Chapter 3
Issues in the International Community

Section 4
Outer Space and Security

Nearly 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. No state is allowed to own outer space, and it is freely available to all nations. Major countries thus make proactive efforts to use outer space. For example, meteorological and observation satellites are used to observe weather as well as land and waters; communication and broadcasting satellites are used for the Internet and broadcasting; and positioning satellites are used to navigate aircrafts and ships. These satellites have widely prevailed in social, economic, scientific, and other areas as essential infrastructure for the public and private sectors.

In major countries, military forces are actively involved in outer space activities and utilize a variety of satellites. 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 Earth. Thus, major countries make efforts to enhance the capabilities of a variety of satellites and launch them for the purpose of enhancing C^4ISR functions. Such satellites include imagery reconnaissance satellites reconnoitering military facilities and targets, satellites gathering radio wave information for military communications, communication satellites for military communication, and positioning satellites for navigating naval vessels and aircraft and enhancing the precision of weapons systems.

On the other hand, in January 2007, China conducted a test to destroy its aging satellite with a ground-launched missile. The resulting space debris spread across the satellite’s orbit, and came to be seen as a threat against space assets such as satellites owned by countries. Furthermore, countries including China and Russia are thought to also be developing anti-satellite weapons (ASAT) that do not directly hit and destroy a satellite by a missile, creating less space debris. For example, it has been noted that ASATs under development include an ASAT that approaches the target satellite using a “killer satellite” and utilizes a robot arm to capture the target satellite to disable its functions, as well as an ASAT that disables the functions of the target satellite by using a jammer to interfere with communications between the target satellite and the ground station.

Against this backdrop, since existing frameworks, including the Outer Space Treaty that prescribes the exploration and use of outer space, do not have provisions on avoiding the destruction of space objects and actions triggering space debris, international efforts have been under way recently for the creation of the International Code of Conduct for Outer Space Activities proposed by the EU and the guidelines for “Long-term Sustainability of Outer Space Activities” of the Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) which address such matters. Moreover, countries are working on the Space Situational Awareness (SSA) by monitoring the impact of accelerated solar activity on satellites, electronic equipment on Earth and threats caused by meteors reaching Earth, in addition to threats posed by anti-satellite weapons and space debris to space assets.

As the above illustrates, the risk to the stable use of outer space has become one of the critical security challenges countries face.

See>> Part III, Chapter 1, Section 2-6 (Responses in Space)

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1 The Outer Space Treaty (The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies) that came into force in October 1967 defines such matters as the use of the Moon and other celestial bodies for peaceful purposes, the freedom in principle of exploration and use of outer space, and the prohibition of ownership. However, no clear international agreement has been reached on the definition of outer space, though according to one of the concepts, outer space is considered space located 100 km or further away from the Earth’s surface.

2 The term “C^4ISR” stands for command, control, communication, computer, intelligence, surveillance, and reconnaissance. The 1991 Gulf War is considered “the first high-tech war conducted in outer space in the history of mankind.”

3 Unnecessary artifacts orbiting around the Earth, including satellites no longer in use, upper stages of launch vehicles, parts, and fragments.

4 In 2007, the EU formulated a draft and started bilateral discussions with major countries. Discussions have been made multilateral since 2012 and have been ongoing with a view towards its adoption.

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6 In 2015, Gen. John E. Hyten, Commander of the U.S. Air Force Space Command, stated, “Total number that we track is about 23,000 objects...we expect to be tracking 250,000 to 500,000 objects down to the size of my fist,” describing that space debris constitutes a significant challenge.
2 Trends in the Use of Space by Countries for Security Objectives

United States

The United States launched its first satellite, Explorer 1, in January 1958, following the satellite launches by the former Soviet Union. The country has since then 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 in this regard, actively utilize outer space for security purposes. In June 2010, the United States released the National Space Policy that presents the country’s basic guidelines for space policy, including its objectives and principles. It specified guidelines on security space, civil space, commercial space, and international cooperation, among other sectors. In February 2011, the country also released the National Security Space Strategy (NSSS) as the security guideline regarding outer space, presenting the view that the current and future outer space environment is driven by three trends: (1) congestion caused by artificial objects including satellites; (2) contestation by potential adversaries; and (3) increasing competition with other countries. Based on these strategic guidelines, the U.S. Department of Defense (DoD) is presently undertaking efforts to identify threatening activities in outer space and increase the survivability of U.S. space systems to achieve the goal of maintaining and strengthening U.S. space superiority for security purposes, recognizing that the United States needs to prepare for the possibility of conflict extending into outer space.

