

Space Situational Awareness Capabilities and National Security Among Growing Space Actors

Japan Case Study

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Abstract Summary

This paper looks at Japan as a case study of the growing space actor, and the priority on space situational awareness as an integral aspect of space development. The paper includes an analysis of the space security plans, actions, and policies of Japan and of the specific actions Tokyo is taking to secure its space interests, particularly in the space situational awareness area. The study explores how its approach to space has evolved in recent years, the role space now plays in Japan's security, and Japan's current philosophy for space security and how Tokyo's defense budget is prioritizing space capabilities.

1. Introduction

Japan made history in 1970 when it became the fourth country to launch a satellite using native launch capabilities, following the former Soviet Union, the United States, and France. Over 50 years later, this remains an impressive feat that only 11 countries have successfully accomplished. The United States, the Soviet Union (later Russia), and China increased space and counterspace developments for defense and national security while Japan spent several decades focused on scientific and civil space missions. This Japanese position was altered in 2008 when the first Japanese law focused on space development was passed, the Basic Space Law. The Basic Space Law was a catalyst that ended the country's decades-long policy that space be utilized for non-military purposes only, and opened the door for space to be integrated into defense planning.

As Japan reckons with an increasingly tense security dynamic in the Indo-Pacific, notably from a military buildup of capabilities from both China and North Korea, space capabilities are becoming an anchor of national security and power projection. These concerns are reflected in three new Japanese strategic security documents released in 2022: the National Security Strategy, National Defense Strategy, and National Buildup Program. Integrated into each of these three documents is the use of space for security.

With a rich history of technological innovation, Japan is establishing itself as a growing voice in the space domain. In decades past, Japan's space capabilities were driven primarily by heavy industry and centered on space launch and the production of satellite components. Today, the industry is diversifying, with a number of smaller start-ups building upon Japan's strengths in areas to further the nation's interests. Japan's space security emphasis is significant and will usher in greater Japanese activity in defense and national security, including new priorities, acquisitions, and operational activities with efforts towards space situational awareness serving as a key example.

2. Japan's Space Development

Following its surrender in World War II and the start of Allied occupation, the Japanese government created a new constitution with emphasis on the peaceful advancement of its governance and populace. This constitution explicitly disavowed the pursuit of war and the "employment of force as a means of resolving international conflicts."¹ During the U.S. occupation of Japan in the years that followed many defense capabilities were prohibited, such as aircraft development, until the San Francisco Peace Treaty of 1951 which ended the legal state of war and re-established peaceful relationships between the Allied Powers and Japan through the United Nations.² The treaty also lifted a prohibition on Japanese aerospace production, which allowed Japanese introduction into the space age. In 1955 Professor Itokawa Hideo, known as the father of Japanese rocketry, launched a miniature, 9-inch rocket called a pencil rocket with a team from the Institute of Industrial Science at the University of Tokyo.³

While the Cold War era's space race pitted the Soviet Union against the United States, encompassing both civil and national security space missions, Japan's national policy remained steadfast in dedicating its space development exclusively to peaceful objectives. This enduring commitment led Tokyo to prioritize research and scientific advancements in space over the ensuing decades.

Intensifying ballistic missile and space endeavors emanating from China and North Korea initiated a notable shift in the security landscape of the Indo-Pacific region. This transformation prompted Japanese leadership to undertake a reevaluation of Japan's national defense strategy. Tokyo embarked on a gradual process of assimilating space considerations into its overarching security policies, commencing in the late 2000s. China's 2007 direct-ascent antisatellite (ASAT) test, which resulted in the creation of a multitude of debris fragments in low Earth orbit (LEO), significantly influenced Japan's stance on space matters. Japan stood among the earliest nations to firmly condemn this test, alongside the United States and the United Kingdom, garnering support from many others.

In 2008, just a year after China's consequential ASAT test, the Japanese Diet ratified the Basic Space Law, a legislative framework that underwent multiple revisions to secure backing from both the ruling and opposition parties within the Diet. The Basic Space Law marked a pivotal moment as the first explicit legal framework dedicated to space development in Japan. It represented a departure from Japan's longstanding policy of utilizing space exclusively for non-military purposes, aligning Japan with the policies adopted by numerous other nations.

