

Ideas for the Recent Development of Long-Term Sustainability of Outer Space Activities

From the Perspective of Active Space Debris Removal

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Abstract

The UN COPUOS Working Group on the Long-term Sustainability (LTS) of Outer Space Activities has been continuously facilitating the adoption of the guidelines for the long-term sustainability of outer space activities. There are more than one third of the draft guidelines that have been reached consensus within the working group, while the left ones are still under discussion. In the context of building an international mechanism for “Long-term Sustainability of Outer Space Activities” in the UN platform, drafting relevant standards and procedures of active space debris removal were put on the agenda. Before relevant technical standards coming out, it is necessary to study the legal issues of active space debris removal. This article argues that, according to various legal documents and national practices, space debris still belongs to the “space objects” stated in the Outer Space Treaty regime, and the active removal of space debris is still regulated by the existing framework of international law; the removal of recognizable space debris is not only the right but also the obligation for its producing countries; for unrecognizable space debris, when they pose a threat to the common interests of humankind, any State of the international community has the right to remove it; in the case of facing identifiable space debris owned by other countries, any threatened countries and countries with removal capability also have right to remove these debris, subject to confirmation of their dangers and urgency.

Keywords: LTS, space debris removal, OST.

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1. The Background of LTS and Space Debris Active Removal

In recent years, the increasing number of outer space activities has led to the proliferation of space debris and the collision of space objects, which have posed a threat to space environment and long-term sustainability of space activities. The international community is aware that, given the special physical properties of outer space, any space activities are likely to have an impact on other space activities. The absence of regulation on outer space activities would not only cause irreversible damage to space environment, but also impair the interests of future generations and countries with potential space capacity.¹

In response to the increasingly fierce space competition between countries and the deteriorating space environment, the Scientific and Technical Subcommittee (STS) of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) has added the issue of “Long-term sustainability of outer space activities (LTS)” to its agenda since February 2010, meanwhile, corresponding working groups and expert groups were set up, with the objective of developing a set of guidelines of sustainable space conduct that could be widely accepted and voluntarily implemented by the international community.²

As of June 2017, the draft Long-term Sustainability Guidelines for Outer Space Activities (Guidelines) drafted by the UNCOPUOS was still in heated discussion, and the members, including the U.S. and Russia, had submitted their own amendments proposals to the Guidelines. Although some of the provisions have been finalized, there are still two-thirds of the terms including the preamble have not yet reached a consensus.³

In the context of recognizing the fact that the international community has been plagued by space debris for many years and space debris mitigation measures are not sufficient to eliminate potential threat, Articles 20 and 22 of the Guidelines provide that relevant standards and procedures for the active space debris removal should be developed.⁴ Since the standards and

1 Christopher D. Johnson and Victoria Samson, A summer update on the COPUOS long-term sustainability guidelines, www.thespacereview.com/article/3291/1, last visited on September 1, 2017.

2 The UN COPUOS Guidelines on the Long-term Sustainability of Outer Space Activities, https://swfound.org/media/205929/swf_un_copuos_lts_guidelines_fact_sheet_july_2017.pdf, last visited on September 1, 2017.

3 Committee on the Peaceful Uses of Outer Space, Report of the Committee on the Peaceful Uses of Outer Space Fifty-ninth session, P. 125-138, U.N. Doc. A/71/20(2016).
www.unoosa.org/res/oosadoc/data/resolutions/2016/general_assembly_71st_session/a_res7190_html/N1642782.pdf, last visited on August 29, 2017.

4 UN Doc. A/AC.105/C.1/L.354, P. 25-29.

procedures for the removal of space debris are closely related with the harmonization of standards in the practice of spacefaring countries, this standardization process is particularly complicated and difficult, which leads to the dilemma that the two guidelines are still in the stage of waiting to be discussed.⁵

Thus, it is necessary to analyze the legal basis of the space debris active removal prior to the final coming out of the standards and procedures of space debris removal, which is not only important for the construction of international legal mechanisms for long-term sustainability of outer space activities, but also helpful for each country's participation in the consultation of LTS Working Group by providing legal and policy suggestions.

