

Briefing Memo

Japan's Use of Space for Defense Purposes

—Continuity and Change Before and After the Enactment of the Basic Space Law—

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Introduction

The enactment of the Basic Space Law in 2008 was widely recognized as a turning point in Japan's use of space for defense purposes. Prior to the enactment of this law, the Self-Defense Forces (SDF) were only allowed to use satellites intended for general use and the likes (generalization theory). However, the enactment of the law made it possible for the SDF to also use space for defense purposes beyond the boundaries of generalization theory but within the scope of international agreements and the constitution. In response to this, the Ministry of Defense (MOD) drafted the "Basic Guidelines for Space Development and Use of Space" (or "MOD Basic Guidelines") in 2009, and commenced reviews on the concrete approach toward the use of space.

This paper examines the impact that the enactment of the Basic Space Law has had on the actual use of space for defense purposes in Japan. Close to a decade since the enactment of the law, this paper aims to shed light on what has actually changed or remained unchanged by comparing the use of space for defense purposes before and after the enactment of the law.

1. Prior to the Enactment of the Basic Space Law

Prior to the enactment of the Basic Space Law, the MOD/SDF did not possess any satellites; instead, they used satellites owned and operated by others. These included satellites owned and operated by corporations (commercial satellites); satellites owned and operated by other ministries or organizations (civil satellites, multipurpose satellites); and satellites owned and operated by the governments or militaries of other countries.

The types of space capabilities that the MOD/SDF had used were also wide-

ranging. The major examples of space development and use for defense purposes as outlined in the “MOD Basic Guidelines” include: (1) Space-based information gathering, warning, and surveillance; (2) Space-based communications; (3) Space-based positioning, navigation, and timing, and; (4) Space-based meteorological observation (refer to Table 1 below). All of these capabilities, with the exception of radio wave information gathering under the category (1) Information gathering, warning, and surveillance have been utilized prior to the enactment of the Basic Space Law.

Table 1: Major Examples of Space Development and Use for Defense Purposes

(1)	Information gathering, warning, and surveillance (functions such as imagery information gathering, radio wave information gathering, and early warning)
(2)	Communications
(3)	Positioning, navigation, and timing
(4)	Meteorological observation

The following outlines the situation of usages, categorized by the types of space capabilities, based on information published by the Japanese government. Firstly, with regard to imagery information gathering under the category (1) Information gathering, warning, and surveillance, a government response at the Diet session in 1982 revealed that images taken by the U.S. civil optical earth observation satellite LANDSAT were in use. These images were provided free-of-charge via the National Space Development Agency of Japan (organizational names hereafter all refer to names that were current at that point in time).

Imagery intelligence (IMINT)-related work that uses commercial satellite imagery commenced in fiscal year (FY) 1984. In relation to this, the defense white paper of 1986 noted that the Japan Defense Agency (JDA) purchased images taken by LANDSAT (the U.S. company EOSAT sold these images from 1985 to 2001 on consignment from the U.S. government). A government response in 1994 also stated that a French optical earth observation satellite SPOT, owned and operated by the Centre National D’Etudes Spatiales (CNES), with images sold by Spot Image Corp., is in use. In 2001, the JDA began operating the IMINT Support System (IMSS). The IMSS

was installed as a system that could handle the 1m-class high-resolution images obtained commercially with the launch of the optical earth observation satellite IKONOS in 1999. A government response in 2003 revealed that images taken by the Canadian earth observation satellite RADARSAT, mounted with a synthetic aperture radar, were also purchased.

In addition to such civil and commercial satellite images, after the start of the launch of Information-Gathering Satellites (IGS) in 2003, images captured by such satellites have also been in use. The IGS are multipurpose satellites, and its introduction was triggered by the so-called “Taepodong Shock” that happened in 1998. The Cabinet Satellite Intelligence Center of the Cabinet Secretariat is responsible for the development and operation of the satellites.

Next, with regard to early warning under the category (1) Information gathering, warning, and surveillance, the JDA began to receive early warning information from the U.S. military in 1996. Under the Shared Early Warning System (SEWS), information about the firing of ballistic missiles, detected by early warning satellites and earth-based radars of the U.S. military and the cooperating countries, is transmitted in quasi-real time.

As for (2) Communications, the JDA began to lease commercial satellite communication lines in 1977. Specifically, this involved the use of MARISAT by the Maritime Self-Defense Force (MSDF)’s icebreaker “Fuji” that was supporting Antarctic zone research activities. The MARISAT was a maritime communications satellite launched by the U.S. company COMSAT in 1976. After the International Maritime Satellite Organization began operating the INMARSAT in 1982, it became possible for troops dispatched overseas to make use of the satellite.