From an organizational perspective, the National Aeronautics and Space Administration (NASA) is responsible for non-military space development in the United States, while the U.S. DoD works on space development from a national security perspective. Recently, NASA and the U.S. Air Force announced cooperation in areas such as aircraft design and materials development.

Major satellites used for military purposes include satellites for imagery reconnaissance, early warning, electronic / signals intelligence, communication, and global positioning, and their operations are wide-ranging.

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 end of the collapse of the former Soviet Union. The satellites included many military satellites, which enabled the country to compete against the United States for military expansion in outer space. Russia’s space activities have declined since the former Soviet Union collapsed in 1991. However, the country has recently started to expand its activities once again against the backdrop of its economic recovery.

Regarding the country’s trends in security, the National Security Strategy of the Russian Federation, approved in December 2015, states that the U.S. deployment of weapons into outer space constitutes one of the factors undermining global and regional stability. The Military Doctrine of the Russian Federation, a document created in February 2010 to specifically define the principles of the National Security Strategy in the military field, mentions that securing supremacy in outer space is one of the decisive factors in achieving the objectives of its armed forces. It also states that the tasks of the armed forces include providing timely warning to the Supreme Commander-in-Chief of the Armed Forces of the Russian Federation of an air or space attack and deploying and maintaining space systems supporting the activities of the Russian Armed Forces. In addition, it refers to the need to establish air-space defense organizations.

From an organizational perspective, the Roscosmos State Corporation for Space Activities 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

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7 Based on this understanding, the NSSS identifies that the U.S. strategic objectives for outer space are to: (1) strengthen safety, stability, and security in outer space; (2) maintain and enhance the strategic national security advantages afforded to the United States by outer space; and (3) energize the space industrial base that supports U.S. national security. To meet these objectives, the NSSS states that the country will pursue the strategic approaches of (1) promoting responsible, peaceful, and safe-use of outer space, (2) providing improved U.S. outer space capabilities, (3) partnering with responsible nations, international organizations, and commercial firms, (4) preventing and deterring aggression against space infrastructure that supports U.S. national security, and (5) preparing to defend attacks and to operate in a degraded environment.

8 For these efforts, the DoD’s FY2017 budget request related to space appropriated approximately US$7.1 billion, 1.4% more than the FY2016 approved budget. It is considered that, for example, next-generation GPS systems and next-generation Advanced Extremely High Frequency (AEHF) communication satellites that were newly included in the development budget are not easily impacted by adversaries’ sabotage activities.

9 “The Military Doctrine of the Russian Federation” was revised in December 2014.
Aerospace Forces\(^\text{10}\) conducts actual space activities for military purposes, manages facilities for launching satellites, among other activities.

Major satellites launched by Russia are satellites for imagery reconnaissance, early warning, radio wave information gathering, communication, positioning, and others, all of which are presumed to be used for security purposes. Currently, Russia is developing a new Angara carrier launch vehicle,\(^\text{11}\) along with building a new launch site in Vostochny in the Far East.\(^\text{12}\)

It is thought that in the future, “Galileo,” a satellite positioning system planned by the EU and the ESA;\(^\text{15}\) “Copernicus,” a global environment and security monitoring program;\(^\text{16}\) and the Multinational Space-based Imaging System (MUSIS),\(^\text{17}\) a reconnaissance satellite project implemented by the European Defence Agency (EDA),\(^\text{18}\) will be utilized for security in Europe.

\section*{Europe}

Regarding European outer space activities, France succeeded in launching its own satellite for the first time in 1965, following the former Soviet Union and the United States, and the United Kingdom succeeded in launching its own satellite for the first time in 1971. Italy and Germany used launch vehicles developed by the United States to own satellites in December 1964 and July 1965, respectively. On the other hand, the European Space Agency (ESA)\(^\text{13}\) Convention signed in May 1975 established the ESA, which launched a satellite in 1979.