2. Legal Implications of Active Space Debris Removal

There is no clear and definite definition for space debris in the OST system, and the most relevant concept is the "space object" that is directly referred to in Article 1 of both the Liability Convention and the Registration Convention. However, the concept of space object is so ambiguous that it may create institutional barriers to the removal of space debris in practice.

In order to clarify the scope of space debris, IADC and UNCOPUOS have defined space debris as all non-functional man-made objects and their components stayed in the Earth's orbit or re-entered into the atmosphere.⁶ Domestically, the Chinese Interim Measures for the Reduction and Protection of Space Debris was issued in 2010, and it also introduces the space debris as "non-functional man-made objects produced by spacecraft and carrier, which keeps running around the Earth's orbit, including the non-functional satellites, rockets and the separation produced in the final stage."⁷

It could be found from the definition for space debris mentioned above, the international community generally believes that space debris has the feature of "no function". The uncertain question is whether the space debris can be identified as a space object mentioned in the OST regime, and the answer is often affirmative. The academic circle tends to regard space debris as space objects, since when the liability arising from space debris, if the Liability Convention is to be applied, one of the premises is that the space debris is identified as space object. When the space object reintroduces into the surface of the earth, since atmospheric frictions tend to melt space objects into non-functional objects; if such non-functional objects are excluded from the

5 UN Doc. A/AC.105/C.1/2017/CRP.29, P. 30-34; UN Doc. A/AC.105/2015/CRP.18, P. 7.

6 UN Doc. A/62/20. Annex, P. 47.

7 The Chinese Interim Measures for the Reduction and Protection of Space Debris (2010), www.spacechina.com/n25/n144/n206/n214/c742783/content.html. Last visited on September 6, 2017.

category of space objects, and in the circumstance that such objects cause damage on the surface of the earth, the application of the absolute liability clause of Article 2 in the Liability Convention would create a problem in identifying the causality.

European Space Agency (ESA) divides space objects emitted by humans into two broad categories: the first is the functional spacecraft, such as a running satellite; the other is a space debris that includes all the failed objects, such as a failed Satellite, rocket, micro particles and so on.⁸ The International Astronautics Academy (IAA), in its Cosmic Study on Space Traffic Management (2006),⁹ states that there is no legal difference between valuable spacecraft and non-functional space debris.

In addition, in accordance with Article 31 of the Vienna Convention on the Law of Treaties (VCLT), treaty interpretation should be interpreted in good faith in the context of the article and the objective of the treaty. Space debris is in a non-functional status of the final appearance of objects launched into outer space, in Article 8 of the OST and Article 1 of both the Liability Convention and Registration Convention, the “space object” mentioned only focus on the basic physical properties of space objects and their attributes as a component, and have no requirement that the space object should be in functional being. Moreover, the space object that has ended its mission should still belong to the scope of space objects, otherwise there should be a similar set of space law system to regulate the failure of these objects. If space debris is excluded from the scope of space objects, it may be contrary to the original purpose of the OST regime.

Learning from the academic arguments and the States practices, it is believed that space debris should also be classified as space objects referred to in the OST. Thus, according to Article 8 of the OST, the State of Registry still retains jurisdiction and control over the trackable space debris it produces. Similarly, for any operation of space debris, including active removal, it falls within the scope of jurisdiction and control of sovereignty States, and the active removal of space debris could still be regulated within current international law.

3. The Legal Basis for Active Space Debris Removal

This section will explore the legal basis for the space debris active removal within the international law framework, which would provide legal support for the procedures and standards for the removal of space debris under the

8 William B Wirin, Space Debris and Space Objects [J]. Proceedings of 34th Colloquium Law of Outer Space, 1991:45-46.

9 Cosmic Study on Space Traffic Management (2006), International Academy of Astronautics (IAA). P. 40. <https://iaaweb.org/iaa/Studies/spacetraffic.pdf>, last visited on September 6, 2017.

LTS project. Because of different attributes of space debris, and for the purpose of achieving comprehensive analysis, this paper divides space debris into the following three categories according to nationality and identifiability: recognizable self-owned space debris, unrecognizable space debris and recognizable debris owned by other countries.

