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STM in the Nature of International Space Law

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Abstract:

The discussion regarding STM has been accelerated due to the US policy decision of taking the lead of international discussion in Space Policy Directive 3 (SPD3). It is necessary to solve the following 3 issues to install STM in global sphere; the SSA data sharing; space debris mitigation management; and traffic management regulations.

This paper will be focusing on the 3rd issue, traffic management regulations, and firstly describe the reason of inherent reluctance of States to control the outer space based on the fundamental principle of international space law. The States sovereignty is always the dominant in the territorial area of land, sea or air space and that dominance provides them their incentives to regulate and control the area. To the contrary, the outer space is not entitled to State sovereignty, because of the prohibition of State appropriation by the Outer Space Treaty, thus States will not bear costs and responsibilities to control that area likewise the other territorial area. This legal nature of the outer space consists the cause of embarrassment among the space community to stepping into regulating the area. Based on this circumstance in regulatory field, this paper will aim to reiterate the necessity of consolidating technical best practices of current operators as a bottom-up approach for forming decent international regulatory criteria. The paper will also touch upon the recent STM discussions in Japanese space community confounded by the embarrassment of the international community.

1. Introduction

Constituting a proper system for managing space traffic internationally is becoming a crucial topic in the congested, contested and competitive circumstances of the outer space today. It is in this context that the concept of Space Traffic Management (STM) has been illuminated in this couple of years. There are mainly three issues for realizing STM in the international field; establish common space situational awareness (SSA) database for space operations, common rules for sharing on-orbit maneuver information, traffic management rules for collision avoidance, and responsibility and liability rules against breach of the common rules.¹ The necessity of rules and regulations for establishing STM in global level are discussed and recognized worldwide, though almost all of the international initiatives ended without fulfilling its goals.² At this stage, it is important to settle down from the politics and explore the legal background that this issue retains. This paper tries to illuminate the paradox lying on the principle of international space law for realizing global STM and explain another reason of the effectiveness or indispensability of bottom-up approach. This paper aims to encourage operators, notably the industries, to take important role of rule-making for global STM as it is not played in the main field of public players likewise the other areas.

2. Paradox in International Space Law

The STM discussion, to date, seems to be frustrated because the elements of the issue have almost been talked out with multiple possible technical solutions, but few policy advancement or action is going ahead. Of course, there are overwhelming political issues lying on the process of arranging necessary circumstances for STM. Establishing common SSA data sharing mechanism cannot be realized without heavy political debates for common data policy to let national security sectors exchanging data. Major space debris mitigation measures have already been conducted by most of the existing operators and discussions to strengthen their rules are ongoing in international fora in multiple levels without any consensus so far. Traffic management regulation discussion engaged both in international political sphere and technical community.³ Every element is on-going, but nothing has been decided yet. This sense of stagnation might be the source of frustration. However, instead of leaving this as an emotionally charged issue, this paper tries to adjoin a logical explanation from the perspective of international law. Namely, in this context, it is necessary to reexplore the nature of the principle of international space law as it conduce inherent reluctance of area control in outer space.

¹ Kai-Uwe Schrogl, Petr Lála & Corinne Contant-Jorgenson, *Cosmic Study on Space Traffic Management* (Paris: International Academy of Astronautics (IAA), 2006) at 128–144.

² Yu Takeuchi, “Space Traffic Management as a Guiding Principle of the International Regime of Sustainable Space Activities” (2011) 4:2 *Journal of East Asia and International Law* 319.

³ Kai-Uwe Schrogl; Corinne Jorgenson; Jana Robinson; Alexander Soucek, *Space Traffic Management -Towards a Roadmap for Implementation-* (International Academy of Astronautics (IAA), 2018) at 128–142.

The Outer Space Treaty (OST)⁴ does not explicitly regulate traffic rules in outer space. It simply prescribes the freedom of exploration and use of the area by all States (Art. 1) and try to control the limitation to that freedom by *ex-posto facto* responsibilities of States to the damages including those resulted by non-State actors' activities. It is true that the State Parties have obligations to inform any phenomena they discovered in outer space that could constitute a danger to the life or health of astronauts (Art. 5) or any identifying data of the object in case of return to the State of registry (Art. 8). States are also obliged to provide general information of the nature, conduct, locations and results of space activities for maintaining transparency (Art. 11) and to consult with other State of possible harmfully interfered activity (Art. 9). However, there are no obligation of information sharing, notification requirements or traffic management rules that OST requires the State Parties to engage. It is reasonable to understand, at least, that the Article 9 of OST can serve as the legal basis for STM since it establishes a consultation mechanism in case of potentially interfering activities before conducting such activities. Although, there are no concrete case exercising this Article to date. Rather, the reality is that there is no consensus understanding on the legal responsibility of space debris.⁵ More than half of the century have passed without any modification of space treaties based on the common benefits of major space powers to maintain the liberty of activities on the current outer space circumstances.

