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Military Competition and Arms Control in Space

우주상 군비경쟁과 군비통제

Shin, Dong-Chun(신 동 춘)*
Cho, Hong-Je(조 홍 제)**

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* Vice President, Korean Association of Air and Space Law/ Vice Chairman of T'way Air, Ph.D. (한국항공우주법학회 부회장, 티웨이 항공 부회장)
** Senior Research Fellow, Research Institute on National Security Affairs, Korea National Defense University, Ph. D (국방대학교 안보문제연구소 전문연구원)

Ⅰ. Introduction

The scope of mankind's activities has experienced expansion from land to ocean, from ocean to atmosphere, and from atmosphere to outer space. Space technology, which emerged in the 1950s, opened up a new era for man's exploration of outer space. Over the past half-century, mankind's space activities have scored remarkable achievements, greatly promoted the development of social productivity and progress, and produced profound and far-reaching effects. Space technology has turned out to be one field of high technology that greatly influences modern society. The continuous development and application of space technology has become an important endeavor in the modernization drive of countries all over the world.

Understanding space is vital to national security in that it enhances a nation's ability to support diplomatic efforts, foresee emerging threats, and project power globally by conducting operations successfully, thereby enabling global economic viability. As more nations and non-state actors recognize these benefits and seek their own space or counter-space capabilities, we are faced with new opportunities and challenges in the space domain.[1)]

Given the increasing global reliance on space systems and rising proclivity to militarize space, the weaponization and evolution of space into a distinct theater of military operations is a pending phenomenon. Though technologies applicable for space combat includes a wide variety of military instrumentalities, the development of space weapons is the most obvious choice. North Korea launched a missile in April 2009 while falsely claiming that it was a communications satellite, and conducted a second nuclear test in May of the same year. Such actions threatened the Korean Peninsula and international security. The US shot down the intelligence satellite despite condemnations from China and Russia. China also

1) NATIONAL SECURITY SPACE STRATEGY, January 2011, pp.1～3.

successfully conducted the launch of an anti-satellite missile. These incidents show how the arms race in outer space will intensify internationally in the future.

The space arms race began with the launch of Sputnik I by the former Soviet Union, and since then, mankind has been expanding its capacity to wage war in outer space. After the former Soviet Union launched Sputnik I, it launched about 5,400 satellites among which 1,000 satellites are still active today. The increasing development of space technology has contributed positively to human life, and the overall standard of living has been raised to spur further military and commercial space development in nations such as China, Japan, the EU, not to exclude the US and Russia.

In the twenty-first century, countries wanting to expand their sphere of influence and power have been motivated to pursue the space arms race in order to obtain information on enemy targets, surveillance satellites, and develop space arms relevant to the military. In this respect, the space arms race has become a great threat to international security. Thus, the international society should be concerned about the military use of space and should try to search for necessary measures in preventing possible catastrophic consequences.

Many scholars insist upon the prevention of the space arms race, basing their claims on the norm prohibiting the arrangement of arms in outer space and asserting the peaceful use of it. For example, the Outer space treaty of 1967 and the Moon treaty in 1979 stipulate as follows: Space must be used peacefully and space is not exclusive to any nation's sovereignty and ownership. Outer space is the "Common Heritage of Mankind"(CHM), thus prohibiting the stationing of arms and nuclear tests. However, disputes over disarmaments in outer space are ongoing. Recently, many nations have worked together through the UN in order to prevent a space arms race of greater magnitude. As every nation has a different stance with regard to national interest and are engaged in different levels of space development, the conditions required for the successful negotiation of a comprehensive treaty are not yet fruitful. Furthermore, those countries with space

power – the US, China, and Russia - stand on distinctively different grounds concerning the space arms race is a greater obstacle. This article introduces the space arms race in detail and suggests what direction and measure should be taken in order for space disarmament to be successful.

Moreover, North Korea has been establishing its status of a nuclear power by conducting several nuclear tests, launching mid-and short range missiles and even rockets and operating nuclear facilities. In the meantime, South Korea has been trying to launch satellite rockets on its own launching site known as Narodo. Since the Koreas has been involved in more and more space-related activities, they are advised to be in conformity with international rules and norms. Therefore we are also dealing with the two Korea's position with regard to this issue in this article.

Ⅱ. Military Competition in Space

1. Space weapons

In most respects, the history of mankind's ascent to space is a history of the militarization of outer space. A review of this history, along with a basic familiarization of current and potential implements of space warfare, provides the requisite context from which the analysis herein can proceed to legal considerations related to the weaponization of space. Among other things, an understanding of technical space developments provides insight into the way international legal norms have developed. Such weapons can be grouped according to a variety of criteria. They can be grouped by missions intended such as "anti-satellite" and "missile defense," or by methods of pursuit such as "boost phase intercept" and "direct ascent."

Space weapons can be categorized according to the geographic aspects of their

effective direction and to their mode of operation.[2] Space weapons can either act from earth to space,from space to space, or from space to earth. Possible modes of operation are kinetic energy, directed energy, or nuclear explosions. Most anti-satellite (ASAT) weapons fall into the category of earth[3] to space. They are fired from earth to space with the aim of destroying satellites.

Depending on its characteristics, a space weapon can fall under several different categories at once. One of the most logical means of identification focuses on the weapon's means of destruction as its distinguishing feature. The most probable future space weaponry can be described using this method of identification, including those representative samples discussed in the six categories below.

(1) Origins and Evolution of Space Militarization

Space warfare, as any other use of outer space, requires access to the space environment. That access requires the use of missiles and rockets, later termed "boosters" in view of their utility as launch vehicles for spacecrafts. As for most other segments of space technology, rockets were first developed by military forces. Matte notes the likelihood that "as early as 3000 B.C. the Chinese had developed rockets for, among other things, use in warfare." However, it would be almost 5000 years before rockets became a major instrument of warfare. Following the advent of rocketry, creating a weapon of ultimate destructive capability was just a matter of time for the leading scientific minds. The conventional explosives used by the V-2 rockets simply mimicked the effects attainable by means of air-dropped bombs. These contained the equivalent of one ton of TNT. By contrast, the earliest nuclear weapons contained the equivalent of 20,000 tons (20 kilotons).Later

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2) Max M. Mutschler, Preventive Arms Control in Space: Breaking the Deadlock, Paper presented at ECPR-SGIR 7th Pan-European International Relations Conference, Stockholm 9-11 Sep. 2010. Section 7 - International Security. Panel: Arms control as a condition for or as a result of security?, Institute of Political Science University of Tübingen.

