companies will have independent capabilities to develop various space vehicles and embark on the exploration of Mars and beyond on their own. In this connection, space tourism, not only sub-orbital flights but also orbital flights, will be a travel option for ordinary travelers by about the 2030s. Second, the first phase of a more futuristic activity, commercial space resources exploitation and utilization, has just started as exploring and prospecting a desirable asteroid and pertinent place on the Moon. Third, new types of on-orbit activities are now being developed both by governmental

and non-governmental actors. These include active debris removal (ADR) and on-orbit satellite servicing (OOS) such as refueling and repairing a target satellite. Both ADR and OOS are ideas to use space more economically, efficiently and reasonably, and OOS will be one way of debris mitigation as well.

### Space Resource Mining & International Space Law Finding

From the international law perspective, the second and third areas of activities are more important, as they require finding, making and maybe changing international space law for giving new activities legal certainty and predictability. Without predictable legal consequences, private actors cannot get a full investment, and governmental agencies will be hesitant to pursue such activities beyond the experimental phase.

In fact, for the second area, the national acts of the US (2015) and Luxembourg (2017) were adopted for clarification purposes. The US act acknowledged a US citizen's right to possess, own, transport, use, and sell space resources obtained from celestial bodies, and the Luxembourg act provides that space resources can be appropriated. There is no explicit rule to prohibit or permit space resource mining in the Outer Space Treaty, which only prohibits the appropriation of the soil of celestial bodies.

From here, two interpretations are possible. As space resource mining is not banned, the private mining business is lawful as long as it is authorized and supervised by its national State that abides by international space law. Obviously, the US and Luxembourg take this view. The other interpretation is that without an explicit banning clause, further research on relevant laws is needed before concluding whether it is lawful or not. In this case, in addition to the efforts to find a customary rule on this matter, the related provisions of the UN

space treaties should be carefully interpreted, including the meaning of the freedom of “use” of outer space if it contains selling resources for economic gain.

Since 2017, “general exchange of views on potential legal models for activities in the exploration, exploitation and utilization of space resources” has been discussed in the COPUOS/LSC. An early resolution of differences seems difficult as this entails a fundamental difference in attitude to international law, if it is made as a prohibitive rule or a permissive rule. But, fortunately, as it may be decades before resource mining starts, it is expected that discussions in and outside the UN will result in a reasonable solution coordinating the principle of freedom and public interests in space activities.

### New Rules Needed for ADR & OOS

As outer space is an international area, national jurisdiction and control is exercised by the State of registry of a related space object (objects made on Earth and launched into outer space). That was decided by the 1967 Outer Space Treaty, and elaborated by the 1975 Registration Convention. Registration plays a similar role to nationality, while it has to be noted that space objects are not formally given nationality, different from the case of ships and aircraft. It only implies that national registration (first phase) is tantamount to nationality and UN registration (second phase) makes it clear who registered what, and which kind of a satellite is orbiting where for what purpose. Note that furnished information under the Registration Convention remains unsatisfactory to truly identify a satellite, but the idea of the UN registration is the identification of a space object.

Is space debris a space object? Yes, certainly. Space debris consists of orbital stages of a rocket, satellites whose mission capabilities have been terminated, and their fragments, and by the very notion of a space object, space debris cannot be anything but a space object. This means that without the consent of the State of registry, any ADR is not legally permitted. It may be thought that this would not be a problem, for ADR will not be carried out without a request from the private owner of the debris concerned based on the prior consent of the State of registry. But a State does not necessarily appropriately supervise its private actors. There is always a possibility that an ADR will take place without the consent of the State of registry which is supposed to exercise jurisdiction. Worse, there are satellites not registered in the UN registry at all, with the ratio as much as 30.5% as of 2004, according to a UN study (*A/AC.105/C.2/2005/CRP.10* (14 April 2005), pp.1-2). With the 2007 General Assembly resolution on enhancing space objects registration, and the increased number of contracting States to the Registration Convention, 67 States as of 2018, the problem has been alleviated to some extent, yet the fundamental issue remains.

Moreover, there must be many cases where the State of the registry of a fragment of a former satellite cannot possibly be identified even if the satellite had been registered. Debris more than 10 centimeters in diameter is said to be capable of destroying a functioning satellite, and there must certainly be a demand to remove

such debris. However, there is no means to get consent from the State of registry of that object. Further, it has to be seriously taken into consideration that ADR technology could amount to ASAT technology. Similar issues are to be found in OOS, for refueling and repairing space objects entail part of ASAT technology, though there may not be a problem in identifying the State of registry of the target object.

The international community needs to find, and to some extent make, new rules to solve any legal uncertainty on the operational ADR and OOS. These rules should include: 1) how to end the jurisdiction and control exercised by the State of registry when it cannot be identified anymore; 2) how to determine how a State should exercise jurisdiction and control as well as responsibility over a non-registered space object; 3) when a volunteer actor can remove debris without the consent of a State of registry if that debris poses an unacceptable threat to the normal operation of functional space objects; and 4) the confirmation of the obligation of an actor not to release more than a reasonable amount of debris.

Currently, there is no clear legal obligation banning the release of unreasonable amounts of space debris. It has to be noted that a Chinese ASAT test that scattered more than 3,300 pieces of orbital debris cannot be criticized as an internationally wrongful act. The Outer Space Treaty only prohibits placing or stationing a WMD in outer space. Thus, a new legal norm is needed not to cause harmful effects on any other space object, and through them to the State of registry of that space object. For this purpose, it has to be clearly determined which State holds jurisdiction and control over a space object with or without registration.

### Conclusion

To maintain the future of space as global commons, the most urgent matter is mitigating debris. For that purpose, the COPUOS and IADC guidelines are efficient to a certain degree, and space law rules on ADR and OOS are being considered. But in making rules on ADR and OOS, which forum will be possible, and what form of instruments is desirable? The answer to the latter is easier. Making a treaty seems impossible in the near future, but non-legally binding UN resolutions or guidelines would be a possible target. As for the selection of the forum to make rules, while taking time to build a consensus in the UN, important norms should be discussed in the COPUOS to make them universally applicable. Detailed descriptions about rules, such as the degree of care needed in releasing debris, and more technically-focused standards, may be made in the IADC, ISO or other entities. The importance of the COPUOS should be underlined. It helps striking a fine balance between the freedom of space and the pursuit of common interests and benefits to all humanity. As the number of autonomous spacefaring nations is considerably restricted, the role of the COPUOS is critical. **JS**

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