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Space Security and Strategic Stability

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In recent US–led wars, space power invariably played a very important role. Space power, a core component of war fighting capability, enabled coalition forces to integrate all their assets into a joint operations concept in the true sense of the term. Today, the United States considers space as its strategic 'highlight' and the most significant interest in the information era, not least as part of its missile defense project. It is against this backdrop, that this article seeks to depict the new emerging challenges of space security and analyze their impact on future global strategic stability and arms control.

Over the past half–century, mankind has taken great strides in space exploitation and achieved considerable progress. As a result, human society and space are becoming increasingly inseparable. However, the situation in terms of space security is not one that generates much optimism. Although there are no weapons deployed in space today, it is undeniable that situation is serious and the trend in the weaponization of space is conspicuous.

Recent changes in the security of space stem mainly from current international relations, developments in global economics, and the related scientific–technological environment. The end of the Cold War and the collapse of the Soviet Union left the United States as the only superpower and it has displayed increasing strength and ambition in space. Meanwhile, as a new territory for human exploration and the last frontier for human existence, space is regarded both as a reflection of a country's technological prowess and as a key to its future economic development. In addition, since the most obvious characteristic of high technology in the information era is its rapid diffusion, it is impossible for any country or organization to monopolize space technology for long. In the early twenty–first century, more countries are looking to enter space. Until now, eleven countries have a space launch capability and over sixty countries own and operate approximately 1100 active satellites. Against this backdrop, many observers and analysts have claimed that an era of space competition has arrived.

Emerging challenges to space security

Those wishing to ensure space security are confronted with unprecedented challenges that are different from those of the past. If these are neglected and mishandled, the resulting fallout could lead to acute vulnerabilities, and even to conflicts.

Four major future challenges have emerged, which will be discussed in detail below. First, the space policy and doctrine of some space–faring countries which focus on space deterrence and the military use of this domain are possibly creating a serious risk of reigniting a new round of great power competition thereby generating new vulnerabilities. At present, the most important factor resulting in instability in space is American policy. Although the latest U.S. National Space Policy (NSP), released in October of 2010, has obviously shifted away from the Bush administration's emphasis on the military freedom of action in space, over all other requirements, to a multi–layered approach to ensure space security, the U.S. still emphasizes deterrence with a clear ambition to monopolize space. Space deterrence reminds us of the Cold War. It is established on basis of confrontation with a perceived enemy. The U.S. space deterrence idea has clearly upset other countries. It stresses that deterrence of hostile acts in space, as with nuclear deterrence, rests on secure retaliatory capabilities sufficient to deny advantages to an attacker, as well as effective command and control mechanisms (Krepon 2014). To achieve space deterrence, the U.S. puts forward a multi–layered strategy that can help deter hostile actions against American space capabilities. It includes the ability to respond appropriately to attacks on American space assets, greater resilience and redundancy, better space situational awareness, improved command, control, and intelligence capabilities, and sound diplomatic initiatives (Krepon 2014).

Under the guidance of space deterrence, the United States is vigorously pushing its missile defense system. It is a *de facto* step that will lead inevitably to space weaponization. The U.S. military holds the notion that its missile defense system is a purely defensive weapon system. However, it may not be. On the one hand, any defensive technology can easily be changed into offensive one or used in offensive operations, not least because the border between offensive technology and defensive technology is blurring. As we all know, it is very easy for anti–missile technology to be used for anti–satellite purposes. That said, not all missile defense systems have latent ASAT capabilities. Missile defense systems are generally categorized into three types based on which phase of ballistic missile flight they target: namely their boost phase, terminal phase and midcourse missile defense phase. As one U.S. scholar pointed out these midcourse missile defense systems are very similar in capability to ASAT functions as they are designed to target objects moving through space in the same altitude regime as LEO satellites (Weeden 2014). What's particularly noteworthy is that thee is no meaningful difference between midcourse ballistic missile defense and 'hit–to–kill' ASAT capabilities. Midcourse ballistic missile systems are intended to destroy warheads travelling at speeds and altitudes comparable to those of satellites; typically the only difference between the two systems is the software and control algorithms used to detect, track, and home in on a satellite compared with a warhead (Weeden 2014). In fact, midcourse ballistic missile systems are likely to be more complex than that of an ASAT weapon since most satellites are easier to detect, track, and target than warheads with often a penetrating capability moving through the earth's upper atmosphere and subject to a range of interfering factors. On the other hand, if a country's defensive capability against missiles increases, then its