The other efforts, during this half century, of elaborating the norms of space treaties by using soft laws seems to achieve certain meaningful value.⁶ Those non-legally binding instruments can be classed in 2 types. One is introducing a common understanding of existing prescriptions of the treaties to redefine them in contemporary context. The "Application of the concept of the 'launching State'"⁷ or the "Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects"⁸ are this type of recommendations. The other type is the set of guidelines for practice. The "Space debris mitigation guidelines of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space"⁹ or the "Recommendations on national legislation relevant to the peaceful exploration and use of outer space"¹⁰ are this type of recommendations. Those soft laws certainly fostered communal sense of the issues in governmental

⁴ *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*, 1967 205.

⁵ Ram S Jakhu, "Iridium Cosmos Collision and Its Implications for Space Operations" in Kai-Uwe Schrogl et al, eds, *Yearbook on Space Policy 2008/2009* (Vienna: Springer Vienna, 2010) 254; Michael C Mineiro, "FY-1C and USA-193 ASAT Intercepts: An Assessment of Legal Obligations under Article IX of the Outer Space Treaty" (2008) 34 *Journal of Space Law* 321.

⁶ Irmgard Marboe, ed, *Soft Law in Outer Space* (Vienna: Heribert, 2012).

⁷ A/RES/59/115.

⁸ A/RES/62/101.

⁹ A/RES/62/217.

¹⁰ A/RES/68/74.

level and helped exploring its international discussions or raising momentum of developing relevant technical standards. It is also certain, unfortunately, that they did not served as sufficient rules for STM. Therefore, no rules have been applied into outer space traffic to date.

This seesaw history of governing the outer space can be seen as an evidence of reluctant attitude of States to control the area. Looking from a different perspective, through a comparative analysis with other areas of traffic management, a further structural factor appears as the reason of that reluctant attitude. The reason is based on the fundamental principles of international space law, namely the non-appropriation of the outer space by States (OST art. 2). Table 1 shows the relation of State sovereignty and traffic control in the areas of ground, maritime, aviation and outer space. Two significant differences appearing in this comparison emboss the reason.

	Ground	Maritime	Aviation	Outer Space
Jurisdiction to vehicle	Territorial State	Flag State	State of registry	State of registry
Jurisdiction to area	Territorial jurisdiction	Territorial sea jurisdiction	Territorial air jurisdiction	None
Vehicle registration	Vehicle registration	Vessel registration	Aircraft registration	Space object registration
Sanction to registration failure	Denial of travel	Subject to capture by authority /Denial of entry to ports	Denial of traffic navigation/landing/passage	None
Traffic management rules	Road traffic rules	Sea way/preventing collision rules	Aerial route/aviation rules	Likely common practices
Traffic management authority	Traffic police	Maritime safety authority/military	Civil aviation authority	None

(Table 1: State sovereignty in managing traffic)

Firstly, the jurisdiction of States does not apply to the area but only to the object functioning in the area. In the other area, jurisdiction applies on their respective territorial ground, sea, or air space, which are connected to international areas. International areas are not subject to State jurisdiction, of course, but its physical connection to their territorial areas delivered States' incentives to be aware of the situation and hopefully exercise certain affect in those areas. This is because those connecting areas will be a virtual buffer zone for preparing against possible threats to their borders. In this context, traffic management becomes a practical tool of awareness of the area while maintaining their order. This is why every State bare their own costs of maintaining their personnel or equipment for traffic control of those areas. The structure of air traffic control using Flight Information Region is applied to the air space above the high seas using solely the resources of the coastal states as the assignment

coordinated at the International Civil Aviation Organization (ICAO).¹¹ The World-Wide Navigation Warning Services for sea vessels on the high seas are assigned to 21 States as NAVAREA Coordinators allocated by International Maritime Organization (IMO) and International Hydrographic Organization (IHO) operated by the resources of those states.¹² This tool can be used not only for controlling their territorial areas, but also for affecting their connecting international areas by aware the situation and maintain orders. In outer space, on the other hand, OST permanently drives the control of State sovereignty from the area, and to this reflection, the incentives of the State to bare cost for maintaining the order of traffic in that area is also eliminated.

