Chapter 8

Threats Against the Use of Outer Space: Japan's Case

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Introduction: Where Problems Lie

This paper describes how Japan is responding to threats in the utilization of outer space and how Japan could more desirably respond to them.

Threats in the utilization of space may be categorized into purely security threats and threats that can hamper the safe use of space. While security threats should be considered mainly in terms of threats to Japan and how Japan deals with them, threats to the safe use of space are problems for the entire international society and as such it is presumed that it would be often meaningless to distinguish between such threats to foreign countries and those to Japan. Furthermore, envisioned security threats in the use of outer space include not only those that occur in an unexpected fashion and in a short period of time, but also the situation that gradually makes Japan's free and stable utilization of space difficult due to slow but sustained changes in the political and economic situations of the international society.

Thus, the present author will discuss measures and policies Japan is currently taking and those Japan should take going forward against security threats and threats to the safe use of outer space in that order, and in the concluding remarks, the author will make a modest proposal to deal with the possibility of Japan's use of space becoming difficult due to changes in the international environment.

1 Security Threats

A typical example of purely security threats is an anti-satellite (ASAT) attack, or a situation where a Japanese satellite is attacked in outer space and destroyed physically or functionally.[1] In order to deal with ASAT threats, 1) actions to prevent ASAT attacks, 2) deterrent measures, and 3) steps to mitigate damage in the event of failure of deterrence, are to be taken. These responses are

[1] Functional destruction of a satellite at the same time represents an issue of cyber security, but this aspect of the threats is not referred to in this paper.

deemed to largely overlap those, referred to in the Basic Plan on Space Policy,[2] to address the challenge of ensuring the resiliency of space systems.[3] In addition, it would be necessary to consider actions as 4) appropriate countermeasures against the use of force in the form of an ASAT attack.

(1) ASAT Prevention

Ultimate solution for the prevention of ASAT attacks is for the international society to reach a legally binding agreement that prohibits an ASAT attack under international law and provides for effective implementation measures to ensure compliance with that agreement. This has not been achieved, however. While the Outer Space Treaty of 1967[4] succeeded in demilitarizing celestial bodies,[5] regarding outer void space, it only prohibits weapons of mass destruction (WMD) "placed" in orbit around the Earth and otherwise "stationed" in outer space in any other manner. The ASAT test conducted by China in January 2007 involved conventional weapons mounted on an intermediate-range ballistic missile, thus not violating at least the Outer Space Treaty.

Needless to say, the international society has been sparing no effort to extend the scope of prohibitions to cover conventional weapons. The

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2 Strategic Headquarters for Space Policy, Basic Plan on Space Policy, 9 January 2015.

3 *Id*., esp., pp. 12-13.

4 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies ("Outer Space Treaty" or "OST"), entered into force 10 October 1967. Japan is the original Party to the OST, and as of January 2016, 104 States are Parties thereto.

5 Art. IV of the Outer Space Treaty. Article IV provides that "[t]he Moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes," and "peaceful purposes" is interpreted as the "non-aggressive" use, rather than the "non-military" use, according to the internationally standardized interpretation. Thus, there is the possibility that celestial bodies may be used for military purposes within the scope of "peaceful" purposes. However, since Article IV specifically forbids 1) the establishment of military bases, installations and fortifications, 2) the testing of any type of weapons, and 3) the conduct of military maneuvers, on celestial bodies, as it stands now, it is assumed that the use of celestial bodies would be substantially limited to non-military purposes, as found in Article I of the Antarctic Treaty of 1959. But Article I of the Antarctic Treaty places the term "inter alia" before the specifically prohibited actions to clearly indicate that they are the merely examples. As the Outer Space Treaty does not specify such limitations, it should be noted that the military use of outer space for peaceful purposes other than the explicitly forbidden actions may become possible in the future.