offensive capability with its own missiles will be accordingly raised to a new level. This will inevitably undermine strategy stability. When the U.S. deployed the base elements of an anti–missile system in Poland and the Czech Republic, it provoked corresponding reactions from Russia, including demands that it move from a global approach back to a regional one. Some experts have deduced that the U.S. could test capabilities for space weapons via missile defense tests. The Bush administration's proposal for missile defense therefore went a long way towards preparing for the deployment of space–based weapons.

Japan is another case example where enhancing the potential military dimension of current and future use of space. Many space programs have obvious military purposes. Japan's four IGS systems (two satellites have optical sensors and two others have imaging radar capabilities), which make it possible to gathering information by scouting any point on the Earth at least once every day, were completed in 2007, and its new–generation IGS were scheduled to be launched between 2009 and 2014 (Sawako 2009). Furthermore, Japan was keen on participating in the U.S. MD program from 2003 and made efforts to expand further its technological cooperation of MD. The MD system is a major step toward Japan's militarization of space. Even more worrisome, in 2008, Japan enacted the basic space law, ending a several–decades–long decree against the development of military space capabilities and instead permitted the development of non–offensive military space capabilities. The new space law further lifted the ban on the use of space technology for military purposes. In particular, the revision raised a serious conflict with the second paragraph of Article 9 of the Japanese Constitution, which declares that 'land, sea, and air forces, as well as other war potential will never be maintained'. Some experts are worried about this tendency and have a sense that 'It is not just in terms of Japan's position on the legitimate uses of outer space, but also in terms of its potential broader 'remilitarization' (Hughes 2009). As a result of the approval of the Basic Law on Space, Japan's space budget is weighted even more heavily toward military purposes and inevitably will lead to the integration and reframing of its space industry.

U.S. space defence and Japan's move toward a more militarily–oriented policy will have a far–reaching impact on other countries. Faced with the United States' policy of seeking absolute security and a monopoly over the use of space at the expense of the security of all other countries, it is almost certain that other countries will make corresponding plans to counter the ascendant U.S. monopoly of power in space. It is reported that Russia, the European Union, China, India and other space–faring powers have major plans for space exploration. Therefore, the U.S. desire for monopoly is triggering a new round of competition in space. As Kenneth N. Waltz has argued, the aspiration for dominance, coupled with the immoderate behaviour of one country, causes others to look for ways to protect their interests (Sagan and Waltz 2003, 149). Many examples in history illustrate how uncontrolled competition in developing advanced technology can lead to escalation and generate action–reaction escalation. Space competition could become a case in point.

Second, with the rapid development of space technology, space power has become closely linked with land power. It has become the most important component of the future integrated battlefield. Since the end of the Cold War, four major military conflicts have taken place, all of which could be characterized as high–tech wars, namely the Gulf War in 1991, the Kosovo War in 1999, the Afghanistan War in 2001, and the Iraq War in 2003. In all of these wars, space power had played a very

important role. Furthermore, its significance is increasing with each new war, given rise to the rapid development of space technology.