In Europe, the EU, the ESA, and European countries are promoting their own unique space activities and are helping each other to implement space activities.\(^\text{14}\)

The ESA signed a “framework agreement” with the EU in May 2004 to specify that they will collaborate to proceed with space development and hold regular minister-level council meetings. The joint council meeting held by the ESA and the EU in May 2007 approved the “European Space Policy.” The “European Space Policy” mentions improving synergy effects between space activities for civil and defense purposes, and the importance of implementing space activities based on coordinated efforts among member states and ensuring an internationally competitive space industry. The Policy identifies security as one of its areas of priority.

China began work on space development in the 1950s. In April 1970, the county launched its first satellite “Dong Fang Hong I,” mounted on the transportation launch vehicle “Long March I,” using technology enhanced through its missile development.

China has thus far conducted activities such as manned spaceflight and lunar rover launches. It is speculated that China’s space development is intended to enhance national prestige and develop space resources.

The National Medium- and Long-Term Program for Science and Technology Development published by the

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\(^{10}\) According to the Russian Ministry of Defence, the Aerospace Forces were created by merging the Air Force and the Aerospace Defence Forces, and started performing its tasks in August 2015. The tasks of the Aerospace Forces include: (1) providing focused combat command to the air force; (2) conducting aerial and missile defense; (3) launching and controlling satellites; (4) warning about missile attack; and (5) monitoring of outer space.

\(^{11}\) In July 2014, the first launch of “Angara-1.2F” was conducted successfully. In December 2014, “Angara-A5” successfully put a dummy satellite into orbit for the first time. The Angara launch vehicle is considered as the first large launch vehicle that Russia developed after the collapse of the Soviet Union. It is expected that the vehicle will be launching commercial as well as military satellites.

\(^{12}\) The new launch site is being built to replace the Russian-leased Baikonur Cosmodrome in Kazakhstan, and Russia aims to have the site fully operational by 2020. The first launch vehicle was launched in April 2016.

\(^{13}\) The ESA was established in May 1975 based on the ESA Convention targeting to establish a single European space organization focusing on the peaceful use of space research, technology, and application areas. The organization was formally established in October 1980.

\(^{14}\) In September 2000, the European Commission (EC) and the ESA created the European Strategy for Space that committed to pursuing Europe’s coherent and effective space activities. The strategy envisioned that the EC would make political and strategic decisions on space policies and that ESA would function as the implementing organization. For the satellite positioning system “Galileo” currently in operation and the environmental and security monitoring program “Copernicus,” the EU and ESA are complementing each other in carrying these projects forward, with the former mainly taking charge of the policy dimension and the latter the technical dimension.

\(^{15}\) The launch of fully capable operational satellites began in 2014. This system consisting of 30 satellites in total is expected to start service by 2020. Galileo reportedly has 12 satellites in orbit as of January 2016.

\(^{16}\) New observation satellites called “Sentinels” are being launched to collect imagery necessary for conducting Earth observations. Sentinels are classified according to their purpose into 1 (all-weather satellite that takes images of land and ocean), 2 (all-weather satellite capable of high-resolution land monitoring to provide imagery of vegetation, inland waterways, and coastal areas), and 3 (satellite measuring land- and sea-surface temperature and topography). Two Sentinels are said to be in orbit as of January 2016.

\(^{17}\) The MUSIS was started by Belgium, Germany, Greece, France, Italy, and Spain. The organization was joined later by Poland in December 2010. This is a joint project succeeding such projects as “Helios 2” (a French military reconnaissance satellite), “Hedas” (a French Earth imaging satellite used for military and civilian purposes), “SAR-Lupe” (a German group of military radar satellites), and “COSMO-SkyMed” (an Italian constellation of Earth observation satellites).