3) Hasenclever, Mayer, and Rittberger (2002) divide theories of international regimes into interest-based, power-based, and knowledge-based theories. 4 In the subsequent description of space weapons I broadly follow Dickow (2008, 109–11), Neuneck and Rothkirch (2005, 369–73), Neuneck and Rothkirch (2006, 26–32), von Kries, Schmidt-Tedd, and Schrogl (2002, 253–6).

versions would deliver the equivalent of 15,000,000 tons (15 megatons) of TNT and more.

It was not until 1957 that the first nuclear detonations occurred in space. Not only did this development become a catalyst for the passage of a treaty limiting nuclear weapons testing (Limited Nuclear Test Ban Treaty), but it also brought a plea from the Soviet Union that such tests not endanger the safety of Soviet cosmonauts. The U.S. responded to the Soviet concern with the assurance ″that no activities were contemplated which could have harmful effects upon the Soviet spacemen.″ Following the passage of the Limited Nuclear Test Ban Treaty in 1963, such detonations in space were no longer lawful and simple verification measures made them easily detected.

In many ways, the evolution of satellite technology follows the evolution of missile technology. Without the latter, the former had no way of reaching outer space. Thus, the early battles for the funding of satellite technology in the DOD (Department of Defense) and in Congress often pitted satellite and missile research against conventional weaponry. Once funding for ICBMs came through, however, it was soon realized that rockets more powerful than an ICBM (Intercontinental Ballistic Missile) might succeed in launching satellites.

The earliest military satellite program focused on a reconnaissance mission. In time, the mission for reconnaissance satellites in the U.S. would be shared between the military and the intelligence establishment. Systems such as the venerable Corona series were launched in early 1959 amid great secrecy and were controlled by the U.S. Central Intelligence Agency. Though the focus of public U.S. military space activity remained in the DOD, it was determined that reconnaissance missions from space could not be publicized.

Reconnaissance was not the only military mission for early satellites. The system showed its great value during the 1991 Persian Gulf War by providing for combatants answers to the age-old questions of ″Where am I?″ and ″Where am I going?″ to an accuracy of less than thirty feet. It was also used to guide munitions

launched from air, sea, and land-based weapons to their targets providing three-dimensional position and velocity data. This constantly-improving targeting capability will likely be a significant law of war contribution made by GPS. The better GPS accuracy becomes, the higher the burden it will place on its users to distinguish legitimate from illegitimate targets and to minimize collateral damage. Thus, it will no doubt "change the face of future warfare." Operating on only sixteen satellites in the 1991 war, the system nonetheless proved itself highly useful and will be indispensable to space missions for future conflicts as well.

(2) Present and Potential Technologies Available for Space Combat

To date, there has not been a single reported case of force used in outer space by one nation against another. Nonetheless, given the increasing global reliance on space systems and the rising proclivity to militarize space, the weaponization and evolution of space into a distinct theater of military operations is a pending phenomenon. Though technologies applicable for space combat will include a wide variety of military instrumentalities, the development of space weapons is the most obvious choice. Such weapons can be grouped according to a variety of criteria. They can be grouped by missions intended such as "anti-satellite" and "missile defense," or by method of pursuit such as "boost phase intercept" and "direct ascent." Depending on its characteristics, a space weapon could ~~fitwithin~~fall under several different categories at once. One of the most logical means of identification focuses on the weapon's means of destruction as its distinguishing feature. The most probable future space weaponry can be described using this method of identification, including those representative samples discussed in the six categories below.

a) Electromagnetic and Radiation Weapons

The quint essential electromagnetic and radiation weapon is the nuclear bomb.

Recognizing this, the first anti-satellite (ASAT) weapon system made operational by the U.S. involved a nuclear detonation in space. Though the history and basic functioning of nuclear weapons have been noted previously, it will be necessary to consider briefly their effect as a weapon when detonated in outer space. Given the near-vacuum conditions of space, the range of a nuclear blast in terms of spreading radiation and heat is greatly diminished. In the absence of atmosphere, radioactive fallout cannot occur.

b) Kinetic Energy and Hypervelocity Weapons

Kinetic energy weapons, of which hypervelocity weapons are a subtype, are historically the most common forms of space weaponry. As suggested above, given the tremendous speeds at which objects travel in orbit, on the order of 4.7miles per second in low-earth orbit, just about anything properly aimed could become a weapon even without the use of an explosive warhead. This is true because such an object's speed, including those of very small masses, gives it tremendous kinetic energy for impact. One U.S. kinetic energy weapon, originally tested as a missile interceptor, could equally serve as an ASAT. Known as the Homing Overlay Experiment (HOE), the weapon, once boosted into space, unfurls a 4.5 meter radial "net" that is wrapped tightly behind the nose sensor. The net increases the lethal radius of the homing and kill vehicle. Successful testing in 1983 and 1984 showed the weapon capable of homing in and destroying a dummy warhead in space using a long-wavelength infrared sensor.

c) Laser Weapons

"Laser" is an acronym for Light Amplification by Stimulated Emission of Radiation and is a device that produces a narrow beam of radiation by means of a physical emission. The light constituting the laser beam can be produced by a variety of chemical means. Key components of such a weapon include both the laser itself and the beam control subsystems which aim the beam. Once created,

the beam used in the proposed weapon's laser is so concentrated that it can be projected for extremely long distances with very little loss of energy. Study on laser weapons, including those capable of disabling satellites, began in the early 1960s, and received increased attention as part of the Strategic Defense Initiative. Despite tremendous technical problems, mostly still unresolved, lasers could radically change warfare if ever fielded.

d) Particle Beam Weapons

The first proposed use of particle beam weapons for satellite defense occurred in 1965. Even more technically challenging than lasers, both particle beam and laser weapons constitute "directed energy" weapons-that is, weapons which destroy their targets by delivering energy at or near the speed of light (approximately Mach 1,000,000). This would be a considerable advantage during time-urgent military engagements. In theory, a particle beam weapon could mimic the effects achieved by an electron accelerator by transferring energy to its target at nearly the speed of light. In so doing, it would transfer thermal energy similar to the action of a lightning bolt. Unlike the short attack of a nuclear (or other) blast-triggered EMP, a particle beam weapon could keep its destructive beam focused on the target for longer periods of time.

e) Explosive Proximity Weapons

The category of space weapons characterized by an explosion in proximity to its target is perhaps the most self-evident form of space weaponry. This type of weapon simply steers close to its target and blows it up by detonation in the target's vicinity. The best example is the Soviet ASAT system, first tested in the late 1960s and fielded in the 1970s. The explosive kill vehicle is rocket launched to coincide with the period during which the earth's rotation will put the weapon into the same orbital plane as the target satellite. Once the ASAT achieves orbit, ground controllers maneuver the object

for one to two revolutions of the earth until it is close enough to the target for its own guidance system to activate.

f) 'Soft Kill' Weapons

A final category includes those weapons designed to disable their space-based targets, usually satellites, rather than destroy them. Though never fielded, at least three types of systems in this category have been considered, all of which rely on rendezvous with the target satellite. First, weapons that spray paint onto the optics, solar arrays, or radiators of the target would disrupt power supplies or mission execution. Second, a target satellite could be nudged or tipped out of its current orbit in order to exhaust its control fuel. Third, electronic jamming could disrupt a satellite's proper functioning or shut it down altogether. In each case, unless detected before the "attack," disabling missions such as these could be undertaken covertly and the true source never be detected or proven. Because the results of these "soft kills" often mimic routine failures, detection would prove difficult.