3.1 The Removal of Recognizable Self-Owned Space Debris

3.1.1 The Right to Remove Recognizable Self-Owned Space Debris

According to the definition of space debris provided by IADC and UNCOPUOS, the space debris mentioned in this paper mainly include: non-functional satellites, debris produced in satellite collisions, disintegration, separation and self-destruction process. It has been discussed above that these space debris can still be identified as “space object” in the OST regime and that, in accordance with Article 8 of the OST, the State of Registry still has jurisdiction and control over its space debris that is retained in outer space.¹⁰

It can be seen from the preamble to the Registration Convention that its purpose is to assist in the identification of outer space objects so as to strengthen the supervision and management of the objects that are launched into outer space by the State of Registry; Furthermore, the purpose of the Liability Convention is to provide effective compensation for damages caused by space objects in high-risk space activities.¹¹ In the UNGA Resolution on the registration of space objects (2007), it was suggested that the information “any change in operational status”, “date of loss of functionality of space objects” should be submitted to the United Nations as additional information.¹² As the principle of unanimous consensus in the adoption of resolution is applied in the UNCOPUOS, it means that it has become a widely recognized practice to continually keep record of non-functional space objects (i.e. space debris).

Article 6 of the OST stipulates that States parties shall license and continue to supervise their own space activities, spontaneously, the generation and active removal of space debris are certainly included in a State’s space activities. The launching State of the space object, if it is also the State of Registry, should have ownership and jurisdiction over the space debris it generates, and the owner has an exclusive right to deal with its possessions. Article 8 of the OST also provides that the ownership does not vanish due to changes in the location of the space object, thus the State of Registry has the right to take the initiative to remove debris; if there are multiple launching countries, the launching State may agree on the allocation of jurisdiction of the space

10 OST, Art.8.

11 The Liability Convention, the Preamble.

12 UN Doc. A/AC.105/891.

object, and the active removal may be conducted by a launching State or multiple launching States.¹³

3.1.2 The Obligation to Remove Recognizable Self-Owned Space Debris

(1) Due Diligence

Article 9 of the OST states: "...States Parties to the Treaty shall be guided by the principle of cooperation and mutual assistance and shall conduct all their activities in outer space, including the Moon and other celestial bodies, with due regard to the corresponding interests of all other States Parties to the Treaty...", thinking from a broad perspective, this provision emphasizes the intra-generation equity of the sustainable development principle, namely besides achieving the interests of one country itself, the interests of other countries should also be considered. In conjunction with the OST preamble to interpret the duty of due regard referred to in Article 9, a State should be aware that its own space interests are closely linked to the interests of other States, and that if the duty of due diligence is not fully implemented and further results in infringing the interests of other States, it is not only breaching international law, but also make the country's space activities lose long-term sustainability, which is contrary to the common goal of human beings to explore and use outer space.

(2) The Principle of Space Environmental Protection

The Earth's orbital area will become less suitable for exploration and utilization in the light of the current development trends of space activities and the fast increasing rate of debris, the arrival of this day depends on the way in which human activities are conducted, the frequency of launches, mitigation measures and some other factors. Today, the densest satellite orbits (such as the GEO) are also the most valuable ones, meanwhile, they are also the most vulnerable orbits that are threatened by space debris.

Article 9 of the OST also provides that: "... States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them so as to avoid their harmful contamination and also adverse changes in the environment of the Earth resulting from the introduction of extraterrestrial matter and, where necessary, shall adopt appropriate measures for this purpose." This provision was primarily intended to preserve the integrity of outer space and to avoid irreversible damages, so that human beings would be able to explore and exploit outer space in a sustainable way. As a State is obliged to comply with the environmental protection obligation of Article 9 stipulated in the OST, it can be judged by the fact that if outer space activities cause irreversible negative impacts on outer space (such as the indefinite occupation of space orbit and

¹³ Registration Convention, Article 2(2).

the destruction to other functional space assets), these space activities could be seen as breaching the principle of environmental protection of international law.