Space capabilities were integrated into operations at all levels in the Iraq war and represent an indispensable component of the warfighting package of the United States. Because of the progress of integrated operations, the combat effectiveness of American formations were increased significantly. For example, U.S. military forces required more than two days to detect and then attack a Scud missile in the first Gulf War, a relatively slow operational process called observe–orient–decide–act (OODA) loop. In the Kosovo War, the time for this OODA process was reduced to 1–2 hours. In the war in Afghanistan, it was further reduced to only 19 minutes. In the Iraq War, the time was again shortened to no less than 10 minutes. According to a report from *USA Today*, it will take only 7 seconds to finish this cycle in a future war since the attacking missile will be able to acquire and adjust the information from the data link even during its flight course. It is therefore inevitable that there will be an increasing demand for, and reliance upon, space–based force enhancement capability.

According to an estimate from a war–game simulation, it is believed that combat effectiveness can increase at least 50 to 100% with the application of space power. One U.S. military expert even commented that if space war was only an infant in the first Gulf War, then it now is growing up at light speed. In the Iraq War, for the first time, space power enabled the coalition forces to integrate all their assets into joint operations to such an extent that many observers thought that the Iraq War was indeed the first real Space War in human history. Space warfare, as a new pattern of future war, is divided into two phases by this U.S. expert: the first phase of Space War features a compact linkage between space and earth operations. The establishment of new concepts of space operations, space weapons, and space forces will be the indicators of the second phase of space warfare.

According to these theories and given the benefits of space power in recent wars, the United States has taken great pains to adopt a policy of developing space technologies to enhance and integrate its military power. Based on the understanding that the center of gravity of the future battlefield is an effective system of command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR), the most critical part of which are all kinds of satellites, the U.S. military is trying hard to establish an integrated battlefield, by further engaging space power into global military deployments at every level: from strategy to tactics. Since the effective use of space assets has become a determinative factor in wars, it has now become highly likely that satellites and other space assets could become targets subject to attack or deception during a major conflict. Even primarily civilian satellites will likely be attacked, as they play a significant supplementary and substitute role for military satellites. Thus, due to an integrated battlefield and the strategic significance of space assets, space conflict will almost certainly lead to escalation of such wars.

From a long–term perspective, with a tighter linkage between space and earth in the future, the possibility of space conflict among the great powers will increase if there are no effective measures to prevent it. Even an accident or misjudgment in space could possibly escalate into a conflict.

The third point, linked to the previous one, is that space weapons might be hidden in civil space assets, given the dual–use nature of space technology. At present, the borderline between emerging military and civilian technologies is becoming increasingly blurred. This fuzziness is reflected not only in the overlap of key technologies

in the military and civilian fields, but also in the synergy of future development trends for key technologies. It is sometimes difficult to tell the difference between military and civil uses in space technology. For example, Japan's use of solid propellant in certain rocket boosters is puzzling. The development and production costs for such fuel, as well as launch expenses, are so high that they are hard to justify on commercial grounds. However, solid boosters may be used in ICBMs. It has also been reported that the American X–37B has the potential capability of attacking and destroying hostile satellites. Therefore, many civil space items have shadows of military purposes. As Joan Johnson–Freese has pointed out, there is no distinction between space technology for civil or military use, since 95% of space technology is dual–use. How to regulate space items to both ensure equal rights to peaceful uses of space while guaranteeing that no military intentions are involved has become a real challenge.

The fourth point is that, with space power overlapping with cyber power and nuclear power, it will almost increase possibility that space power will be dragged into future conflict. With the development of integrated systems, the borderline between different technologies is being increasing blurred. This development tendency of the high–tech sector will lead to the overlap and penetration of different domains. Firstly, the field of space and nuclear missiles are becoming more closely entwined. The command and control systems of nuclear missiles require satellites in outer space. The intertwining of space and nuclear weapons is inevitably stronger with an increased dependency on space–based assets for all operational activities. Meanwhile, full–scale missile defense systems (using space assets) will undermine the existing strategic deterrence capability of nuclear missiles. Secondly, cyber power has illustrated incredible synchonisation with space power due to its ability to penetrate and enabling a range of other operations. Cyber power and space power are both generally considered an enabler and penetrator of other domains, and could integrate with the other domains to the point that all these domains are dependent on them. There are two phenomena that display such tendencies of tighter synchronization between space power and cyber power. One phenomenon is that Global Information Grid (GIG) as the basis of cyber operations, whose main component is the transfer of operations from land to space. The other phenomenon is that future satellites are being allocated of IP addresses and operated by a universal network. As a result, the linkage between nuclear missile C2 and cyber power is obviously increasing. As we all know, cyber power has penetrated into all aspects of human society in the information era. Consequently, even a small incident or misjudgment occurring in any domain will possiblly lead to a series of reactions in other domains. This must evoke the strong possibility, if not inevitability of space power being dragged into future conflict.