Conference on Disarmament (CD)[6] established in 1979 has been the central forum to promote multilateral arms control in outer space, where comprehensive disarmament proposals were submitted nine times in order to prohibit the placement of any weapons in and any aggressive military use of outer space.[7] A variety of treaty proposals focusing only on ASAT weapons have also been brought forward.[8] However, all of these proposals remain as proposals, with no negotiations launched on any of them. One of the major reasons for this is that there is little likelihood that consensus among the 65 member States will be reached in the CD that requires consensus for any decision-making. Another big reason is that in many cases, treaty proposals have been put up with loopholes favorable to proposing countries or with the real purpose of keeping rival countries in check[9]. Further, 1) it is difficult to comprehensively define "weapons" ("space weapons" and "weapons in outer space," etc. depending on treaty proposals), and 2) it is also difficult to distinguish between ASAT and missile defense (MD) from the external appearance of action. In connection with 2), 3) it is impossible to present appropriate verification measures. Therefore, it is a general assumption in the

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6 The Committee on Disarmament (CD) was renamed as the current Conference on Disarmament (CD) in 1984.

7 The nine proposals were made respectively by Italy in 1979, the Soviet Union in 1982 and 1984 (the same proposal was submitted to the United Nations General Assembly (UNGA) in 1981 and 1983), Venezuela in 1988, Peru in 1989, China in 2001, and jointly by Russia and China in 2002, 2008 and 2014. The three joint proposals put forward by Russia and China in the 21st century, while their titles differed somewhat in detail (e.g., the term "deployment" in the first proposal was replaced by the term "placement" in the second and third), are well known as the PPWT proposal for the abbreviation of the "Treaty on the Prevention of the Placement of the Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects," designed to seek disarmament under a legally-binding treaty, as against the enhancement of outer space security under a non-legally binding instrument sought by the United States, the EU and Japan. The "outer space object" as defined by the PPWT proposal may differ in scope from the "space object" used in the UN treaties on outer space.

8 For proposals for a total ban on ASAT weapons, see e.g., CD/726 (19 August 1986), p. 26; CD/905, CD/OS/WP.28 (21 March 1988), pp.15-16. For proposals for a partial ban on ASAT weapons, such as a ban on only the high-altitude placement of ASAT weapons or a ban on weapons specially designed and manufactured only for ASAT purposes, see e.g., CD/642 (4 September 1985), p.123; CD/870 (12 September 1989), para. 30.

9 For example, it is often explained that the true purpose of the three joint proposals by Russia and China in the 21st century is to ban space-based missile-defense systems for which the United States has an edge.

arms control community that it is impossible to forbid ASAT weapons and actions under international law in the near future.

Thus, under the current circumstances, measures that can be possibly taken when there are any signs of an ASAT attack include the prompt avoidance of a danger by giving a warning to and seeking an explanation about the state of things from an adverse party,[10] and protecting one's own satellites by changing their orbital positions, etc. The prerequisite of these measures are the existence of a surveillance network that determines the locations of space objects. This will only be accomplished by enhancing the space situational awareness (SSA) capability, first, through Japan's efforts and second, through stronger cooperation with the United States and other friendly nations of Japan. As the collection and sharing of the precise information on space objects are made with strong security considerations, and the leakage of information may possibly cause military conflict,[11] it is realistically difficult to strive toward the universal sharing of such information centering on the United Nations. Therefore, the objective of the safe and stable utilization of outer space (to be discussed below in the section 2 of this paper) based on the sharing of information of space operations may have to be partially sacrificed.

(2) ASAT Deterrence

Based on the Basic Policy for National Defense, [12] Japan, rather than resorting to "deterrence by punishment" (or "deterrence by retaliation"), which is to discourage an enemy from making an attack by demonstrating the will and capability to stage a military counteroffensive equal to or stronger than an enemy attack when attacked, seeks the resiliency of space by "deterrence by denial" without military force to discourage a potential enemy from attacking Japanese satellites by showing that the cost-benefit performance of an attack would not reach a reasonable level. And such deterrence is to be achieved firstly through efforts by Japan on its own, secondly by the deepening of the

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[10] It is desirable to have a crisis management network in place in order to distinguish a simple accident from intentional ASAT attack.

[11] This information means precise information based on agreements, arrangements and contracts, etc. other than standard orbital congestion information provided globally free of charge by the Joint Space Operations Center (JSpOC) of the U.S. Strategic Command of the Department of Defense.

[12] "National Defense Program Guidelines for FY2014 and Beyond" (hereinafter "Basic Defense Program") (approved by the Security Council and the Cabinet on 17 December 2013), pp. 4-5.