In the nearly 60 years of human space activities, the principle of free exploration and use of outer space established by Article 1 of the OST has been applied in a maximum way. From the initial period where the concept of environmental protection of outer space did not highlight broadly to the 21st century where space debris mitigation measures were carried out, the international community's awareness of the space environmental protection is increasing, and the principle provided by Article 9 of the OST should be an international legal obligation to be widely observed and fulfilled by States in their space activities. When the earth orbits which are closely related to human life are threatened by space debris, these countries that produce such space debris should strictly behave in the way that is complied with the principles of space environmental protection established by the OST, just like actively taking the initiative to remove space debris.

3.2 The Removal of Unrecognizable Space Debris

The above part states that a State has the right and obligation to remove recognizable self-owned space debris. For the second type of space debris, namely the unrecognizable ones whose nationality could not be identified, will be discussed in this part. The legal status of the unrecognizable space debris and the principle of common interests of all human beings will be analyzed to argue that every member of the international community has the right to remove this type of debris.

3.2.1 The Legal Status of Unrecognizable Space Debris

Currently, there is no synonymous norms of international law to define and regulate unrecognizable space debris. It is necessary to limit the scope of this kind of debris, the unrecognizable space debris discussed in this paper includes the rocket body and the satellite body which have finished their tasks and their nationality could not be determined, the spray of rocket, the discards in the implementation process of space missions, debris produced in collisions between space objects. Because of the lack of space debris mitigation measures in the process of early human activities, and the underdevelopment of early tracking and monitoring techniques, there have been a large amount of unrecognizable space debris, which is increasingly congesting the Earth's orbit and posing a security threat to the orbital resources.

This paper believes that unidentified space debris can be identified as derelict (the property without the owner). The concept of "derelict" was mentioned in the Roman law, and was inherited by many civil law countries. Drawing on the provisions of the traditional civil law, derelict refers to the objects which has no owner or the owner is not identified. In the case of no-owner

objects, where the law is not otherwise provided, the ownership can be obtained in accordance with the principle of preemption.

The unrecognizable space debris referred here has its predecessor before it becomes a space debris. Therefore, compared with the occupation of terra nullius in international law, the concept of “derelict” in domestic civil law is more suitable for analogy with the unrecognizable space debris discussed in this paper. After a space object has become space debris, and its owner State cannot carry out effective jurisdiction and control on it, such scenario is manifested in the absence of a follow-up tracking mechanism, the default of its abandonment, and the absence of an indication of continued possession for the debris in international occasions. These State behaviors can be used as evident to prove that these abandoned space debris are derelict, and for those debris that still occupy the limited orbital resources, any capable State has the right to remove and further dispose of them.

3.2.2 The Principle of “Common Interest of Humankind”

Article 1 of the OST establishes the well-known principle of common interest. First, the benefits referred to in the article are for all States instead of individual one; Second, the focus of the provision is the welfare and interests of all States, irrespective of their level of economic or scientific development, which implies that this principle pays special attention to substantive equality rather than formal equality. Regardless of the degree of development, all States have the right to benefit from outer space activities. This connotation defines the principle of the common interests of all humankind and provides equal opportunities for all countries in exploring outer space.

In the meantime, it is within the scope of protecting the common interests of human beings to mitigate and eliminate space debris to ensure the future generations’ capability of utilizing outer space. Countries that produce space debris are often countries with strong space capabilities. For the space benefits of these countries that are temporarily unable to carry out outer space activities and backward in outer space capacity, countries that develop faster have obligation to protect the outer space environment, thereby ensuring these less developed countries to be able to engaged in outer space activities in a safe circumstance. Based on the basic essence of the principle of common interests, it could be safely concluded that to create equal opportunities and conditions for the use of outer space for all countries is also an integral obligation required by the OST for space-faring countries.