Implications of space weaponization on strategic stability and arms control mechanisms

Faced with these serious challenges, it is undeniable that the situation for space has become serious in recent years. Space weaponization will surely have deep implication for strategic stability due to its strategic nature not least as a countermeasure against nuclear weapons. Moreover, it will almost certainly change the arms control regime in the future.

Firstly, space weaponization will possibly lead to a power unbalance. Strategic

stability in essence refers to the notion of a balance of power among the leading nations, and a sustained stability through certain international mechanisms. Strategic stability can also be defined therefore as an enduring situation, in which various strategic forces in the world are able to establish and sustain a framework for the fundamental relations with each other, giving them, in turn, an adequate sense of security. Strategic stability thus is closely related to the existing world order, through established international mechanisms and norms of behavior in international relations.

During the Cold War, the nuclear weapon was the pillar of strategic stability. The nuclear balance between the United States and the Soviet Union became the central theme for that stability. The equilibrium of MAD (Mutually Assured Destruction) was believed to be effective in preventing nuclear war as neither side would not dare launch a preventive nuclear strike lest the attack would lead to the automatic retaliation by the other side and bring about a guaranteed self-destruction. MAD thus was not only a practice, but also the basis of a theory, which constituted the conceptual basis for the strategy of deterrence that both these two Superpowers were believed to embrace. According to deterrence strategy, the focus was on the prevention rather than the actual fighting of a nuclear war. Thus, a nuclear balance was achieved in terms of the identical nuclear doctrine as well as the nuclear force structure between the two Superpowers. And it was based on this nuclear balance that strategic stability was ultimately established. It was indeed a balance of terror, codified by the ABM Treaty and other related nuclear agreements.

At the same time, strategic stability went beyond the manipulation by the two superpowers even in the Cold War years. With the development of the world campaign for peace, nuclear disarmament and nonproliferation, tension between the nuclear weapons states (NWS) and non-nuclear weapons states (NNWS) increased. This situation had led the conclusion of a number of important multilateral treaties like the Partial Test Ban Treaty (PTBT) in 1963 and the Nonproliferation Treaty (NPT) in 1967. Strategic stability in the Cold War years was therefore further consolidated as it became institutionalized through the gradual establishment of a series of arms control and disarmament agreements, and regional security arrangements both at bilateral and multilateral levels.

Yet nuclear weapons, as a core of strategic stability during the Cold War, was challenged with the development of a revolution in military affairs (RMA) and new types of strategic technology such as space power and cyber power. In particular, with the development of space power and its extensive use in military operations, space power has become a significant component of strategic power. Compared to the ordinary conventional weapon, the use of a space weapon, projected onto the surface of the earth, would have unimaginable shock effects on the populace and lead to the escalation of a war due to the inevitable reaction from an adversary. Although a space weapon could not perhaps cause the massive damage of a nuclear weapon, it would become even more important than nuclear weapons in the future frame of global strategic stability because of its special effects on a country's politics, economics and security. We might also anticipate an amazingly rapid development by different nations.

Space weaponization could therefore have grave and perhaps unknown negative implications for the world strategic stability and arms control mechanisms. On one hand, space weaponization would undermine strategic stability. Full-scale missile defense, as one step of space weaponization, will lead to the nuclear unbalance due

to its counteraction to nuclear weapons. This is a typical case where the search for absolute security at the expense of the stability can affect the whole world. As a result, space weaponization will perhaps further stimulate the horizontal and vertical proliferation of nuclear and conventional missiles.

