

Section
2

Trends in Space Domain

1 Space Domain and Security

Approximately 60 years have passed since a satellite was launched into outer space for the first time in the history of mankind. In recent years, technology leveraging outer space has been applied to various areas, growing more important as key infrastructure for both the public and private sectors. As the Outer Space Treaty, which took effect in October 1967, stipulates that outer space is not subject to national appropriation and that all states parties to the treaties shall use it freely for peaceful purposes, major countries have been making proactive efforts to use outer space for maintaining peace and safety in the security area.

There is no concept of national borders in outer space, meaning that the utilization of satellites enables the observation of, communication at, and positioning on any area on the Earth. Thus, major countries make efforts to enhance the capabilities of a variety of satellites and launch them for the purpose of enhancing C4ISR (command, control, communication, computer, intelligence, surveillance, and reconnaissance), functions. Such satellites include satellites for reconnoitering military facilities and targets, early warning satellites for detecting the launch of ballistic missiles, satellites for gathering radio signals, communication satellites for communications between military units, and satellites for the positioning, navigation and time synchronization of naval vessels and aircraft and enhancing the precision of weapons systems. In outer space, various countries are thus rapidly developing their capabilities to ensure their military superiority.

From the viewpoint of ensuring their military superiority, various countries are also rapidly developing their capabilities

to impede each other's use of outer space. In January 2007, China conducted a test to destroy its aging satellite with a ground-launched missile. Russia also conducted a similar test in April 2020. **Space debris** caused by directly destroying satellites spread across the satellite's orbit and came to be seen as a risk against space assets such as satellites owned by various countries.

Furthermore, countries including China and Russia are thought to be also developing an anti-satellite weapon (ASAT) that does not directly hit and destroy a satellite by a missile, thus creating less space debris. For example, it has been noted that ASATs under development include a "killer satellite" to approach a target satellite and utilize a robot arm to capture the target and disable its functions. On this point, it has been noted that China has carried out experiments in outer space in which they have maneuvered satellites close to other satellites to simulate the movements of a killer satellite. The United States has claimed that a satellite launched by Russia in 2017 fired a high-speed flying object, exhibiting characteristics of a weapon. It has also criticized Russia for launching in 2019 another satellite that actively maneuvers near a U.S. satellite and had an "unusual and disturbing behavior" and condemned that such activity has the potential to create dangerous situations in outer space.

Furthermore, it has been pointed out that China and Russia are developing not only missiles and killer satellites but also jammers for interfering with communications between target satellites and ground stations, and laser weapons for attacking target satellites with directed energy. It has also been noted that China and Russia have been enhancing capabilities to

KEY WORD C4ISR

C4ISR stands for Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance.

KEY WORD Space debris

Space debris represents post-operational satellites, upper rocket stages, their parts and pieces, and other unnecessary artificial objects remaining on satellite orbits.

operate these anti-satellite capabilities and impede the United States and its allies from using outer space.¹ While threats in outer space, including the development of such various countermeasures, are pointed out to be growing, the United States and other countries increasingly position outer space as a warfighting domain or an operational domain, making outer space security an urgent challenge.

As the above illustrates, the risk to the stable use of outer space has become one of the critical security challenges for countries, thus it has become necessary to deal with this risk effectively in an effort to ensure stability in the use of outer space.

Against this backdrop, the existing international agreements do not have direct provisions on prohibiting

the destruction of space objects and refraining from actions triggering space debris. Discussion on guidelines has been under way recently by the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) and the Inter-Agency Space Debris Coordination Committee (IADC). Moreover, countries are working on Space Situational Awareness (SSA) by monitoring the solar activity with a potential impact on satellites and electronic equipment on the Earth, and threats caused by meteors reaching Earth, in addition to threats posed by ASATs and space debris to space assets.

[Q See](#) Part III, Chapter 1, Section 3-1 (Responses in Space Domain)

2 Various Countries' Outer Space Initiatives

1 The United States

Since its first satellite launch in January 1958, the United States has proceeded with a variety of space activities in fields including military, science, and resource exploration, such as launching the world's first reconnaissance satellite and landing on the Moon. Today, the United States is the world's leading space power. The U.S. Forces clearly recognize the importance of outer space for their actions, and on this point, actively utilize outer space for security purposes.

The U.S. National Security Strategy (NSS) released in December 2017 pointed out that some countries are pursuing a variety of ASATs on the basis of belief that the capability to attack assets in outer space will give them asymmetrical advantages. It also indicated that unlimited access to and freedom in activities in outer space were vital interests of the United States, and that the National Space Council would consider long-term goals in outer space to develop strategies. The United States released its National Space Strategy in March 2018, demonstrating its recognition that its adversaries had turned space into a warfighting domain and vowing to deter and defeat threats in the space domain to protect the national interests of the United States and its allies. The National Intelligence Strategy (NIS) announced in January 2019 indicated the recognition of threats in the space domain of which the previous NIS made no mention, warning that adversaries were increasing their presence in the space domain with plans to exceed the United States in some areas. The National Military Strategy (NMS) announced in July 2019 introduced the notion of an operational art through the integration of joint capabilities in all domains, giving priority to space and cyberspace in addition to land, sea and air.