Furthermore, the Basic Space Law gave rise to the inaugural Basic Plan on Space Policy, an essential document in Japanese space policy. This document, in its initial iteration, identified national security as a primary objective of Japanese space activities, signifying a significant departure from previous approaches. Subsequently, the Basic Plan on Space Policy underwent multiple revisions and is currently in its fourth iteration. In both the Basic Space Law and the various versions of the Basic Plan on Space Policy, there is a consistent emphasis on space's role in enhancing the well-being of Japanese citizens and contributing to international peace and security. This marks a transformative juncture in Japan's approach to space capabilities as an integral component of its national defense strategy.

In 2020, the first space-focused unit of the Japan's Self Defense Force (SDF) was created in 2020, the Space Operations Squadron, organized to cooperate and integrate with parallel U.S. operations. This squadron's initial

¹ *Constitution of Japan*, 3 November 1946, https://japan.kantei.go.jp/constitution_and_government_of_japan/constitution_e.html

² *Joint Compendium of Documents on the History of Territorial Issue between Japan and Russia*, March 1 2001, available at: <https://www.mofa.go.jp/region/europe/russia/territory/edition92/period4.html>

³ "50 Years since OHSUMI, the First Satellite Orbiting by Japan," Japan Aerospace Exploration Agency, <https://global.jaxa.jp/activity/pr/jaxas/no082/02.html>

responsibility is the operation of the space situational awareness (SSA) system. The Space Operations Squadron is considered a “mid-term defense program” which has four main efforts: (1) SSA; (2) improving information, communication, and positioning capabilities; (3) electromagnetic capabilities to deny other actors from using the full slate of command, control, communication, computer, and intelligence operations; and (4) to work with other Japanese agencies, like JAXA, and relevant counterparts in the United States and around the world.⁴

Japan released three new strategic documents which indicate a sharp change in Japan’s defense posturing: *National Security Strategy* (NSS), *National Defense Strategy* (NDS), and a *National Defense Buildup Program*.⁵ In a noticeable difference from Japanese defense policies of the past, space is integrated into each of the three documents to be used for both defense and national security. This language is in stark contrast to language of the past, which called for exclusively peaceful and non-military use of outer space.⁶

The NSS outlines substantial threats to Japan—namely from China, Russia, and North Korea. The document also states that the line between military and non-military fields has been blurred in areas both technological and economical, a departure from previous national documents which explicitly drew a line between the two. The NSS, an update to a 2013 document of the same name, outlines three main national interests: sovereignty and independence while maintaining peace and security; economic prosperity; and to protect universal values and international order, specifically in the Indo-Pacific region.

Space is called upon heavily in this document, and is specifically mentioned as a national security policy area, among diplomacy, defense, and economic security. The NSS calls for increased comprehensive efforts for space security from the entire government, including the use of the space domain by the SDF and the integration of space, cyberspace, and electromagnetic domains into ground, maritime, and air capabilities.

For the first time in a Japanese national defense document, space security has its own subsection: “Reinforcing Comprehensive Efforts for Space Security,” where space is described as “indispensable” for activities, spanning social and economic factors. The space domain is authorized to be used by the SDF and the Japan Coast Guard (JCG), and the section calls for strengthening cooperation between JAXA and SDF - language which is a departure from past space policies where JAXA was isolated from any defense or security discussions. The section also acknowledges industry development, particularly for the development of satellite constellations, and the need to better integrate industry products into the space security pipeline. The document itself does not lay out specifications for priorities or space organizations, but sets the expectation that the country will release a concept supported by the government, and which will be reflected in the Basic Plan on Space Policy. This concept was released in June 2023, and serves as the country’s first space security policy. The plan emphasizes the increased importance of space in Japan’s national security plans, again highlighting the importance of space in Ukraine’s resistance to Russia’s 2022 invasion.

The NDS seeks to clarify the national defense objectives of Japan, maintaining that the development of defensive capabilities is solely to protect the nation, not to pose a threat to other countries.⁷ Framing the document are the

⁴ Japan Ministry of Defense. “Launch of the Space Operations Squadron.” Japan Defense Focus no. 125, July 2020. <https://www.mod.go.jp/en/jdf/no125/specialfeature.html>.