Furthermore, space weaponization would destroy arms control and disarmament mechanisms. As noted above, strategic stability in the Cold War years was consolidated with a series of arms control and disarmament treaties. These legal documents reflected the convergence of interests of the majority members of the world, as well as their willingness to accept certain constraints on their own actions in the international arena. However, space weaponization will completely overturn all these efforts by the international community. An un–limited missile defense system (via space) will undermine the nuclear balance, the very basis of these arms control treaties. It will thus block directly the progress towards nuclear disarmament and that will surely spread to related field of nuclear nonproliferation. Of course, some hold different views on this issue. In the 2011 London Summit known as 'Global nuclear zero', the 'Global nuclear zero initiative' was committed to support to development of the proposed Missile Defense cooperatively. Ultimately, it was seen as a benefit for strategic stability by advancing the case for 'nuclear zero'. However, as far as I am concerned, future cooperative development of full–scale MD will create ambiguity because of the sharing of sensitive technology and the absence of trust amongst those outside the MD system. Meanwhile, as long as full-scale MD exists, it is difficult to continue to cut nuclear weapons. Therefore, full–scale MD will directly and seriously impede disarmament. Space weaponization will be a huge challenge to a series of arms control and disarmament agreements.

A second point is that, with space deterrence overlapping with nuclear deterrence and cyber deterrence, it will make the institution of strategy stability more complicated. This will require the reframing of the architecture of arms control entirely. Nuclear deterrence was supposedly critical for strategic stability due to perceptions that if not deterred, an opponent will attack. For nuclear deterrence to be successful it relied mainly on the size of the nuclear arsenal. It was only with sufficient scale that states would moderate their aggression and accept political stability.

Space deterrence is depicted by the Pentagon planners of the United States as 'control of space' in order to 'conduct defensive and offensive counter-space operations as directed to protect space and terrestrial forces'. Its core can be categorized in three categories: deterrence by denying benefit to an adversary; deterrence by cost imposition; and deterrence by inducing an adversary action. Space deterrence is more complex than nuclear deterrence because of the rapid development of space technology and the vulnerability of space environment. As Michael Krepon argued: 'successful space deterrence depends on a multi-layered approach which includes the ability to respond appropriately to attacks on US space assets, greater resilience and redundancy, better space situational awareness, improved command, control, and intelligence capabilities, and sound diplomatic initiatives.' (Krepon 2014)

Cyber deterrence has instinctive characteristics different from nuclear deterrence and space deterrence. First, cyber deterrence has strong operational potential. The United States has attempted to develop cyber deterrence as a strategic instrument since 1990 (Stevens 2012). In recent years, there has been a series of published works, such as 'International Strategy for Cyberspace' in May 2011, 'Department of defense cyberspace policy report' in December 2011 and 'sustaining the U.S. global leadership: priorities for 21st century defense' in Jan 2012, and each have proposed

'positive defense' as the strategy of cyberspace security on the basis of deterrence. And the U.S. military will further launch a new type of cyber deterrence strategy on the basis of combining 'integrated operation of strategy deterrence' with a 'new trinity strategy deterrence'. Under the guidance of the cyber deterrence concept, the U.S. Department of Defense (DOD) treats cyberspace as an operational domain where it will organize, train, and equip troops so that it can take full advantage of cyberspace's potential. Accompanying the creation of its cyberspace command system, there have been a host of new U.S. initiatives and cyber deterrence doctrines clearly targeting state actors, including leaving open the option for escalation to traditional military means in the physical realm if the U.S. ever felt it suffered too dearly in the cyber realm.