2. Military Competition in Space

During the Cold War, the United States and the Soviet Union developed ASAT (Anti-Satellite) capabilities. The U.S. tested airborne ASAT-missiles, and the Soviet Union deployed a ground-based ASAT-system and conducted 20 ASAT-tests. In 2007, China conducted its first successful ASAT test. These weapons use kinetic energy in order to destroy satellites. Simply speaking, they are rockets with an integrated, so-called "kill vehicle" that hits the satellite and destroys it by the sheer energy of the impact. Another option would be to use directed energy weapons that use laser energy to blind or destroy satellites. It is important to note that although the U.S., Russia, and China have already demonstrated a latent capability to develop ASAT weapons, no state has yet deployed a highly effective, large-scale

ASAT system.

ASAT weapons that act from space to space have also been conceeived. They are satellites that have the capacity to either destroy or to manipulate other satellites. This ~~could~~can be done either with kinetic energy (one simply maneuveres one satellite into the orbit of another one), or with directed energy (satellite-based laser). In addition to earth to space and space to space weapons, military planners also considered weapons that could project force from space to earth. Proposals have been made, for example, to develop a space-based strike system with rods of heavy metal deployed in orbit that would be hurled earthwards at extremely high speed, creating an impact equivalent to a small nuclear weapon.

Another proposal that has its origins in the SDI plans of the 1980s is the idea of making use of space-based lasers for the purpose of missile defense. Space-based lasers could be used to destroy enemy missiles already in their boost-phase. Most of these technologies are still in the phase of R&D; others only exist on white papers of defense planners. However, China's anti-satellite test in 2007 and the kill of a proprietary out-of-control spy satellite by the U.S. in 2008 demonstrated that the danger of an arms race in space is real. Such an arms race would probably not be limited to the U.S., Russia, and China; other emerging powers with access to space technology are likely to follow. In January 2010, the Director-General of India's Defense Research and Development Organization announced that India is working on a kill vehicle that could be used to attack satellites in Low Earth Orbit (LEO)[4].

The current top contender in the space arms race is the United States. The United States began developing anti-satellite systems in 1957, and as early as 1962 had produced anti-satellite interceptors with nuclear warheads on Nike-Zeus and Thor missiles that it operationally deployed on Johnston Island. The U.S. introduced two such anti-satellite systems between 1972 and 1974, when they were withdrawn from operational status and mothballed.

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4) Space News, January 11, 2010.

In 1977, within the framework of its ASAT program, the U.S. began development of a new-generation MALS anti-satellite system designed to destroy satellites with its miniature homing vehicle MHV fired from an F-15 aircraft into a vertical trajectory on a SRAM-Altair booster. Its altitude, however, was limited to 1,000 kilometers. In 1984–1985, this anti-satellite system (ASAT) underwent flight tests against real space targets. It was estimated that the system would allow the U.S. to destroy between three and five spacecraft in low-Earth orbits of under 1,000 kilometers within 24-36 hours.

Work on MALS was terminated in 1988 for a number of technical and political reasons, and the system was mothballed. It is estimated that the system could be made mission-capable again within a matter of months. This decision on MALS did not mean that the U.S. had completely rejected the idea of developing ASAT, including the land-, air- and sea-based components of the system.

A new stage of work on anti-satellite systems began in 1989. At that time, the U.S. placed most of its chips on the development of a land-based ASAT. By 1991, it already had a draft plan for an "environmentally clean" KEASat (Kinetic Energy Anti-Satellite) interceptor that supposedly eliminated fragmentation.[5] Such interceptors would weigh several dozen kilograms each. ASAT equipped with such interceptors would supposedly be able to destroy all near-Earth military satellites within a week. According to development plans, such interceptors would carry a Teflon sheet with a surface area of 113m^2 that would unfurl shortly before impact with the target and "envelope" the space craft in the sheet, thus preventing the resulting debris(fragments of both the satellite and the interceptor) from spreading. This anti-satellite weapon was supposedly designed to prevent the creation of additional debris that could endanger other spacecraft. In reality, however, the interceptor's high speed encounter with its target involved such a large amount of kinetic energy that no sheet could ever be capable of preventing the scattering

5) Aviation Week and Space Technology 134, IX/III (1991); Zarubezhniye kosmicheskiye kompleksy i sistemy, №. 3,1992.

of the enormous number of fragments produced.

The U.S. has also continued to develop a space-based laser weapon system (SBL) based on an orbital anti-missile and anti-satellite platform to destroy targets at ranges of from 1,000 to 3,000 km. U.S. experts continue to view such SBLs as potential weapons for use against ballistic missiles (BM) at any range by targeting them during their boost phase (at altitudes of 10 kilometers or higher). Aside from using them as a component of the BMD system, the U.S. is also considering using SBLs as a potential weapon against low- and intermediate-orbit satellites, as well as against aircraft targeted over distances of from several hundred to several thousand kilometers. SBL systems consist of the following components:

The U.S. attaches great importance to the role of counter-information weapons in carrying out radio-electronic warfare in and from space. Indirect evidence of this comes from its current efforts to protect U.S. space-based systems from electronic warfare. For example, the U.S. telecommunications system's National Coordinating Center was transformed into the National Telecommunications and Information Exchange in January 2000, with a new role focusing on assessment of system vulnerability and survivability and analysis of threats and anomalies affecting the U.S. telecommunications infrastructure. The importance of these activities may also explain the data that have appeared about recent electronic counter-measures development work. At a series of Senate hearings, it was disclosed that the U.S. Air Force in 2004 had created the 76th space control squadron, which was to use terrestrial active jamming stations to destroy or disable foreign satellites.