\(^{18}\) The European Defence Agency (EDA) was established in 2004 to improve Europe’s defense capabilities for crisis management purposes and to execute and maintain security and defense policies.
State Council of China positions manned spaceflight, and high-resolution Earth observation systems as specific critical projects in the aerospace area. Along with these medium- and long-term plans, “China’s Space Activities in 2011,” a space white paper published by China in December 2011, clarifies the country’s major challenges, policies, and international cooperation projects for the coming five years and emphasizes the peaceful use of space.

With regard to the organizational setup, the State Administration for Science, Technology and Industry for National Defense, under the Ministry of Industry and Information Technology of the State Council, oversees industries related to space, nuclear technology, aviation, ships, and weapons. The China National Space Administration enforces the administrative control of the space area for civil and commercial purposes and represents the Chinese government externally.

In the meantime, it is regarded that China is also using space for information collection, communications, and positioning for military purposes. Recently, the Air Force indicated its intention to make proactive use of space. Since September 2015, China has publicized a series of its decisions on military reforms, and in January 2016, the establishment of the Strategic Support Force was announced. While the details of the Force’s tasks and organization have not been revealed, it is suggested that it is in charge of outer space, cyber, and electronic warfare. China’s defense white paper “China’s Military Strategy” (May 2015) states that outer space is a commanding height in strategic competition among all parties. Meanwhile, China asserts that its activities in outer space constitute “peaceful use of outer space,” and underscores that China is “opposed to the weaponization of arms race in outer space, and [will take] an active part in international space cooperation.”

China also commits to “[keeping] abreast of the dynamics of outer space, deal with security threats and challenges in that domain, and secure its space assets.”

In addition, China is developing new models of its “Long March” carrier vehicle series, and completed a new launch site in Wenchang, Hainan Province, which became China’s fourth launch center. This launch center faces the ocean unlike China’s other launch sites and is located furthest south. In this regard, some observers note that the launch site allows launches to be conducted with a high degree of freedom. Carrier launch vehicles are developed and manufactured by Chinese state-owned enterprises, which are thought to be also developing and manufacturing ballistic missiles. It is expected that China will pursue space development through close collaboration between the public sector, military, and private sector.

Additionally, China is considered to have become one of the space powers through investments, research and development, and introduction of technologies from the United States and other countries. It has been suggested that China could threaten U.S. information superiority in outer space in the future. Moreover, China continues to develop ASATs. In January 2007, China conducted a test using a ground-launched missile that destroyed its own satellite. In July 2014, China tested an anti-satellite missile not involving the destruction of a satellite. It is also suggested that China is developing directed-energy weapons, including “killer satellites,” jammers, and laser beams.

India’s space development promotes space programs aimed at social and economic development in line with the 5-year national plan. The country’s latest 12th Five-

19 China launched “Tiangong-1,” a space laboratory, in September 2011 and succeeded in docketing it with an unmanned spacecraft, “Shenzhou 8,” in November 2011 and with the manned spacecraft “Shenzhou 9” and “Shenzhou 10” in June 2012 and June 2013, respectively. In this regard, China is considered to have acquired the technologies needed for its space station construction project.
21 By December 2012, the BeiDou Navigation Satellite System officially started its services covering most of the Asia-Pacific region. It is reported that the BeiDou system has already started to be mounted on other vessels, government vessels belonging to maritime law enforcement agencies, fishing boats, among other vessels. BeiDou offers not only positioning services but also interactive short message features. It is suggested that these features make it possible to centrally capture and share, in real time, the position and other data related to vessels of other countries that Chinese navy vessels have detected, and improve information gathering capabilities on the ocean and other areas.
22 In April 2014, Xi Jinping, Chairman of the Central Military Commission, inspected an Air Force agency and made reference to building an air force that “integrates air and space capabilities and balances offensive and defensive operations.”
23 In September 2015, China succeeded in its first launch of Long March-6 (for launching small satellites) and Long March-11 (for launching solid-fuel small satellites). Furthermore, China is developing Long March-5 (for launching large satellites) and Long March-7 (for launching “Shenzhou”). It is assumed that China has plans to develop Long March-9 (for launching ultra-large satellites).
24 In September 2014, China announced that the launch center was already ready for launching vehicles. In June 2016, the first launch of Long March-7 was conducted successfully. China plans to conduct the first launch of Long March-5 from this launch center in September or October 2016.
25 The launch center enables discarded stages of the launch vehicle, such as the first stage launch vehicle, to fall into sea rather than into Chinese or other countries’ territories. It is thus suggested that the launch center eliminates the restrictions on launches. In addition, latitudes close to the equator at which a launch vehicle can take advantage of the force of the Earth’s rotation are generally considered favorable for launches into a geostationary orbit and other launches.
27 The February 2016 “Worldwide Threat Assessment” of the U.S. Director of National Intelligence notes that in July 2014, China tested an anti-satellite missile not involving the destruction of a satellite. In addition, it states that China has satellite jamming capabilities and is making progress on an anti-satellite system.
28 According to the U.S. DoD’s “Annual Report to Congress: Military and Security Developments Involving the People’s Republic of China” of May 2015, China continues to develop a variety of capabilities, including directed-energy weapons and satellite jammers, designed to limit or prevent the use of space assets by adversaries during a crisis or conflict.
Year Plan focuses on non-military projects including communication, positioning, Earth observation (e.g., disaster monitoring, resource exploration, and weather observation), transportation systems, space science, and spinoff promotions.