Among U.S. government organizations, the National Aeronautics and Space Administration (NASA) under direct control by the President is responsible mainly for non-military space development, while the DoD undertakes research, development, and operation of military observation and reconnaissance satellites. In August 2019, the United States inaugurated the U.S. Space Command as a new geographic unified combatant command based on the Strategic Command's component in charge of space missions. In December 2019, the United States created the Space Force under the Department of the Air Force as the sixth military branch, with approximately 16,000 personnel.

[Q See](#) Chapter 2, Section 1-2 (Military Posture)

2 China

China began working on space development in the 1950s and launched its first satellite "Dong Fang Hong I" in 1970. China has thus far conducted activities such as crewed space flight and lunar rover launches. In January 2019, China succeeded in landing unmanned spacecraft "Chang'e 4" on the far side of the moon, the first ever such attempt and landing. It is speculated that China's space development is intended to enhance national prestige and develop space resources.

In its 2019 defense white paper, released in July 2019 and titled "China's National Defense in the New Era," China asserts that outer space is a critical domain in international strategic competition and that outer space security provides strategic assurance for national and social development. "China's Space Activities in 2016," China's white paper on space activities released in December 2016, presented a vision to "build China into a space power" and for "the

¹ According to "Worldwide Threat Assessment," the U.S. Director of National Intelligence (January 2019)

realization of the Chinese Dream.” It also gave a schedule to launch lunar, Mars, asteroid, and Jupiter explorers by around 2020.

While traditionally emphasizing international cooperation and the peaceful use of space, China has not ruled out its military use of space and proactively used space for military purposes, including information collection, communications, and positioning through satellites. China continues to develop ASATs. In January 2007, China conducted a test using a ground-launched missile for destroying its own satellite. In July 2014, China implemented an anti-satellite missile test² without actually destroying any satellite. It is also suggested that China is developing killer satellites, jammers, and directed-energy weapons,³ including laser beams. It is pointed out that the BeiDou satellite positioning system, which reportedly started global services in December 2018, could be used for military purposes. A Chinese state-owned corporation, which develops and produces launch vehicles, has claimed to continue the launch of new rockets in the Long March series and develop a launch vehicle that can carry a large satellite. However, the corporation has been reported to have been developing and producing ballistic missiles as well, indicating that the technology used in the development of satellite launch vehicles is applicable to the development of ballistic missiles. China is thus expected to focus on space development through close cooperation between government, military, and private sectors. China is considered to have become one of the space powers through investments, research and development, and the introduction of technologies from the United States and other countries. It has been suggested that China could threaten U.S. superiority in outer space in the future.⁴

The Strategic Support Force, established in December 2015 as a force under direct control by the Central Military Commission, is considered to be in charge of outer space, cyber, and electronic warfare missions, including the launching and tracking of satellites, although the details of its missions and organization have not been published. The Equipment Development Department of the Central Military Commission is believed to be in charge of crewed space programs. The Ministry of Science and Technology takes charge of planning and making China’s science and technology policy covering outer space. The State Administration for Science, Technology and Industry for National Defense, which belongs to the State Council’s Ministry of Industry and Information Technology, works out



Launch of Long March-5 Y3 on December 27, 2019
[Avalon/Jiji Press Photo]

and implements space-related programs. The China National Space Administration takes charge of civilian programs and represents the Chinese Government externally by concluding international agreements.

3 Russia

Russia’s space activities have been continuing since the former Soviet Union era. The former Soviet Union successively launched multiple satellites after it launched the first satellite in the history of mankind, Sputnik 1, in October 1957, and had the largest number of launched satellites in the world until the collapse of the Soviet Union. Russia’s space activities have declined since the former Soviet Union collapsed in 1991. However, the country has recently started to expand its space activities once again.

Regarding the country’s trends in security, the National Security Strategy, approved in December 2015, states that the opportunities for maintaining global and regional stability are shrinking significantly with the deployment of the U.S. weapons in outer space. In response to the United States’ release of the annual MDR in 2018, Russia expressed concern that the implementation of plans in the MDR would trigger an arms race in space with hugely negative consequences for world peace and stability.

In March 2016, Russia released the Federal Space Program for 2016-2025 as a specific future guideline for space activities, including the development and deployment of domestic space satellites and crewed flight programs.