There has also been extensive work carried out in the field of orbital inspection technologies, especially within the framework of the ANGELS program, which the U.S. Department of Defense had begun financing in 2005. This program involves the development of autonomous micro-spacecraft that are designed to safeguard and inspect U.S. spacecraft, but that can also be used to inspect and attack a potential enemy's satellites. In 2005, the Lockheed Martin Corporation

won a contract from the U.S. Air Force's research laboratory to develop an autonomous micro-spacecraft for the ANGELS inspection program.

The results of this dual purpose program are applicable both to electronic warfare and space defense. According to experts at the U.S. Center for Defense Information, autonomous micro-spacecraft built with ANGELS technology could be equipped either with radio transmitters for creating radio interference or with paint spraying equipment that blocks the optical equipment of other spacecraft. An experimental inspection micro-spacecraft was to be launched into geostationary orbit in 2009. The development of electronic warfare capabilities focuses in particular on programs for developing high power orbital radio frequency transmitters that can either destroy or disable the electronic equipment of combat control and space-based communications systems or disable the enemy's missile attack early warning satellites.

For the future, the real technological groundwork has already been laid for using existing radio technology to develop space-based electronic warfare equipment. The key to increasing the energy potential of on-board space-based electronic warfare systems has been the development of large-area antennas. By the beginning of the 1970s, the U.S. had already deployed in orbit a nine-meter parabolic mirror antenna designed for a top working frequency of 8.25 GHz. The Rhyolite spacecraft was equipped with a specially-developed 15-meter antenna (which had a top working frequency of 9 GHz). Development work continues on a mirror antenna of 55 meters in diameter and 320 kilograms in weight. Designs for 15, 30, and 100-meter parabolic mirror antennas with frequencies up to 12-18 GHz have also been developed. The technology for building large antennas with apertures measured in hundreds of meters could be developed over the next few years. Development is progressing on space-based adjustable phased-array antennas. Based on available data, single-component mirror antennas with gain factors of up to 50 dB, as well as multi-cell antennas with diameters of up to 200 meters and enhancement factors of up to 100 dB, could be built by 2010.

Space-based electronic warfare systems to disrupt space-to-Earth, space-to-space, and Earth-to-space radio communications could probably be service-ready in the near future. A space-based anti-communications satellite electronic warfare system could include up to two to four electronic warfare satellites operating in stationary orbits and equipped with four to eight interference transmitters. In stand-by mode, they could have a service life of several years.

The use of outer space at present is confined mostly to “near-space”. Still, due to the degree of difficulty associated with the development and use of outer space, at present only military/logistic, commercial and scientific missions are being planned. It is only the largest countries that can deploy complex space systems for military missions. Compared to other spheres of military operations, space imposes the greatest number of limitations. This is why up to the present time spacecraft have been primarily engaged in providing the armed forces with information support for pursuing activities within the three traditional spheres of military operations, as well as for ballistic missiles and anti-ballistic missile defenses (BMD) that are not based in space.

The space-based information capabilities of the future will develop in two interrelated directions. The first will be to create highly survivable and rapidly deployable space systems that rely on small (light) spacecraft and boosters with significantly miniaturized electronics; the second will involve transmitting satellite information down to the lowest possible level of the command chain, eventually to the individual soldier.

At the same time, the increasingly military role of outer space and scientific and technological progress are making space an even more attractive environment both for developing weapons systems in space and for using force in and from space. This new phase in the militarization[6] (or, to be more precise, weaponization)

6) The militarization of space through deployment in orbit of military and dual use satellites has already been underway for a half century. The weapons themselves (in other words, the attack components) appeared in space much earlier, with the launches of the first ballistic missiles, which had flight paths that transited space. Until 1963, nuclear weapons were also tested in space. However, although weapons have been tested in orbit, they have never actually been deployed as

of space may become the greatest threat to the peaceful use of this environment space and development of international cooperation in space.

Ⅲ. Concepts of Arms Control and Space Arms Control

1. Definition of Space Arms Control

The central idea of the concept of arms control is that it can make a useful contribution to improve the security of states by creating strategic stability and thereby avoidingwar. Even relations among enemy states are not ones of purely conflict. They involve “strong elements of mutual interest in the avoidance of a war that neither side wants, in minimizing the costs and risks of the arms competition, and in curtailing the scope and violence of war in the event it occurs”. A special case of arms control is preventive arms control.[7)]

A distinction can also be made between disarmament as a process (the process of eliminating weapons), and disarmament as an end state (the absence of weapons). Disarmament has also come to be associated with three things, none of which relate to the systematic and comprehensive reduction of weapons: (1) Generally Arms Control, (2) Structural Arms Control, and (3) Operational Arms Control. General Arms Control is divided into Structural Arms Control and Operational Arms Control. Structural Arms Control limits, reduces, and abolishes the causes of war. Operational Arms Control reduces the possibility of sudden attacks and

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permanent objects in space.

7) Max M. Mutschler , Preventive Arms Control in Space: Breaking the Deadlock, Paper presented at ECPR-SGIR 7th Pan-European International Relations Conference, Stockholm 9-11 Sep. 2010. Section 7 - International Security. Panel: Arms control as a condition for or as a result of security?, Institute of Political Science, University of Tübingen, pp.2～3.

increases security. Basic Arms Control is Confidence Building Measures (CBMs). CBMs are relatively easy to begin, drawing upon mutual agreement with the accumulation of the actual result being very important. It is imperative to dissolve mutual mistrust in order to continue arms control. Thus the former Soviet Union and the US established a hot line in 1963 to decrease the threat of nuclear war.

CMBs were very important to prevent proliferation and misunderstanding. These CBMs were adopted as concrete policy measures at the final declaration at the Conference on Security and Cooperation in Europe (CSCE), with 35 participating nations in 1975. Verification of mutual agreement is crucial for relevant arms control measures or CBMs. There is no purpose of mutual agreement in and of itself if there is no agreement, and measures of verification are useless if arms control is compromised. Nations break agreements in spite of voiced cooperation with regard to arms control. In view of these general arms control theories, the definition of arms control is to accomplish security in order to reduce or weaken a military threat by mutual consultation with a potential enemy or opposing state.

This concept was developed mainly in response to the rapidly increasing pace of the development of weapon systems. The central idea of preventive arms control is that control already takes place in the early phase of the lifecycle of certain weapons. Not yet existing but foreseeable military options that are potentially destabilizing are to be averted by blocking (or at least steering) the process of technological innovation and development that would lead to these options. The process of technological innovation reaches from the earliest phase of research and development (R&D) until just short of the deployment of a weapon.

Conclusively, the definition of Space Arms Control is to achieve security in order to reduce or weaken space military threats. The definition of Space Arms Control can be contrasted with arms control, which essentially refers to the act of controlling arms rather than eliminating them.