⁵ Cabinet Secretariat, *National Security Strategy of Japan: Provisional Translation* (Tokyo: Cabinet Secretariat, December 2022), <https://www.cas.go.jp/jp/siryou/221216anzenhoshou/nss-e.pdf>; Japan Ministry of Defense, *National Defense Strategy* (Tokyo: Government of Japan, December 2022), https://www.mod.go.jp/j/approach/agenda/guideline/strategy/pdf/strategy_en.pdf; and Ministry of Defense, *Defense Buildup Program* (Tokyo: Government of Japan, December 2022), https://www.mod.go.jp/j/approach/agenda/guideline/plan/pdf/program_en.pdf.

⁶ Watanabe Tsuneo, “What’s New in Japan’s Three Strategic Documents,” CSIS, *Commentary*, February 13, 2023, <https://www.csis.org/analysis/whats-new-japans-three-strategic-documents>.

⁷ Japan Ministry of Defense, *National Defense Strategy*, 3, 4.

threats posed by China, Russia, and North Korea to both the national security of Japan and the international community.⁸

The NDS also details a desire to integrate space into the Ministry of Defense and SDF activities by utilizing satellite constellations for intelligence, surveillance, and reconnaissance (ISR); positioning, navigation, and timing (PNT); communications, and by building a space domain awareness (SDA) structure to respond to threats in the space domain. The NDS calls for an enhanced SDA capability by FY2027, and for the continued acquisition of space capabilities to integrate into SDF units over the next 10 years⁹ The NDS recognizes space as vital for both civilians and the military, and calls for the increase in collaboration between the SDF and JAXA.¹⁰

The National Defense Buildup Program serves as a guideline for the MoD and SDF to build, maintain, and operate defense capabilities.¹¹ The program states that within five years Japan will strengthen its defense capabilities, and within 10 years the Japanese military should be capable of warding off future invasions without allied assistance. Space capabilities are called upon early in the document as a tool to improve cross-domain operations such as missile warning, information gathering, and communications. The SDF is called upon to launch a space domain awareness satellite constellation, which will include commercial imagery. The Ministry of Defense will also coordinate with JAXA to leverage space as a mechanism of strengthening cooperation with the United States and other allied nations. Finally, the Defense Buildup Program calls to rename the country's Air Self-Defense Force to the Air and Space Self-Defense Force, highlighting the increased role space capabilities will play in the military.¹²

3. Japan's Focus on SSA

Today, Japan is heavily investing in SSA capabilities, largely through its civil space program, the Japan Aerospace Exploration Agency (JAXA). JAXA has three domestic SSA facilities, one for radar, one for optical observation, and another focusing on data analysis.¹³ Together these systems are capable of tracking objects from LEO to GEO. The country invested \$17 million U.S. dollars in SSA initiatives in 2018, and is working towards a deep-space radar center to be fully operational in 2024. This new system will be led by the Ministry of Defense, and the Self-Defense Forces will be charged with the development of further space-based telescopes to be incorporated into the system.

JAXA and the Ministry of Defense are working together to update these SSA systems, and they are sharing personnel when necessary for the mission. They are also working with the United States to maintain the databases and share orbit information. Japan and the United States have had an agreement to share SSA data since 2013, and the two countries have participated in multiple joint SSA workshops and security exercises. The U.S. military plans to launch SDA payloads on the next generation of Japanese QZSS navigation satellites in 2023, which will be the first time a foreign country has launched hosted payloads for U.S. national security missions.

For space assets, the FY 2022 budget dedicated ¥79 billion (\$542 million), or 1.2 percent of the total 16-month budget, to capabilities in the space domain—not inclusive of funds dedicated to ballistic missile defense (BMD).¹⁴

⁸ *Ibid.*, 3.

⁹ *Ibid.*, 25–26.

¹⁰ *Ibid.*, 16.

¹¹ Japan Ministry of Defense, *Defense Buildup Program*, 4.