The Indian Space Commission (ISC) determines the country’s space policy under the leadership of the Prime Minister and assumes responsibility for preparing space development budgets and implementing space development programs. The Department of Space, managed by the ISC, oversees the Indian Space Research Organisation (ISRO), which implements space development policy, develops and launches launch vehicles, and develops and manufactures satellites.

In the area of space development cooperation with other countries, India and the United States, for example, reached agreement on future space development cooperation at the bilateral summit meeting in January 2015. The two countries are expected to cooperate on SSA and other dimensions.

India reportedly launches remote sensing satellites also for security purposes. Additionally, the country plans to launch positioning satellites, implement planetary explorations, and conduct manned spaceflight.

### Republic of Korea

The Republic of Korea (ROK) is considered to have started full-scale space development by creating the first “Mid- and Long-Term Basic Plan for Space Development (1996-2015)” in 1996. In recent years, the country has promoted space development projects in accordance with the Space Development Promotion Act (enacted in May 2005). The ROK carries out space activities based on the three key plans it established in November 2013, namely: the “Mid- and Long-Term Plan for Space Development (2014-2040),” which plans to move up the first launch of launch vehicles manufactured by the ROK to June 2020; the “Space Technology Industrialization Strategy,” which prompts the private sector to lead space development; and the “Revision of the Korean Rocket Development Plan,” which outlines the use of ROK-made launch vehicles and the ROK’s own development of planetary and space exploration satellites and high orbit satellites.

On the security front, the ROK’s Defense White Paper published in December 2012 states that the ROK would secure a space surveillance system and other mechanisms for developing the Air Force into an aerospace force, and establish a Satellite Surveillance Control Group in order to secure air and space operational capabilities.

On the organizational front, the ROK has the National Space Committee, which deliberates major issues related to space development under the leadership of the President; and the Korea Aerospace Research Institute, which 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.

Major satellites launched by the country include imagery reconnaissance and communication satellites launched using foreign launch vehicles.

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29 The 12th Five-Year Plan covers the period between April 2012 and March 2017.
30 Technology enabling the observation of the size, shape, and nature of an object from a distance without making physical contact with the object.
31 In April 2016, India succeeded in launching the seventh satellite constituting the Indian Regional Navigation Satellite System (IRNSS), which completed the deployment of the constellation.
32 In December 2014, the ISRO succeeded in the test launch of a large launch vehicle carrying an unmanned capsule.
33 The Act stipulates that the country create a mid- and long-term basic plan every five years and an execution plan for each fiscal year, and establishes the National Space Committee. Based on this Act, the country established the “1st Basic Space Development Promotion Plan” and the “2nd Basic Space Development Promotion Plan” in June 2007 and December 2011, respectively.
34 This is a modified version of the “2nd Basic Space Development Promotion Plan.”
35 In January 2013, for the first time on its third attempt, the ROK successfully launched the “Nano” launch vehicle (KSLV-1) that was developed under a technical cooperation agreement with Russia.
36 The launch of the pilot launch vehicle is scheduled for December 2017.