2. Argument on Space Arms Control

Relevant to Space Arms Control and space security, the UN raised concerns about the militarization of space and insisted on preventing an arms race by way of a multilateral agreement. The US, Russia and China in particular, have different views on the outer space arms race. Russia and China insist on making international treaties to not militarize space, but the US has taken an opposite stance claiming that an international treaty and arms control treaties would be ineffective.

Despite the implications of a regime demand, there is no international regime of preventive arms control in space. After the launch of Sputnik (1957), the General Assembly of the United Nations (UN) set up the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) in 1958 in order to develop space law. Treaties on conduct in space were concluded, and the most important one is the Outer Space Treaty (OST) of 1967. It states that space is free of any claims by states and proclaims the “peaceful use” of outer space. However, the definition of “peaceful” is missing and the deployment of weapons of mass destruction is banned. The deployment of conventional weapons, as long as they are not used for aggressive purpose but for self-defense (in line with Art. 51 of the UN Charta), is not outlawed by the OST.

There have been attempts to establish a specific regime for the military use of outer space within the Geneva-based Conference on Disarmament (CD) of the UN. Already in the 1980s, a separate committee was set up for this purpose, the Committee on the Prevention of an Arms Race in Outer Space (PAROS). However, the committee could not come up with any concrete results. On the 27th of June 2002, China and Russia made efforts to start serious negotiations on banning space weapons by introducing a working paper banning the deployment of weapons in space. However, they failed to include issues concerning their testing. Before that, in June 2001, China delivered a working paper with more far-ranging proposals, but both attempts failed due to U.S. opposition. As a result, negotiations on the

prevention of an arms race in space remain stalled. In the reminder of this paper, we attempt to find an adequate explanation for this failure, basing our claims on interest-based theories of international regimes.

Ⅳ. Measures of Space Arms Control

In the Fourth Committee of COPUOS which delivered the agenda items such as Strength of International Space Law to Prevent Militarization of Outer Space, and Respond to Other Current Challenges, United States said that space exploration thrived under the existing international framework and the Russian Federation warned of gaps in space law ratification, and risk of space becoming an arena for arms race. Before concluding their consideration of the peaceful uses of outer space, the delegations weighed the jurisdiction of the existing international space law to prevent the militarization of outer space and respond to other current challenges, such as the use of nuclear power sources in outer space and the threat of space debris.[8)]

The position and prospects of the various nations with regard to space arms control have already been reviewed. In order to prevent the space arms race, Russia and China have emphasized the need of a new international law. According to them, this law should further define the limitations within the terms of the current international law system and guarantee transparency and mutual confidence among nations. On the other hand, the United States opined that making a new treaty on space arms control in the current international law system would be unnecessary and adhered to the dominant position that non-interference should be maintained in outer space. Thus, finding negotiable grounds to present clear and unified measures of space arms control is a challenging task.

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8) Department of Public Information, Sixty-fifth General Assembly Fourth Committee 10th Meeting (AM) 14 October 2010 General Assembly GA/SPD/458.

Taking these conditions into consideration, we attempt to propose viable and implementable measures of space arms control that will coordinate the interests of various nations. These measures will be based on principles such as “settling easy issues first, resolving more difficult matters later” and “methods of progression and phases.” In addition, we will search for solutions with regard to space arms control within the current international norms and the making of new international laws. –The Ottawa process, which aims for a regional cooperative model as appropriate measures, will be applied for this end.

1. Confidence Building Measures

CBMs are voluntary protocols by which states opt to abide. They are not usually legally binding or inclusive of verification mechanisms. Instead, they work to promote dialogue and interaction, facilitate information-sharing and increase trust between states. CBMs are easier and arguably quicker to negotiate and implement than treaty-based regimes. Negotiating a CBM for outer space activities, for instance, could circumvent difficult definitional issues such as space weapons, peaceful uses or even outer space. CBMs also do not require parliamentary ratification, and are therefore more expeditiously implemented. There are several precedents for CBMs governing military and commercial activities. Some of the more successful CBMs include the Hague Code of Conduct for Missile Proliferation, or the Incidents at Sea and Prevention of Dangerous Military Activities Agreement. Such precedents further contribute to the attractiveness and feasibility of a CBM approach.

One of the more popular CBM proposals is a Rules of the Road or a Code of Conduct, such as that advocated by the Stimson Center. Such a code would seek to: a) avoid collisions and dangerous maneuvers in space, b) create special “caution and safety areas” around satellites, c) develop safer traffic management practices in space, d) prohibit simulated attacks and anti-satellite tests in space,

e) facilitate information exchanges, transparency and launch notification measures, and f) encourage more stringent space debris mitigation measures.

Such a code of conduct, while not necessarily legally binding, does not preclude the possibilities of a future treaty; rather, it could be complementary or elemental to a future, multilaterally - negotiated, legally binding mechanism. It has already amassed significant support from various militaries, national and international space agencies and commercial space industry leaders. Confidence-building measures, while promoting dialogue and cooperation, are not long-term answers. Short of becoming law, they do not constitute a global norm. Their non-binding nature results in ambiguous compliance.

Space debris caused by peaceful uses may be mitigated, but such mitigation is rendered irrelevant in the face of the dangers posed by potential weaponization of outer space. Moreover, focusing on such a limited regulatory system may detract from the momentum to address these longer-term threats. Worse, disavowing a comprehensive, multilateral approach to outer space security in favor of more limited measures may have deleterious effects. In the 1960s, for example, when strontium 90 was showing up in mother's milk, there was a strong movement for progress on disarmament and testing prohibitions. This movement represented a powerful convergence of environmental, disarmament and feminist concerns. But the quest to prohibit nuclear testing devolved into the negotiation of a Partial Test-Ban Treaty, which permitted nuclear explosions underground. As a result, nuclear testing continued for decades and the political momentum dissipated. A Comprehensive nuclear Test-Ban Treaty was not negotiated until 1996, and in 2007 it has still not entered into force. Faced with the possibility of a stricter regulatory regime, weapons makers may be incited to expedite the research and development of weapons systems, thereby expediting their possible deployment.