Secondly, there are no sanction to non-registered object traveling in the outer space. In the other areas of ground, sea or air space, non-registered vehicle is subject to certain sanctions. Vessels or aircrafts are required to be registered to a State and show its flag or aircraft registration number for physical identification. This is a measure for recognizing those vehicles for protection of the State of registry, but at the same time, a measure to rely on the State of registry to regulate the registered vehicle in consistent with the relevant international regulations. Namely, the system of maintaining the order of maritime traffic or air traffic ensuring smooth and safety operation is functioning by using the States regulations as effective tool for control. Vehicles that are not registered by any States are subject to international sanctions such as denial of providing navigation or information necessary for operation, or other enforcement measures. Non-registered vessels on the high seas can be lawfully inspected or captured by military ship. Those legal system leads the operators' incentives to register their vehicle, because non-registration turns to make against their benefit. In outer space there is a registration mechanism, likewise the other area, established by the Registration Convention¹³, but no obligation for physical identification and no sanction or disadvantage for non-registered object. The legal effect of space object registration is solely of retaining jurisdiction and right of control¹⁴ and no other effects was established including certain known national legislation. If a State consider discouraging the operators of non-registered object, one can establish a piece of legislation sanctioning non-registered object at least in their own jurisdiction, but none of those legislation appearing to date. In this conclusion, non-registered space object is not subject to any sanction under the current legal system, which reduce the incentives of operators to register their space objects.

It is therefore, the fundamental principle of international space law decreasing the motivation of States as regulators and as well as that of operators as complying actors. In consequence, from international legal perspective, outer space is constructively reluctant domain to control and this nature increase difficulties to reach consensus among States. Therefore, at least theoretically, there is no exaggeration to say that the international legal nature of the outer space serves as a barrier to form the

¹¹ *Convention on International Civil Aviation*, 1944 Annex 11.

¹² IMO Resolution A.706 (17) adopted on 6 November 1991.

¹³ *Convention on Registration of Objects Launched into Outer Space*, 1975.

¹⁴ OST Art. 8.

similar controlling system to the other area of land, sea or airspace. One should be admitted that it is on the basic principle of international space law that the hesitation or neglect of establishing a common legal standard for controlling the outer space as an organized area. As far the legitimate authority of international law is the State sovereignty, the hesitation of changing space treaties is also the hesitation of the law makers of international law. It is of course entirely dependent on the political will of the present States, but recognizing that the States are self-serving presence, that nature is enough as an explanation why rule making for the outer space is progressing at a snail's pace. Therefore, there is no exaggeration to say at this stage that it is logically non-sense of waiting the action of States.¹⁵

3. Bottom-up Approach as the Keystone

It is therefore solely the operators that have the incentives to establish regulation on the outer space operations for the sake of safety. It is because the operators are the only receiver of following two demerits of the chaotic circumstances of space operation.

The first reason is fairly economic reason as most of the entire operators will bear into mind. The circumstances without traffic management will be the world without operation standard for safety maneuver. This signify that the standard responsibility of who bears what will remain uncertain. The operator that have to maintain their space assets' safety will try to hedge those uncertain risks, with disassembled logics of measuring their risks. As its corollary, operators hedge their risks excessively or based on under estimation. This miss assignment of necessary cost of safety operation brings false economy to the entire operators' market.

The second reason is lying on the possibility of changing legal standard of the criteria of fault liability. On-orbit accident will be evaluated based on fault liability of the caused party. The standard criteria for fault liability will be evaluated based on the standard of professional operation, but that standard may be changed gradually based on the advancement of technical maturity. If a higher standard of safety operation that the operators may take through reasonable cost, required standard for recognizing fault liability will also be raised accordingly. For instance, if a paid data providing service becomes standard operation among the operators, denial use of that service will may be considered as liable because of its failure of using standard tool. Therefore, industrial best practice retains the basis of becoming de facto standard. This marks the operators' incentives to be front runners of rulemaking of safety operation in outer space. This is also the conception of the necessity of an international STM regime as a technical standard or guidelines rather than an abrupt hard law.