Meanwhile, it is pointed out that Russia has used its outer space capabilities for military operations in Syria and reconnoitering globally operating forces of the United States and its allies.⁵ It is also noted that Russia has continued

² According to “Worldwide Threat Assessment,” the U.S. Director of National Intelligence (February 2015).

³ According to the “Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China,” U.S. DoD (May 2019)

⁴ According to the annual report of the U.S.-China Economic and Security Review Commission (November 2015)

⁵ According to “Competing in Space,” National Air and Space Intelligence Center (December 2018)

ASAT development, repeated tests to fire ground-launched anti-satellite missiles, and has been developing anti-satellite missiles launched from MiG-31 fighter jets, as well as laser weapon systems, such as the Sokol Eshelon system for aircraft.

From an organizational perspective, State Space Corporation ROSCOSMOS is in charge of space activities related to Russia's scientific and economic areas, while the Russian Ministry of Defence is involved in space activities for security purposes. The Russian Aerospace Forces, into which the Air Force and the Aerospace Defence Forces were integrated in August 2015, conduct actual space activities for military purposes and manage facilities for launching satellites.

4 Europe

Regarding European outer space activities, the EU, the European Space Agency (ESA), and European countries are promoting their own unique space activities and are cooperating with each other to implement space activities. France succeeded in launching its own satellite for the first time in 1965, and the United Kingdom in 1971. Italy and Germany used launch vehicles developed by the United States to own satellites in 1964 and 1965, respectively. Meanwhile, the ESA launched its first satellite in 1979.

The EU and ESA at their joint ministerial council meeting in 2007 approved the European Space Policy, which noted that it would be important to improve synergy effects between space activities for civil and defense purposes and secure space activities based on coordinated efforts among member states and an internationally competitive space industry, identifying security as one of the policy priorities. In September 2019, before taking office as President of the European Commission, Ursula von der Leyen stated she would establish a defense and space branch to take charge of military fundraising, development and deployment within the commission. A satellite positioning system called "Galileo" and an Earth observation program named "Copernicus" under planning by the EU and ESA, and a reconnaissance satellite project called "Multinational Space-based Imaging System (MUSIS)" of the European Defense Agency (EDA) are expected to be utilized for the security field in Europe.

In July 2019, France released the Space Defence Strategy as its first document specialized in space defense. The document referred to the creation of a space command and the enhancement of threat identification and space situation surveillance capabilities. In September 2019, France created the space command under the Air Force to integrate functions and personnel of a military space surveillance operation center, a joint space command and a military satellite

surveillance center within the Armed Forces Ministry.

5 India

India has promoted programs to develop communications, positioning and observation satellites. At the end of January 2019, it released a space mission calling for promoting research and development on a crewed space initiative by 2020. At their second meeting of their foreign and defense ministers in December 2019, the United States and India offered to discuss their potential defense cooperation in outer space in 2020.

India is believed to have operated the Navigation Indian Constellation (NavIC) satellite as a positioning satellite that can position locations around India and launched an Earth observation satellite, which is believed to be used for security purposes as well. In February 2017, India successfully launched a satellite launch vehicle loaded with 104 satellites at low cost, marking the largest number ever carried on a single rocket in the world, which indicates its high technological capabilities. In March 2019, Prime Minister Modi announced that the country successfully tested a missile to shoot down a low-orbit satellite.

Among organizations, the Space Agency oversees the Indian Space Research Organization (ISRO), which implements space development policy, develops and launches launch vehicles, and develops and manufactures satellites. It has been reported that the Ministry of Defence approved the creation of the Defence Space Agency (DSA) to control ASATs and other space assets, and to plan defense policies regarding outer space in April 2019. The ministry also approved the establishment of the Defence Space Research Agency (DSRA) to develop weapons and technology for outer space warfare in June 2019.

6 The ROK

The ROK is considered to have started full-scale space development from the latter half of the 1990s. Current space development is promoted based on the Third Basic Space Development Promotion Plan announced by the Moon administration under the Space Development Promotion Act implemented in 2005. The plan proposes a vision towards 2040, giving priority to (1) the establishment of its own launch vehicle technology, (2) the advancement of satellite-using services and satellite development, (3) the initiation of space exploration, and (4) the development of the Korean Positioning System (KPS).

In November 2018, the ROK, which had traditionally depended on other countries for launching satellites, announced that it successfully tested the "Nuri" domestic

launch vehicle under development.

Among organizations, the Korea Aerospace Research Institute leads research and development as an implementation agency. Furthermore, the Korea Agency for Defense

Development is engaged in the development and use of various satellites. The Air Force has offered to create a satellite surveillance and control unit to monitor satellite activities above the Korean Peninsula.⁶

⁶ According to the ROK Defense White Paper 2018 (January 2019)