Japan-U.S. alliance, and thirdly through the trust and cooperation with friendly nations other than the United States.[13] The enhancement of resiliency would rely on such measures: 1) physically strengthen space systems, including satellites and ground-based stations, [14] 2) increase in the number of satellites for security purposes (including the increasing use of less expensive operationally responsive small satellites), and 3) mutually deploy payloads on satellites of the United States and other friendly nations ("hosted payloads"). While some of these measures are currently underway, the expansion of them in both quality and quantity terms is strongly desired.

Japan's decision to consider the increase in the number of information-gathering satellites (IGS) from the current four-satellite constellation (two optical and two radar satellites) to the 10-satellite constellation by adding four surveillance capability augmentation satellites and two data relay satellites, reflects part of such efforts. Of them, optical, radar and data relay satellites are designated as core satellites. In order to procure four surveillance capability augmentation satellites, Japan will commence an experimental study on small alternative satellites in FY2016. Under current plans to increase the number of IGS, Japan will develop and operate IGS-optical 6 and develop IGS-optical 7-8, IGS-radar 5-7, and the first data relay satellite in FY2016 and beyond.[15] In order to realize the 10-satellite constellation, it is necessary to consider ways to reduce costs, including the calculation systems of the operational lifetime of IGS under the severe fiscal conditions. It is not an easy task, but a necessary step in order to enhance deterrence by denial.

(3) Mitigation of the Consequence of the ASAT Attack

If deterrence failed and Japan's satellites for security were physically or functionally destroyed, Japan would be required to respond to the situation through the prompt launching of operational responsive small satellites, the switch to hosted payloads and the utilization of high-resolution commercial satellites. To that end, it would become necessary to consider the possibility of creating new launch sites, including air launch and sea launch, in addition to the

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[13] Basic Plan on Space Policy, *supra* note 2, pp. 4-5 & pp. 12-14. "National Security Strategy" (approved by the Security Council and the Cabinet on 17 December 2013), pp. 12-21. "Basic Defense Program," *supra* note 12, pp. 4-11.

[14] These measures include the toughening of software against cyber attacks.

[15] Strategic Headquarters for Space Policy, "the Implementation Schedule of the Basic

existing Tanegashima and Uchinoura launch sites. In FY2015, Japan started considering the concept of a new launch site to launch an operationally responsive small satellite, including a survey on the conditions of major launch sites of other countries, such as U.S. Spaceports. Going forward, Japan will conduct a careful consideration.[16]

(4) Countermeasures against the Use of Force

When an enemy State or a non-state entity destroys a Japanese satellite, what action can Japan take against the adverse party? The requirements for the exercise of the right of self-defense include an occurrence of an armed attack (Article 51 of the Charter of the United Nations (UN Charter)), and the prevalent interpretation of international law dictates that the requirements of emergency and proportionality need to be met as customary law requirements.[17] Furthermore, against just the "threat or use of force" that does not amount to an armed attack, an affected country, based on the interpretation of international law, is allowed only to take a "countermeasure with proportionality" other than the use of force as a counteroffensive.[18] While there are some theories and practices that argue for a countermeasure associated with the use of force, judgments by the International Court of Justice (ICJ) maintain the dichotomy that supports the exercise of the right of self-defense against an armed attack by an adverse party and a countermeasure with proportionality using the means other than force against the use of force by an adverse party.[19]

Therefore, when an armed attack against a satellite is established, the possibility of the exercise of the right of self-defense may not be ruled out. Is there really any room for an "armed attack" to occur against an unmanned object owned by Japan or Japanese nationals that orbits in outer space, an

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Plan on Space Policy," (decided on 8 December 2015), pp. 8-9.

16 *Id*., p. 23. The rules on the management of launch sites needs to be provided for in the authorization and supervision provisions based on the prospective "Act Concerning the Launch of Artificial Satellites, etc. and the Control of Artificial Satellites," which yet remains as a bill (Bill No. 41) as of June 2016. This bill was submitted to the House of Representatives on 4 March 2016.

17 For example, Takane Sugihara, Chiyuki Mizukami and Tomohito Usuki et al., *Gendai Kokusaiho Kogi* (Lectures on Modern International Law) (Fifth Edition), Yuhikaku, 2012, pp. 436-440.