Although there is no unified international law or norm on regulating the unrecognizable space debris, according the above conclusion, it can be claimed that, in the situation that unrecognizable space debris pose threat to the space environment, any country that is capable of removing space debris has the right to remove it. Perhaps the direct cause of a country’s initiative to remove unrecognizable space debris would be to protect its own space assets and to avoid the devastating impact to its own functional space objects, but it

does not violate the principle of common interests stipulated in the OST, as when a country try to safeguard their own interests in outer space, such practice also achieves the effect of fulfilling international obligations. So far, only a few countries have the capacity to develop the technology of space debris active removal, and it is usually these countries that have created most of the unrecognizable space debris, thus, they should assume the primary responsibility in the space environmental protection governance.

3.3 The Removal of Recognizable Debris Owned by Other Countries

The third category of space debris analyzed in this paper is recognizable space debris owned other countries. Depending on whether the debris-producing country declares the waiver of the jurisdiction and control of the debris, the legal basis for the debris removal is different.

3.3.1 State Renounces Jurisdiction and Ownership

There is no definite provision in the OST system with regard to a State's declaration of renunciation of ownership and jurisdiction over space objects. In accordance with the principle of "absence of legal prohibition means freedom",¹⁴ a State has its right to renounce the ownership and jurisdiction of space objects by complying with relevant means stipulated in the OST and Registration Convention: namely by informing the information of abandonment to other States in an informed manner (Article 11 of the OST) and to the Secretary-General of the United Nations (Article 4 of the Registration Convention). In view with the principle of estoppel, a State shall not claim jurisdiction to such space objects under the Registration Convention after the State has renounced their ownership and jurisdiction.

The active removal in this condition may refer to the international law of high seas. On the high seas, the flag State has exclusive jurisdiction over the ship flying its flag, which is confirmed in the "Lotus" case as a customary international law.¹⁵ When pirate ships on the high seas have lost the legal jurisdiction of their flag State, any States have universal jurisdiction over them. Similarly, in accordance with the principle of free exploration and use established by Article 1 of the OST, States, without prejudicing other countries' interests, may be free to dispose of the space debris renounced by other countries, including the active removal.

14 The principle of "absence of legal prohibition means freedom" was originated in the 1927 "Lotus" case decision of the International Permanent Court, also known as "Lotus" principle.

15 Permanent Court of International Justice, The Case of the S.S. "Lotus", Judgment of 7 September 1927, 450 U.N.T.S.11; This view was later confirmed by Article 11(1) of the Convention on the High Seas (1958) and Article 92(1) of the Law of the Sea Convention (1982 UNCLOS).

3.3.2 No Waiver of Jurisdiction and Ownership

Article 8 of the OST states that “A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body...”, which means States have jurisdiction and control over registered space objects. However, in accordance with the provisions of Articles 1 and 9 of the OST, the freedom to explore and use outer space is also restricted to some extent, which implies that the jurisdiction and control of the State of registry for the space object is not absolutely exclusive. That is to say, the cases exist that the space object of the State of registry is legally interfered with by another State.

The freedom of a country in space exploration and use needs to be balanced with the interests of other countries and the whole international community, which is fully reflected in the international law of the sea. According to Articles 91 and 94 of the United Nations Convention on the Law of the Sea (UNCLOS), it is possible to conclude that the flag State is under an obligation to exercise effective jurisdiction and control of its ship under Article 94. However, in the following circumstances, the flag State’s control and jurisdiction over the ship will be broke through: the flag State is incapable of performing jurisdiction, piracy, trafficking in slaves, and exercising hot pursuit and illegal broadcasting. In addition, for international crimes such as drug trafficking, terrorism and the proliferation of weapons of mass destruction, the flag State is also able to cooperate with other countries in combating crime. The above scenario shows that the flag State’s jurisdiction over its registered ship is also not absolute.

The 1969 “International Convention relating to Intervention on the High Seas in cases of Oil Pollution Casualties” provides that the State party has the right to take protective measures to prevent or mitigate pollution when an immediate action is required in the high seas to respond to an emergency that may endanger its coastline.¹⁶ This proves that there is also an exception in the jurisdiction of the flag State, but the application of this exception has been strictly limited, that is, it must be implemented on the basis of the principle of commensurate with the prior notice and consultation with the third party expert.¹⁷

In summary, a State has the right to resort to legitimate reasons to take the initiative to remove other countries’ space debris. Although Article 8 of the OST provides that the State of Registry has exclusive jurisdiction over its registered space object, it does not exclude the emergency situation in which

16 International Convention relating to Intervention on the High Seas in cases of Oil Pollution Casualties, Brussels, 29 November 1969, entered into force on 6 May 1975, 970 U.N.T.S.210. Article 1.