4. STM Discussion in Japan

Japan see itself as a part of space faring nations based on the historical fact of successfully launched its satellite to the outer space as the 4th country in the world. On the other hand, comparing to the wealth allocated to space activities, annual launches or the number of emerging space companies,

¹⁵ Yu Takeuchi, "Necessity of Establishing International Space Governance by an International Regime for Space Traffic Management (STM)", *Hogaku seijigaku ronkyu (Journal of law and political studies)*, vol.120, Graduate School of Law at Keio University, to be published in March 2019.

one should be admitted that Japan is a middle power comparing to the major space power as US, Europe or China. It is not only because of its character as a middle power, but also the situation of the outer space politics, which are remaining strongly in the age of the cold war, affects the behavior of major player of Japanese space community to sit on the fence on the US policy decisions. Their current confusion regarding STM is based on the wandering and unfocused international discussion. However, as mentioned in the previous section, this paper would also like to serve as a push to Japanese space community to join the international discussion for producing a bottom-up approach forming industrial best practice.

Meanwhile, discussion regarding STM in Japan has been gradually emerged in this couple of years. The government has been mandated from 2018 by the Basic Plan for Space Policy to consider future framework for STM. It seemed overwhelming of discussing the entire STM policy, the government started its discussion in a specific topic of third-party liability for on-orbit damage. The consideration held in a branch of the Committee on National Space Policy namely the Sub-Committee of Space Legislation from September to December 2018. The final report of the Sub-Committee finds that the national legislation have to be in line with the business development within the Japanese jurisdiction which is not matured enough to identify the necessary legislative elements. Although, the report appropriately summarized the issue from legal perspective as 2 dimensions. Protection of the victims of the accident and preservation of the environment of the outer space. The report illuminated the theoretical possibility of national legislation based on those public interests and considered several possible solutions of diversification of the risk to those interests. The most affordable solution is to retain the services of insurance likewise the system of the United Kingdom established by its Space Industry Act¹⁶. The report concluded, based on the actual immaturity of Japanese industries, that the national legislation has to be at the timing of the fact benefitted by the legislation appearing together. Therefore, the report did not suggest an immediate legislation for on-orbit third party liability, but it recognized its practical beneficial when needed.

Furthermore, some of the Japanese industries are making more proactive actions. A Japanese space company Astroscale running a business for providing sustainability of space activities is taking an important role in the Consortium for Execution of Rendezvous and Servicing Operations (CONFERS), which is fostering standards for safe satellite operations.¹⁷ Bottom up approach for establishing technical standard or guidelines for safety operation is the first step to realize worldwide STM, as mentioned in the previous section, CONFERS's activity is further substantial than governmental activities. Some of the Japanese industries are also taking part with the discussions in the Global Future Council on Space Technologies at the World Economic Forum. This activity is to incentivize private companies to move for solving space debris problem from an economic approach.¹⁸

¹⁶ 2018 c.5, 15th March 2018.

¹⁷ See CONFERS website, <https://www.satelliteconfers.org/>.

¹⁸ See World Economic Forum website, <https://www.weforum.org/agenda/2018/04/we-have-a-space-debris-problem-heres-how-to-solve-it/>.

This is also a seed of bottom up approach for a technical standard.

Another activity started from October 2018 is a Study Group for STM. This is an activity started jointly by the Institute of Space Law at Keio University and Legal Affairs Division of JAXA as a study group solely for learning and improving understanding through discussion. Since the potential issues and tasks of STM are too deep to understand the issue at glance, it will be valuable to discuss and exchange the views among the relevant experts as a learning process. The Study Group aims to provide a ground of Chatham House rule based discussion for deepen the understanding among the participants. The Group is receiving diverse participation from academia, private sectors and public sectors and serves as networking platform too. The discussion started by sharing awareness of the necessity of STM at global level and flowing down the issue to the elements that have to be considered. Participants are expected to take actions back in their own entities as the Group will not take the role of unifying the actions but being a standing community.

5. Conclusion

This paper find out that it is one of the fundamental principles of international space law disrupting the State behavior of area control in the outer space. Since it is the basis of the current framework of space activities and politics, it is more reasonable to rely on the bottom-up approach for fulfilling the startup of rule-making process of global STM rather than waiting the actions of public sector. From this stand point, this paper would like to serve as an encouragement of the private operators to commit into the rule-making process, or even more consort a de facto process for bottom up necessary rules for safety operations. Engaging the community for this direction will become beneficial for the entire future space community. Sharing the spirit of “progress through collaboration” have to be the key for achieving global STM.