18 For example, Masaharu Yanagihara, Koichi Morikawa and Atsuko Kanehara eds., *Purakutisu Kokusaiho Kogi* (The Practice of International Law*)* (Second Edition), Shinzansha, 2013, p. 376.

19 Case Concerning Military and Paramilitary Activities in and against Nicaragua

international public domain? Suppose that a satellite is regarded as having the same legal status as a vessel on the high seas and an attack on this vessel could trigger the exercise of the right of self-defense. The Japanese Government's interpretation[20] is that under international law, regardless of the vessel being a public vessel or a private vessel, when the vessel is under an armed attack on the high seas, the flag state of that vessel can repel that attack in the exercise of the right of individual self-defense. However, an armed attack against a vessel is not established with an attack against a single Japanese vessel alone. To make an attack as "armed attack" under Article 51 of the UN Charter, it exceeds a certain threshold in its scale and effects as well as its degree of organization and plan.[21]

If the above is applied to satellites and when an attack that is systematic and larger than a certain scale was made to destroy more than several Japanese satellites owned by the government or non-governmental entities, is it possible to interpret that an armed attack that could trigger the exercise of the right of self-defense was made by regarding it as the same as an attack on a Japanese vessel on the high seas and as a consequence, is it possible to argue for the justification of an counter-ASAT attack against the adverse party? It is very difficult to make a judgment on this point, and there is the high likelihood of answering in the negative, at least tentatively. The reason for this is that while a vessel has a nationality and is normally boarded by humans, a satellite is not granted any nationality. Note has to be taken that the Outer Space Treaty only 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."[22] The fact that a satellite, unlike a vessel or aircraft, does not have nationality and is an unmanned object is regarded as possibly presenting an obstacle in recognizing an attack on satellites as "an armed attack on the territory of the

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(Nicaragua v. United States of America), *ICJ Reports 1986*, para. 191.

[20] The House of Representatives Budget Committee Minutes No. 6 (15 March 1983), p. 2.

[21] The House of Representatives Special Committee on Armed Attack Situation Responses Minutes No. 4 (8 May 2002), pp. 34-35; The House of Representatives Cabinet Committee Minutes No. 17 (22 April 1971), p. 20; The House of Representatives Budget Committee Minutes No. 15 (22 February 1986), p. 12; Masahiko Asada, *Kenpo-jo no Jieiken to Kokusaiho-jo no Jieiken* (The Right of Self-Defense under the Constitution of Japan and the Right of Self-Defense under International Law), Shinya Murase ed., *Jieiken no Gendaiteki Tenkai* (The Right of Self-Defense in the Contemporary Context*)*, Toshindo, 2007, p. 266.

[22] Article VIII, the Outer Space Treaty.

States" owning such satellites.[23]

If we tentatively conclude that against an attack on a satellite, it is only possible to take a countermeasure with proportionality not associated with any use of force, the only option left is to enhance the resilience against an ASAT attack. As such, it gives rise to the increasing need to seek the expansion of SSA cooperation and the toughening and enhanced resiliency of space systems. It is thus important to carry through measures, including the increase in the number of IGS, pursuant to the Basic Plan on Space Policy.

2 Threats Hampering the Safe Use of Outer Space

(1) Threat as Congested Outer Space

The biggest manmade threats against the safe use of outer space are caused by the increasing congestion in the low earth orbits (LEOs) and geostationary earth orbit (GEO).[24] The congestion is traced to the increase in the number of launches of space objects following the explosive growth of the numbers of countries and businesses with space activities. In particular, since the positioning and communications systems using a constellation of as many as 1,000 satellites are planned recently (mega-constellation), LEOs would become even more hard-pressed when these plans are realized. And as many satellites are operated, pressures on frequencies and orbital positions would become more serious with that. Outer space is boundless. However, since the orbits fit for present space activities are limited,[25] the congestion of frequencies, orbital positions and orbit paths[26] is pushing up the cost of new space activities. Types

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[23] Regarding this point, an attack against a manned space station could offer the better grounds for allowing the exercise of the right of self-defense against an armed attack by regarding the registration as a covert nationality.