In 1984, use of “Sakura-2” (CS-2a, CS-2b), operated by the Telecommunications Satellite Corporation of Japan, commenced between mainland Japan and the island of Iwo To. Launched in 1983, the two satellites were Japan’s first practical geostationary communications satellites. They were used based on the principle of non-discrimination and fairness in public telecommunications services provided by the Nippon Telegraph and Telephone Public Corporation.

Furthermore, the MSDF included in their budget for FY1985 the expenses of installing equipment to receive broadcast from the U.S. Navy’s communications satellite FLTSAT onto their vessels. This was because the MSDF, which began participating in the multinational maritime exercise RIMPAC in 1980, recognized the

need to use FLTSAT to ensure interoperability with the U.S. Navy.

In addition, X-band satellite communications through the use of the SUPERBIRD satellites of Space Communications Corporation (established after the enforcement of the Telecommunications Business Act of 1985) commenced in 1990. The MOD had been using dedicated transponders mounted on the SUPERBIRD satellites on lease from MCC Corporation. In 2006, it began borrowing Ku-band satellite communication lines for vessels to complement X-band satellite communications in both the aspects of coverage and capacity.

With regard to (3) Positioning, use of the U.S. military's navigation satellites TRANSIT began in 1986 at the latest. Use of the Global Positioning System (GPS), which is the successor to TRANSIT, began in 1993 when it acquired initial operational capability.

In terms of (4) Meteorological observation, the operation of meteorological satellite imagery receiving equipment began in 1974 at the Fuchu Air Base. In 1982, it began receiving data from the satellite "Himawari" which was operated by the Japan Meteorological Agency. The defense white paper of 1986 also contained a description of the use of the U.S. civil meteorological satellite NOAA.

While the abovementioned information is not exhaustive, it serves to confirm that prior to the enactment of the Basic Space Law, the MOD/SDF had already been using a wide range of satellites which were owned and operated by other parties.

2. After the Enactment of the Basic Space Law

Even after the enactment of the Basic Space Law in 2008, the types of space capabilities used for defense purposes remained unchanged (refer to Table 2 on the following page). As the MOD/SDF has already been using space for a variety of applications prior to the enactment of the law, the room for any changes was small to begin with.

As for radio wave information gathering under the category (1) Information gathering, warning, and surveillance, the concrete use for this function has not been observed even after the enactment of the Basic Space Law. With respect to this function, there are only two available government documents: 1) MOD Basic Guidelines; and 2) Basic Plan on Space Policy of 2009. The "MOD Basic Guidelines" states that there is a need to conduct "studies on technological feasibility, collectable radio wave information and other matters." The Basic Plan on Space Policy of 2009 (established

by the Strategic Headquarters for National Space Policy) also states that steady efforts will be put into “research of radio property for a validity check of a radio information gathering function in space.” In the second and third editions of the Basic Plan on Space Policy formulated after 2013, and the revised edition of the “MOD Basic Guidelines” of 2014, there was no direct mention of this function.

Table 2: Use of Space for Defense Purposes Before and After the Enactment of the Basic Space Law

Capabilities		Before enactment	After enactment
(1) Information gathering, warning, and surveillance	Imagery information gathering	<ul style="list-style-type: none"> • Commercial satellites (IKONOS) • Civil satellites of other countries (LANDSAT) • Multipurpose satellites (IGS) 	<ul style="list-style-type: none"> • Commercial satellites (WorldView-4) • Civil satellites (ASNARO-1) • Multipurpose satellites (IGS)
	Radio wave information gathering	Not available	Not available
	Early warning	<ul style="list-style-type: none"> • Military satellites of other countries (U.S. SEW) 	<ul style="list-style-type: none"> • Military satellites of other countries (U.S. SEW) • Planned launch of demonstration sensor owned by MOD
(2) Communications		<ul style="list-style-type: none"> • Commercial satellites (SUPERBIRD) • Civil satellites (Sakura-2) • Military satellites of other countries (U.S. FLTSAT) 	<ul style="list-style-type: none"> • Commercial satellites (SUPERBIRD) • Civil satellites (Kizuna) • Military satellites of other countries (U.S) • Satellites owned by MOD (Kirameki)
(3) Positioning, navigation, and timing		<ul style="list-style-type: none"> • Military satellites of other countries (U.S. GPS) 	<ul style="list-style-type: none"> • Military satellites of other countries (U.S. GPS)
(4) Meteorological observation		<ul style="list-style-type: none"> • Civil satellites (Himawari) • Civil satellites of other countries (U.S. NOAA) 	<ul style="list-style-type: none"> • Civil satellites (Himawari) • Civil satellites of other countries (U.S. GOES)

*Satellites and systems shown in parentheses are examples.