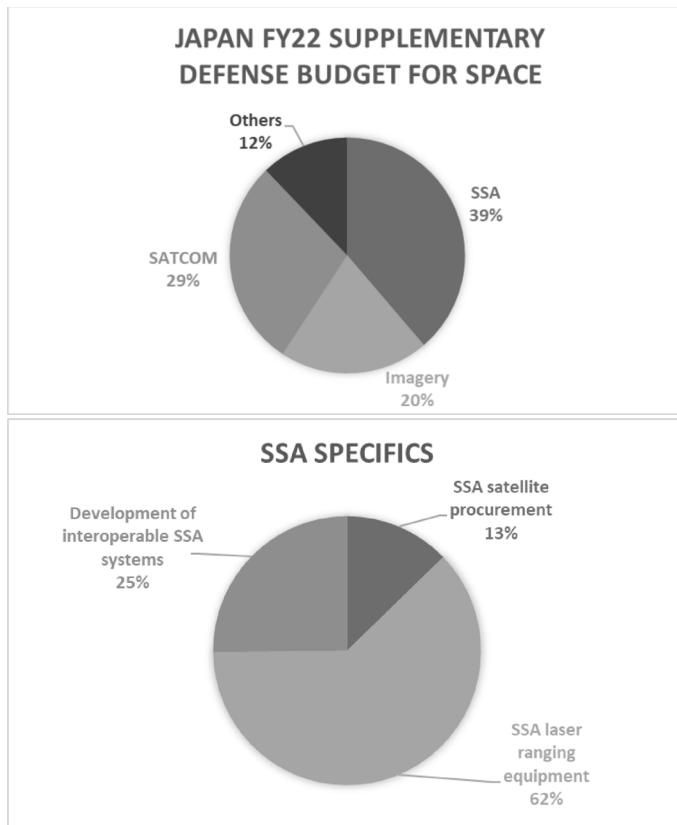
¹² *Ibid.*, 25–26.

¹³ “Space Situational Awareness (SSA) System,” Japan Aerospace Exploration Agency, n.d., <https://global.jaxa.jp/projects/ssa/index.html>

¹⁴ “Defense Programs and Budget of Japan, Defense-Strengthening Acceleration Package — Overview of FY2022 Budget.” Ministry of Defense. https://www.mod.go.jp/en/d_act/d_budget/pdf/20220420.pdf; and Mike Yeo, “Japan Seeks to Increase Defense Spending to 2% of GDP,” *Defense News*, December 1, 2022, <https://www.defensenews.com/global/asia-pacific/2022/12/01/japan-seeks-to-increase-defense-spending-to-2-of-gdp/>.

The FY 2022 budget focuses heavily on the enhancement of space situational awareness (SSA) capabilities and makes three notable allocations: ¥3.9 billion (\$26.8 million) for the procurement of an SSA satellite, including design for a satellite ground system and technical support; ¥19 billion (\$130.5 million) for the acquisition of SSA laser ranging equipment capable of monitoring objects in LEO; and ¥7.7 billion (\$52.9 million) for the development of SSA systems that will be compatible with domestic and U.S. military capabilities.¹⁵

The 2022 budget document also outlines a reorganization of the Space Operations Group, to be separated into a 1st Operations Squadron focused on SSA monitoring, a 2nd Space Operations Squadron focused on the detection of jamming of Japanese satellites, and a 3rd squadron, designated the Space System Management Squadron, to manage and maintain space equipment.¹⁶



4. Conclusion

Japan has evolved from its historical focus on scientific and civil space missions to actively integrating space into its defense planning - a shift largely driven by an increasingly tense security environment in the Indo-Pacific region, marked by growing military capabilities from neighboring countries. The release of key strategic security documents, including the National Security Strategy, National Defense Strategy, and National Defense Buildup Program, underscores Japan's commitment to incorporating space as a crucial component of its national security.

¹⁵ Ibid., 4.

¹⁶ Ibid., 5.

This represents a significant departure from previous policies that advocated for the peaceful and non-military use of outer space. Japan's recognition of the blurred lines between military and non-military domains in space and its emphasis on comprehensive space security efforts reflect the nation's evolving priorities, and an indication that space will play a significant role in defense posture in the future.

The establishment of the Space Operations Squadron and the increasing investments in SSA capabilities further highlight Japan's determination to rely on space for national security missions. However, it is worth noting that while Japan's ambitions in space are growing, its budget in this domain has not fully aligned with its aspirations. Developing advanced capabilities such as SSA and satellite constellations comes with substantial costs, and despite increasing defense budgets for space, Japan still faces budgetary challenges in fully realizing its space ambitions.