[24] Though there is no established definition of LEO, the IADC Space Debris Mitigation Guidelines 3.3.2. (1), prepared by the Inter-Agency Space Debris Coordination Committee (IADC), defines LEO as a spherical region that extends from the Earth's surface up to an altitude of 2,000 km. GEO means the earth orbit whose orbital period is equal to the earth's sidereal period with the altitude of close to 35,786 km.

[25] The orbits fit for present space activities mean positions fit for the operation of reconnaissance satellites at an altitude of around 250-400 km and mobile communications satellites, weather satellites and remote sensing satellites at an altitude of around 650-900 km as well as GEO favorable for communications and broadcasting.

[26] While until recently only the congestion of GEO has been noted as a big worry, the congestion of LEO is likely to present a similarly large problem going forward.

of the congestion can be broadly divided into physical space debris and problems of the exclusive rights of frequencies and orbital positions.

(2) Responses to Physical Congestion

Regarding the former, with the increase in launches, space debris will inevitably increase. Space debris include upper stages of a rocket, satellite covers and sills thrown away in outer space, fragments resulting from the breakup of satellites in operation, collisions between satellites, between satellites and debris, and between debris in orbit. Post-mission satellites orbiting in outer space are regarded as space debris as well. For the safety of outer space, it is necessary to make efforts not to increase space debris as much as possible by implementing non-legally binding international technically-based agreements through national laws and regulations as this makes implementation effective. Space Debris Mitigation Guidelines of the Inter-Agency Space Debris Coordination Committee (IADC)[27] and the UN Committee on the Peaceful Uses of Outer Space (COPUOS),[28] as well as the long-term sustainability guidelines being worked out (and not yet adopted) in the Scientific and Technical Subcommittee (STSC) of the COPUOS are among such non-legally binding rules to be duly implemented.[29]

Another prospective non-binding norm would be the future International

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[27] The IADC was established in 1993 under the leadership of the United States as an international nongovernmental organization among space agencies designed for mitigation of space debris, As of January 2016, it comprises a total of 13 space agencies (the European Space Agency (ESA) is an international organization and 12 entities are national space agencies). The IADC adopted its first Space Debris Mitigation Guidelines in 2002 and has since made supplementary rules and revisions in accordance with technological advancement.

[28] COPUOS became a permanent subsidiary organ of the UNGA in 1959. As of January 2016, it has a total of 83 member States. In 2007, COPUOS adopted the Space Debris Mitigation Guidelines adopted by the Scientific and Technical Subcommittee (STSC) and the Main Committee, which were endorsed by the UNGA in December 2007. While the guidelines are a nonbinding technically-based instruments without the status of a UNGA resolution, they substantially function as international norm.

[29] No consensus was reached concerning the concrete rules of the prospective long-term sustainability guidelines in the STSC of the COPUOS in February 2016. This agenda started in 2010. 15 guidelines were, however, presented by the Chair of its working group as those close to the consensus. While it may take years to reach a consensus on the guidelines in its entirety, those prospective long-term sustainability guidelines nevertheless have potential for the standard of the future space activities. See, e.g., A/AC.105/933 (6 March 2009), p. 31, para. 20; A/AC.105/1109 (9 March 2016), paras. 213-248.

Code of Conduct for Outer Space Activities,[30] adopted at first by the European Union (EU) in 2008. This Code of Conduct provides broader rules on the model behaviors in outer space while also containing the strengthened rules of debris mitigation and the prevention of collision accidents involving space objects. Since 2012, efforts have been pursued to turn it into an international norm. However, momentum for the adoption of the proposed International Code of Conduct faded since 2015 due to the reluctance shown by Russia, China, and emerging space nations, etc. Their opinions include that a global code of conduct should be discussed within the UN and a treaty rather than non-binding instruments such as the code of conduct should be pursued. A deterioration in the relations between the United States and Russia also contributed to this stagnant situation. Therefore, there is little likelihood of an international code of conduct being adopted in the near future, and it seems safe to say that an attempt to seek the international implementation of new safety standards as the proxy of the pursuit of pure security measures has met a setback for now. However, by taking advantage of the fact that the proposed Code of Conduct has demonstrated a comprehensive list of actions necessary for the pursuit of safety of space, Japan should take an initiative in continuously promoting a set of rules reflecting fully or in part the content of the code of conduct, even under a different name, waiting for a favorable international environment that enables to adopt these set of rules. Why Japan should continue to support and promote a code of conduct? It is because the prohibition of attacks against satellites, which is included in the Code of Conduct, will bring direct benefits to Japan's security.