On the other hand, partial changes are occurring for providers of space capabilities. The MOD/SDF has been dependent upon corporations, other ministries and agencies, and the governments and militaries of other countries for the provision of the various capabilities. However, recently the MOD/SDF has begun to develop self-reliant capabilities for early warning under the category (1) Information gathering, warning, and surveillance, as well as (2) Communications. This is because the enactment of the Basic Space Law has made it explicitly possible for the MOD/SDF to develop, own, and operate satellites.

With regard to early warning, the MOD allocated a budget of ¥4.8bn in FY2015 for the demonstration of a dual-band infrared sensor in space. The sensor will be hosted on the Advanced Optical Satellite (ALOS-3) that the Japan Aerospace Exploration Agency (JAXA) will launch in FY2020. An in-orbit demonstration for the same sensor will be conducted until FY2024. Such cooperation between the MOD and JAXA was made possible through the revision of the Law concerning Japan Aerospace Exploration Agency in 2012, in response to the enactment of the 2008 Basic Space Law. The Basic Plan on Space Policy approved by the Cabinet in 2016 touched on early warning, explaining that a review will be conducted regarding this function. It positions the development of practical satellites and sensors for early warning as an issue to be reviewed in the long run.

When it comes to satellite communications, an expenditure of ¥23bn was reflected in the FY2011 budget for the enhancement of X-band satellite communications functions, while a budget of ¥122.4bn was allocated in FY2012 for the development and operation of X-band satellite communications. With the design life of the SUPERBIRD-B2 and SUPERBIRD-D commercial satellites, which the MOD/SDF has relied on for X-band satellite communications, coming to an end in FY2015, the MOD/SDF has been acquiring two satellites to replace them (Kirameki-1, Kirameki-2). While a private-sector corporation (Special Purpose Corporation DSN) is responsible for the procurement and operation of the satellites through the private finance initiative, the satellites are still owned by the MOD. The first satellite was launched in January 2017 and the second one will be launched in 2018. Some of the expenditures, related to the replacement of the SUPERBIRD-C2 which operation will end in 2020, were included in the FY2017 budget as well. The replacement satellite is expected to be launched in 2021.

In parallel to the development of self-reliant capabilities, another significant

change is the launch of initiatives to ensure the stable use of space. Expenditures for the study on the protection of satellite communication system from jamming and for research on satellite protection were included in the MOD's budget for FY2014.

The revised "MOD Basic Guidelines" of 2014 states clearly that studies will be carried out on the acquisition of space surveillance functions and the establishment of an organization dedicated to such a purpose. The necessary expenditures were reflected in the FY2017 budget of the MOD for the basic design concerning the development of a Space Situational Awareness (SSA) system, and for further enhancement of readiness posture for the development of SSA-related facilities and the establishment of an operations manual.

The last change that occurred after the enactment of the Basic Space Law is the clear demonstration of the stance that these initiatives are carried out in cooperation and collaboration with other ministries and agencies, or with the governments of other countries, rather than solely by the MOD. As explained earlier, the infrared sensor will be tested by mounting them on the JAXA satellite. In the aspect of space surveillance as well, the establishment of an operating system based on collaboration with JAXA and other organizations is underway.

The MOD has also begun moving forward on two-way cooperation with the United States. In the Guidelines for Japan-U.S. Defense Cooperation, revised in April 2015, items about space were incorporated for the first time. Within this, items related to cooperation were included, such as ensuring the resiliency of their space systems, mitigating risk and preventing damage in cases where their space systems are threatened, and reconstituting relevant capabilities in the event of actual damage. During the same month, the Japan-U.S. Space Cooperation Working Group was established between the respective defense authorities of the two countries. The said defense authorities have also begun cooperating on SSA. In 2015, Japan participated as an observer in the multilateral tabletop exercise on SSA organized by the United States Strategic Command. Japan became a full-fledged participant of the exercise since 2016.

Conclusion

This paper analyzed the impact of the enactment of the Basic Space Law on the use of space for defense purposes in Japan. The MOD/SDF has long been a user of satellites for a period spanning more than 40 years. These uses include a wide range of

capabilities, from information, warning, and surveillance to weather observation. Comparison of the situation before and after the enactment of the Basic Space Law shows that there has been a stronger trend of continuity rather than a change in the practical aspects of the use of space for defense purposes.

On the other hand, it is clear that there have been changes triggered by the enactment of the Basic Space Law. The MOD/SDF has begun to take initiatives to develop self-reliant capabilities and to ensure the stable use of space. These efforts have been carried out in cooperation with other ministries and agencies as well as the governments of other countries. Furthermore, if orbital tests of the infrared sensor and the operation of the SSA system are initiated, the changes triggered by the enactment of the Basic Space Law are likely to become even more pronounced.

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