2. Strengthening Existing Legislation

There are few international legal instruments dealing with the military uses of outer space. [9]The ABM Treaty ,to a certain extent, was one of them. As its title implies, the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Anti-Ballistic Missile Systems of 26 May 1972, aimed at “ending an emerging competition in defensive systems which threatened to spur offensive competition to still greater heights”[10]

The Treaty permitted each side to have one limited ABM system to protect its capital and another to protect an ICBM launch area[11].It prohibited development, testing, or deployment of sea-based, air-based or space-based ABM systems. Throughout the 1960s anti-ballistic defense was essentially planned to be land based. It was thus confined to intercept incoming missiles during the last phase of their flight path. The ABM Treaty furthermore so restricted and so located ABM deployment areas that they could not provide a nation-wide ABM defense or become the basis for developing one. Each country thus left unchallenged the penetration capability of the other’s retaliatory missile forces. Since the 1970s a number of delegations from around the world have submitted proposals to the various United Nations fora to create special treaty rules that would ensure the peaceful uses of outer space, fill the gaps of the Outer Space Treaty regarding new military uses of outer space, and eliminate the existing legal uncertainties in securing outer space for the benefit of mankind[12] In addition to confidence-building measures and immunity rules for civil space uses, the proposals

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9) Ioannis Tziouras , Working Paper No 3, Common security in outer space Envisaging an effective arms control regime, December 2008, HELLENIC FOUNDATION FOR EUROPEAN AND FOREIGN POLICY , pp.3-5.

10) Arms Control and Disarmament Agreements. Texts and histories of negotiations. Washington DC: US Arms Control and Disarmament Agency, 1982, p.132.

11) Subsequently further limited to a single ABM system on each side by a 1974 Protocol to the Treaty.

12) Wolter D., Common Security in Outer Space and International Law, UNIDIR, UN Publications, Geneva 2006, p.131.

concentrate on an explicit prohibition of active military uses of outer space through an express space weapons ban, in particular of ASAT (Anti-satellite weapons) and BMD (Ballistic Missile Defense) weapons. In the CD's Ad Hoc Committee on PAROS (Preventing an Arms Race in Outer Space), it was hoped that by agreeing first on confidence-building measures, it would be easier to win subsequent US support for specific treaty rules on the prohibition of space weapons.

To date, the proposals submitted in this regard range from those containing specific additional rules for the Outer Space Treaty, to comprehensive drafts for a separate treaty on the peaceful use of outer space. After the USA's withdrawal from the ABM Treaty, December 13th of 2001, opened the door for the militarization of outer space. This article's aim is to examine if it is the time for a new regime about common security in outer space and especially for an effective multilateral arms control regime for space weapons.

There are already a number of international instruments with jurisdiction over space activities. The most important is the OST, which provides a basic framework for space activities. Enshrining the principles of peaceful use and exploration, and that outer space should be available for the benefit of all (not subject to national appropriation by sovereignty claims), the OST has 102 parties, including China, France, India, Israel, Pakistan, the Russian Federation, the United Kingdom and the United States. It prohibits the stationing of WMD, including nuclear weapons, in space orbit or on celestial bodies. It does not cover the transit of nuclear weapons (on ballistic missiles) through space or prohibit nuclear weapons launched from Earth into space for the purposes of destroying incoming missiles. It also says nothing about ASATs or the placement of conventionally armed weapons in space. Other relevant treaties include the 1963 Partial Test Ban Treaty (PTBT), which banned nuclear testing in outer space, and the Moon Agreement of 1979, which confirmed many of the provisions of the OST, with specific reference to the Moon. Though prohibiting the threat or use of force on the Moon or the use of the Moon to commit hostile acts in relation to the Earth or space assets, the Moon Agreement

does not address placing conventional weapons in orbit around the Moon. Important prohibitions on deploying and testing anti-ballistic missile (ABM) systems in space and on interfering with national technical means (NTM) operated for verification purposes were enshrined in the 1972 ABM Treaty, deemed void following US withdrawal in June 2002. The principle of non-interference with NTM was also enshrined in the 1987 Intermediate Nuclear Forces (INF) Treaty and the 1991 Strategic Arms Reduction Treaty (START I).31 START I also prohibited the production, testing and deployment of "systems, including missiles, for placing nuclear weapons or any other kinds of weapons of mass destruction into Earth orbit or a fraction of an Earth orbit" and contained transparency and confidence-building provisions. It reinforced the provisions of the 1988 Ballistic Missile Launch Notification Agreement, providing for advance launch notification of ballistic missiles used as boosters to put objects into the upper atmosphere or space. George Bunn and John Rhinelander, legal advisers to earlier US Administrations, have argued that the OST created an "overall rule [that] space shall be preserved for peaceful purposes for all countries". They argue that OST parties would have the right under the treaty to request consultations if another party planned to test or deploy in space a laser or kinetic kill vehicle capable of being used as an ASAT, a description that would cover the space-based component of the Bush Administration's multi-layered missile defense architecture. Endorsing that OST parties should make use of this provision and request formal consultations with the United States, Jonathan Dean also proposed that nations could pass a resolution in the General Assembly to request the International Court of Justice (ICJ) to give an advisory opinion on whether testing or orbiting space weapons of any kind would be contrary to the core rule and objective of the OST that space be maintained for peaceful purposes. On the grounds that the testing or use of space weapons would jeopardize national technical means of verification, enshrined in several treaties and agreements, and the commercial uses of space, he also suggests that legal action could be taken to prevent such threats, utilizing

international and US courts, as appropriate.

3. Partial Measures

Assessing that the current situation is equally detrimental to the interests of commercial and military space users, and that the alternative to compromising around some middle ground would be no agreement at all (and a victory for the space hawks), advocates of space weapons for missile defense and arms controllers and some arms controllers are exploring partial measures. The Eisenhower Institute has suggested that certain space assets like the Global Positioning System (GPS) and other navigation satellites, telecommunication and weather satellites could be declared "global utilities" and given special legal status. Recalling earlier discussions, particularly during the 1980s debates over Ronald Reagan's Strategic Defence Initiative (SDI), a number of governmental and non-governmental representatives have pushed for reconsideration of a multilateral ban on ASAT weapons, at least as a first step.

Another proposal builds on an earlier Bunn proposal to distinguish between weapons in low and high orbit. With the aim of getting the support of key actors among the inevitable weaponizers and militarization realists, James Clay Moltz argued the case for prohibiting the use, testing or deployment of weapons or interceptors of any sort above 500 miles and prohibiting the stationing of weapons in LEO. His proposal would permit the testing (and presumably use) of ground-based, sea-based and air-based interceptors in LEO against ballistic missiles but not against satellites or other space-based objects (while recognizing that implementation of this would have to rely on taboo-building and confidence, since verification techniques would be unable to distinguish between permitted ABM interceptors and banned ASAT purposes). While such a compromise would be unlikely to satisfy the space hawks, it allows key elements of the Bush Administration's missile defense plans, while clear barriers would prevent

space-based lasers or kinetic kill weapons, and might therefore head off the escalation to higher levels of space weaponization that many fear as the most threatening and destabilizing facet of the missile defense project.