It is also necessary for Japan not only to take the initiative in supporting the report of the Group of Governmental Experts (GGE) on transparency and confidence-building measures (TCBM) adopted in the UNGA[31] as they include safety measures that should be pursued globally, but also to provide capacity-building support for debris mitigation to emerging space nations so that they can carry out space activities in compliance with those non-binding emerging rules.

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[30] EU, 17175/08, PESC 1697, CODUN 61 (17 December 2008). Subsequently, this document was revised on 11 October 2010, 5 June 2012, 16 September 2013, and 31 March 2014.

[31] A/68/189 (29 July 2013). While Japan was not a member of the GGE, its final report incorporates the views of Japan and other non-member countries as well as international organizations, etc.

(2) Pressures on the Exclusive Rights of Frequencies and Orbital Positions

A fundamental solution to the latter issue of the pressures on frequencies and orbital positions, so-called "limited natural resources", may be even harder to address. This may turn into a critical threat that could hamper stable and amicable use of space in terms of international politics by raising the tensions between spacefaring nations and emerging space nations concerning the allocation of such precious resources. As measures Japan should take, it may be considered to follow the trend of taking the relaxed existing practices as is the case with increased number of States, while of course Japan will fully abide by the Radio Regulations (RR) of the International Telecommunication Union (ITU) in allocating frequencies and orbital slots. This implies that Japan has to recognize that the issues concerning "paper satellites," perceived as problematic in the 1990s, have been accepted as legitimate acts with certain conditions, rather than having been settled. Previously, a State had only seven-year period for keeping a certain orbital slot and frequencies for its exclusive use before launching its own satellite. However, at the World Radiocommunication Conference in 2012, the ITU officially approved that leasing a satellite from another party (either the State, an international organization or a private company, etc.) and moving it to the applied orbital position for use for "a period of three months" would be regarded as formally "bringing into use" of the orbital slot concerned.[32] It follows that keeping an orbital slot based on such an action, a practice long considered as something that should be constrained, has been accepted for the economic value of orbital positions. As this is the reality, it may be an idea for Japan to follow without hesitation the approach demonstrated by the ITU: the partial approval of "paper satellites".

Apart from the manmade threats described above, there are also natural threats to be brought about by near-Earth objects (NEOs), space weather, etc. Concerning such threats, Japan will probably get actively involved in various frameworks of cooperative measures, ranging from the cooperation in the STSC of the COPUOS to those made up by space agencies. In addition, Japan will jointly work with other nations in setting up of the cooperative mechanisms and enhancing capacity-building for the operation concerned under the auspices of the UN Security Council, etc.

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[32] See, e.g., Setsuko Aoki, "Efficient and Equitable Use of Orbit by Satellite Systems: "Paper Satellite" Issues Revisited", *Proceedings of the International Institute of Space Law 2013* (2014), pp. 229-246.

3 Conclusion

Japan's desirable responses to the threats in the use of outer space have been studied in this paper above under the two categories, or security threats and threats to the safe use of outer space. The above has been restricted to the analysis against the backdrop of the current international political situation. Going forward, however, it may not be entirely ruled out a situation where Japan's utilization of outer space may be hindered by slow changes in the international environment, for example, a situation where it becomes difficult to launch Japanese satellites by foreign rockets or a situation where it becomes difficult to import foreign satellites, and/or parts and technologies thereof. Such situations would lead directly to threats that a necessary launch cannot be obtained when necessary and satellite images imperative for security purposes cannot be acquired.

Minimum requirement to avert such situations include the securing of autonomous launch capabilities and maintaining abilities to develop and manufacture advanced satellites for security purposes. To that end, Japan must maintain the minimum levels of launch sites, rockets, a variety of constellations of satellites and SSA capabilities on which it can further develop them in response to changes in the situations. The security of the home country has to be defended even by taking no account of economic efficiency.