17 International Convention relating to Intervention on the High Seas in cases of Oil Pollution Casualties, Article 3.

other States could remove these registered space objects. The right of a State to remove space debris is consistent with its obligation to ensure the sustainability of outer space activities. In accordance with the principle of common interest of all humankind established by the OST as mentioned above, when a country's space debris poses a potential threat of collision to another country, the State of Registry is obliged to take measures to remove the space debris to eliminate the threat or to acquiesce in other competent countries to remove these space debris. Human beings could benefit a lot from the space assets which are in normal operation, but the benefit is highly likely to become zero when these space assets are threatened by space debris. In addition, in order to prevent a country from abusing the right of removing space debris, it is necessary to conduct functional identification for space debris, which involves the potential harm of space debris, the degree of harm, the necessity for active removal, and whether space debris involves highly sensitive military information. It is the obligation of the State of Registry to remove the space debris if the removal is proved to be necessary and feasible by an objective inspection institution; If the State of registry has no capacity to remove, or if the debris poses a direct and emergent threat to a third State, the threatened State or the capable ones have the right to remove.

In accordance with the fundamental principles of international law, States can carry out necessary self-help operations in outer space in exceptional emergency situations, as reflected in Article 3 of the above-mentioned "International Convention relating to Intervention on the High Seas in cases of Oil Pollution Casualties". According to Article 25 of the "Responsibility of States for Internationally Wrongful Acts",¹⁸ it can be inferred that a State may apply the urgency to serve as a justification for the unlawfulness of its active removal. In contrast to the example of oil ship pollution in the high seas, the collision between space debris and functional space objects looks even more severe and urgent. When the space debris poses a potential threat to other countries' space assets, and the producing country does not fulfill its removal obligation, the parties whose interests are effected have the right to carry out corresponding self-help measures. With regard to the latest rules of State responsibility, the above-mentioned internationally wrongful acts may raise the obligation of the State of Registry to remove the space debris, which provides the possibility that other countries would apply countering measures as a result.¹⁹

18 UN Doc.A/62/62. P. 50-60.

19 Articles 22, 25, 52, 54 of the ILC Draft Articles on the Responsibility of States for Internationally Wrongful Acts (2001).

4. Conclusion and Remarks

This paper explores the legal basis within international law for the active removal of space debris in the background of the long-term sustainability of outer space activities. On the basis of demonstrating that space debris also belongs to the “space object” included in the OST system, the space debris is divided into three categories: recognizable self-owned space debris, unrecognizable space debris, and recognizable space debris owned by other countries. It is concluded that: for the category of recognizable self-owned space debris, a State has not only the right but also obligation to remove it; for the unrecognizable space debris which has posed a threat to human beings, any country of the international community has the right to remove it; for the recognizable space debris owned by other countries, after the confirmation of its dangers and urgency, the threatened countries and countries with the ability to conduct active removal could also has the right to remove.

This paper explores the basic legal issues of active removal of space debris, however, the discussion on related political, military and diplomatic factors is not within the scope of this paper. In addition, the issues of space debris removal technology, technology transfer, and financial matters are urgent problems that need to be resolved in the construction process of the LTS mechanism. Finally, the establishment of an objective detection and inspection mechanism which includes technical experts for space debris is also essential for creating a transparent environment for space activities, which is also the core system that is urgently needed to be established during the forming process of a regulatory and institutional framework for space debris active removal.²⁰

20 Report of the International Interdisciplinary Congress on Space Debris Remediation and On-Orbit Satellite Servicing, Active Debris Removal-An Essential Mechanism for Ensuring the Safety and Sustainability of Outer Space, presented to the UNCOPUOS Scientific and Technical Subcommittee, 49th Session, A/AC.105/C.1/2012/CRP.16. P19.