The Stimson Centre's "space assurance" concept takes another approach, starting from the premise that cooperative international measures are necessary to ensure the continuation of space commerce and exploration and would be highly advantageous to US military operations. Accordingly, the Stimson Centre favors licensing and controlling particular kinds of space-related activities through consultation, negotiation, or by means of unilateral national action. These are interesting initiatives to gain attention from moderates in the Bush Administration, but there is a risk that partial approaches may buy off public concern, making it more difficult to build the necessary political momentum to ensure that negotiations actually go ahead. It is also important to note that though there are indications that some in the Bush Administration might be willing to consider a ban on ASAT weapons and uses, this is no longer a viable option for other key States, notably China. US use of force-support assets in space means that such a ban would be dismissed as a mechanism to protect US military capabilities while denying others the right to defend themselves against space-supported attacks. If pursued on its own, an ASAT ban would be regarded as discriminatory and unenforceable. To be viable, it would need to be coupled with a ban on space weapons testing and deployment.

4. National and Regional Approaches

Although few parliaments have yet begun to pay attention to space security as an issue, it is beginning to be linked with rising international concern about missile defense. The European Parliament has issued periodic reports on Europe and space. By contrast with the US emphasis on the military uses of space, the most recent European Parliament report emphasized that space activities should only be for

peaceful purposes, including scientific knowledge, with “benefits for research, industry and society as a whole”, including the European Space Agency (ESA) and a future satellite system for global environment monitoring. The report also identified “protection and management of the space environment” as a major policy goal and warned that the European Union could be taking its first step towards the militarization of space with the GALILEO navigation/location system, intelligence-gathering and the Global Monitoring for Environment and Security (GMES) initiative. The European Union’s emphasis on social and economic benefits and on managing the environment is reinforced by France, Europe’s leading space faring nation and a prime mover behind ESA.40 Among US allies in Europe, France has been more keen than most to challenge Washington over missile defense and space policy, and has in the past advocated greater action on PAROS in the CD than the United States is willing to contemplate. Britain, like France, has an active space program, with significant investment in space-based telecommunications, remote sensing, surveillance and intelligence-gathering. Reflecting its close military collaboration with the United States, however, the United Kingdom has been reluctant for PAROS to be made a CD priority, although it traditionally votes in favor of the annual United Nations General Assembly resolutions on prevention of an arms race in outer space. The British Ministry of Defence (MoD) has expressed concerns about space debris, and has noted but without expressing explicit concern that space could become part of a potential “future battle space” in which the use of directed energy weapons “seems likely to increase”. The United Kingdom is more dependent on US military space programs than other European Union countries. Although officials privately express concern about the implications of the Bush Administration’s ambitious and apparently open ended plans for missile defense and the weaponization of space, the United Kingdom already hosts two US facilities that are crucial for missile defense and the US National Security Agency, at Fylingdales and Menwith 77 Hill in Yorkshire, and the current Government would be unlikely to take an

independent or critical stance unless the issue became domestically politicized at a much higher level than at present. Within the United States itself, a Democrat Representative, Dennis Kucinich of Ohio, put forward a Space Preservation Bill in the House of Representatives in January 2002. In essence, the bill calls on the United States to ban all research, development, testing and deployment of space based weapons. If passed, it would also require the United States to enter into negotiations towards an international treaty to ban weapons in space.43 This initiative, which has also given rise to an NGO-sponsored Space Preservation Treaty, can be a useful tool to stimulate public and political debate, but it is unlikely to become a viable basis for negotiations or real legislative action. Nevertheless, there may be some political merit in other parliaments introducing similar initiatives to stimulate national debate and public and political mobilization around space security issues.

5. Comprehensive Approaches

The most effective comprehensive approach for addressing both US and international security concerns would require three interrelated components: A ban on the testing, deployment and use of all kinds of intentional weapons in space. This is needed to extend and strengthen the 1967 Outer Space Treaty's prohibitions on weapons of mass destruction in space so that directed energy (laser) and kinetic kill weapons are also banned, as well as any other potential offensive innovations that military researchers or planners might dream up. A ban on the testing, deployment and use of terrestrially based anti-satellite weapons, adding land, air and sea-based ASAT weapons to the ban on space-based ones covered in the previous point; and A code of conduct for the peace-supporting, non-offensive and nonaggressive uses of space.

6. Legally-binding options

Cognizant of the limitations of CBMs, many states favor the negotiation of a legally binding, multilateral, comprehensive treaty. The General Assembly of the UN has passed dozens of resolutions, oftentimes with unanimous support, for the start of such negotiations. The Geneva-based Conference on Disarmament (CD), as the sole 7 The 2006 resolution supporting the commencement of negotiations on the Prevention of an Arms Race in Outer Space (PAROS) (A/RES/61/58) received 171 votes in favor, with only one vote against (US) and one abstention (Israel). Multilateral forum for negotiating disarmament and nonproliferation treaty, is the preferred venue for such discussions. In their report, Weapons of Terror, the independent Weapons of Mass Destruction Commission noted that the current regime governing outer space security remains inadequate, lacking an overall framework that allows for "the development of a coherent approach to future challenges to space security". In addition to recommending unilateral renunciations of the deployment of weapons in outer space, the Commission recommended convening a Review Conference of the OST. Such a review conference would serve to promote universal ratification of the OST, as well as a way by which to "expand its scope through a protocol to prohibit all weapons in space." Despite the credible authority behind the recommendation, some states are wary of this approach. A Review Conference would necessarily open the entire OST up to revision, and the principles and prohibitions, as well as technical definitions, contained within could be negated. Russia proposes a new treaty on the Prevention of Placement of Weapons in Outer Space (PPWT). While it has yet to be formally released, Russian representatives say that the PPWT will seek to prohibit both space-based weapons as well as intentional destruction of space assets. It will not include verification, nor will it prohibit Earth based weapon systems that attack weapons traveling through outer space, such as antiballistic missile systems. As such, the PPWT seeks to prohibit using such ASAT technology, rather than the development and deployment of systems capable of such destruction.

V. Conclusion

While ongoing developments of outer space have contributed positively to the overall well-being of mankind, there have been mounting concerns that the last frontier may also turn into a political and economic battlefield. Numerous experts have foreseen a high possibility of a space arms race among dominating space powers such as the US and Russia and other emerging nations as they actively attempt to utilize space for military uses. Public opinion is growing with regard to increased measures through various international bodies, including the UN, in guaranteeing the peaceful use of outer space and preventing the space arms race. There is a growing public opinion that increased measures should be taken through the mediation of various international institutions, such as the UN, to guarantee the peaceful use of outer space and prevent the catastrophic outcome that may occur as a result of the space arms race. Such actions are indeed imperative as the non-weaponization of space will be a wasted effort otherwise. If we disregard this problem, people will be demised owing to the past tens years' visualized 'Star Wars' scenario. As the importance of the commercial and military aspects of space is increasing, the vulnerability to cope with threats imposed on the utilization of space still exists and must be confronted.

However, it is very difficult to secure international cooperation due to the narrow view on space arms control and national security, owing to the conflict of interests among nations in regard to their development of weapons and positions they hold in the international society. The outstanding example is that The United States which has been holding the position of the most advanced space power withdrew from OST in early 2000s, which would be very harmful to the efforts of arms control in space by international community. Nevertheless, a long-term and systematical approach is essential to utilize space for peaceful purposes and establish it as a common heritage of mankind (CHM).

Considering confidence building measures, cooperative measures, regional

cooperative measures, and other measures of space arms control, the possibility of realization of long-term measures in that they could constitute the international norms which would have binding force, with the international community to mutually assist each other. Also, In order to prevent a space arms race, it is necessary to take comprehensive cooperative measures within a global framework, with the aid of the UN to join in the cooperation of Space Powers.

South Korea has recently been implementing the program to join the space club and participate in the effort for the prevention of the space arms race in the international community. It is advised to bear more responsibility in carrying out its space-related activities, in particular on the part of the government and to even lead space arms control measures. South Korea should actively urge and encourage cooperation among the international community to identify commercial and military space activities that would increase threats to peace and harm the environment of outer space, e.g. space debris.

Also, South and North Korea should cooperate with regard to space development and prevention of arms race on the Korean Peninsula. According to the South Korean government, the plan to launch a space ship from a space center outside Cholla Nam Do Kohung around 2012 was being broadcast with the knowledge that North Korea would also initiate space development. It is, therefore, important to construct a cooperative relationship with confidence building measures, and to be in conformity with international rules and norms as much as possible.

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Abstract

Military Competition and Arms Control in Space

Shin, Dong-Chun
Cho, Hong-Je

Since USSR successfully launched its satellite "Sputnik"in 1957, many countries including US and USSR began military use of space, and engaged in arms race in space, which is against spirit and ideals of peaceful use of space as common heritage of mankind stipulated in many treaties such as Outer Space Treaty. With worsening Cold War between East and Western Bloc, this military use of space and arms race in space has been intensifying. Regarding the ideals of peaceful use of space, it is interpreted that military use of space is possible unless it does not have the purpose of aggression.

The military use of space may have diverse forms such as attacking satellites in space, or attacking from satellites, making use of present and future technologies available which should include the use of nuclear and kinetic/hyper-speed weapons, laser, particle beams, near explosion, disturbance weapons in different directions (i.e., surface to space, space to space, and space to surface).

Arms control is being implemented by the efforts of many countries in different formalities including legislature of international treaties under the auspices of UNCOPUOS and prohibition of weapons of mass destruction. Taking outstanding examples aiming at arms control by international community, there are confidence building measures (CBM), strengthening implementation of existing treaties, partial ban of nuclear tests, countryand regional approach, comprehensive approach and measures having legally binding force.

While U.S. has surpassed other countries concerned in the area of military useof space, it withdrew from OST in early 2000s, thereby raising concern of international

community. It requires concerted efforts of cooperationand implementation by international society to make sure peace of mankind and environmental conservation through arms control in space.

Observing de facto possession of nuclear weapons by North Korea following series of nuclear tests and launching satellites, and efforts of launching rockets by South Korea, it is strongly needed for both countries to take part in arms control efforts by international community.

Key Words : Common Heritage of Mankind(CHM), Use of Outer Space for Peaceful Purposes, Outer Space Treaty(OST), Military and Arms Control, Anti-Satellite(ASAT), Missile Defense(MD), United Nations Committee on Peaceful Use of Outer Space(COPUOS), Conference on Disarmament(CD), Confidence Building Measures(CBM), Weapons of Mass Destruction(WMD), National Technology Means(NTM)

초 록

우주상 군비경쟁과 군비통제

신 동 춘 · 조 홍 제

1957년 소련의 스푸트닉 위성 발사 성공에 이은 미·소간 그리고 이후 다수 국가에 의한 우주의 군사적 이용 및 우주공간에서의 군비경쟁은 인류의 공동자산으로서의 우주의 평화적 이용을 규정한 우주조약(OST)을 비롯한 다수 국제 조약의 이념에 배치되고 있다.

동서냉전의 격화와 더불어 이 같은 우주에서의 군사적 이용 및 경쟁은 더욱 가열되어져 왔으며, 우주의 평화적 이용 이념은 침략적 목적이 아닌 한 사실상 군사적 이용이 가능하다고 해석되고 있다.

군사적 이용은 주로 우주공간의 위성을 공격하거나 위성으로부터 공격을 하기 위해 지상-우주, 우주-우주, 우주-지상의 세 방향으로 핵무기, 운동/초고속 무기, 레이저, 분자 빔, 근접 폭발, 교란 무기 등 현재 및 미래에 이용 가능한 기술을 사용하고 있다.

우주에서의 군비 통제는 주로 UNCOPUOS를 중심으로 국제조약의 제정과 관련 국가의 많은 노력으로 이루어지고 있으며, 대량살상무기의 우주 공간에서의 배치가 금지되고 있다. 대표적인 국제사회의 군비 통제 노력을 열거하면 신뢰구축조치(CBM), 기존 조약 내용의 강화, 부분적 조치, 국가 및 지역적 접근, 종합적 접근, 법적 구속력 있는 대안 등을 통하여 추구되어지고 있다.

미국은 우주 선진국으로서 우주의 군사적 이용 면에서도 관련국가를 훨씬 앞지르고 있어 2000년대 초 우주조약에서 탈퇴함으로써 우주의 평화적 이용을 위한 국제사회의 노력과 엇 박자를 내고 있다. 우주에서의 군비 통제를 통하여 인류의 평화가 확보되고 환경보전이 이루어질 수 있도록 국제사회 및 관련 국가간 협력과 이행이 절실히 필요하다.

한반도에서도 북한의 핵실험 및 미사일 발사에 따른 핵무기 보유, 남한의 우주로켓트 발사 등 제반 상황으로 볼 때 국제사회의 군비통제 노력에 적극 동참할 것이 요구되고 있다.

주제어: 인류의 공동 자산, 우주의 평화적 목적 이용, 우주조약, 군비통제, 공격 미사일, 미사일 방어, 유엔 우주의 평화적 이용을 위한 위원회, 군축회의, 신뢰구축조치, 대량살상무기, 국가기술수단