Cyber deterrence could be understood as a form of complex deterrence. As Knopt argues, cyber deterrence may only be 'partially effective' and 'less than ideal', but it is better than no deterrence at all; the important consideration is 'whether deterrence can make positive contribution at the margins (Knopt 2010). Tim Stevens also thought cyberspace forms one of a suite of 'complex deterrence measure in a post–cold war world, whose outcomes and objectives are less absolute and more pragmatic than those of preceding era of nuclear bipolarity.' (Stevens 2012) Successful cyber deterrence depends on not only cyber weapon but also the development of regulatory norms for the use of cyberspace, which can lead to a form of soft-power deterrence (Stone 2012).

As space power overlaps with cyber power and nuclear power, it is almost certain that space deterrence will affect deeply both nuclear deterrence and cyber deterrence. The development of full–scale missile defense will counteract nuclear deterrence. The main component of missile defense lies in space and missile defense rely heavily on a space awareness capability. For this reason, NATO leaders have agreed on how to establish better space awareness and, more importantly, space situational understanding through the establishment of a missile defense system that covers all eventualities (Hansson 2011). On the other hand, space deterrence overlaps cyber deterrence. To achieve successful space deterrence relies on not only countermeasures against attacks on US space assets but also a better space situational awareness capability and advanced command, control, and intelligence network, and that is closely linked with cyberspace. Furthermore, cyber deterrence depends mainly on the basic infrastructure of cyberspace, whose critical components have been deployed in space.

With the background of this complex mixture of nuclear, cyber and space deterrence, what is its implication on strategic stability and how we should reframe strategic stability? In the Cold War, nuclear power was the only pole of strategic stability. With the development and extensive uses of space technology and cyberspace technology, there will be multipolarity in future strategic stability. Although space power and cyber power cannot yet be considered to be new poles of strategic stability, current strategic stability is already de facto a complex posture that is based on nuclear deterrence against the background of space deterrence and cyber deterrence. Taking a long term perspective, future strategic stability will be evenly balanced on three poles — nuclear power, space power and cyber power and form a new type of integrated deterrence. This will be the result of the three kinds of strategic powers and the further rapid development of space and cyber technology. The establishment of future strategy stability that relies on this new integrated deterrence will certainly readjust the world balance, and change norms of behavior in international relations.

What is particularly noteworthy here is that the interpenetration of the strategy of deterrence in different domains will have a profound impact on future arms control mechanisms. In general, the articles and codes of the arms control treaties are designed to regulate the behaviors of one special domain. For example, the design of the nuclear nonproliferation treaty only focuses on nuclear weapons and there is little consideration of other related domains. Moreover, the conceived notions of the space codes of conduct is only focused on the space domain and has less linkage with cyber and nuclear issues. However, it is my concern that the whole arms control system has some significant loopholes and inherent flaws. It is difficult for these treaties to be effective even where they have been ratified without much difficulty in the past. With the interdependent nature of different strategic domains, it is now necessary to design a comprehensive framework of future arms control mechanisms from holistic perspective rather than from narrow approach to each domain in isolation.

Approaches to Space Security

Space security is at a crucial crossroads. How is one to protect space security in the future? The international community should take effective measures to contain the tendency toward the weaponization of space and divert space activities onto the right track of peaceful uses in order to serve all humankind.

The solution must be to establish a new security concept. This is a key point for ensuring space security. We should learn lessons from the nuclear era. Seeking a monopoly of weapons superiority and absolute security is mad and unwise. If we keep the old model of conceiving of a rival as the main enemy, progress in space will be a zero–sum game in which any advance made by either side is harmful to the security of the other. Therefore, it is important for states to give up the Cold War concept that is based on ideology and establish instead a new concept of cooperative security. More and more countries have acknowledged that individual nations cannot achieve space security only by depending only on themselves and that a military advantage in space only can ensure space security for a short period of time, yielding to greater insecurity in the long run. Cooperative security is the only wise and realistic approach to ensuring space security. The concept of cooperative security ensures each and every country in the world enjoys equal rights to freely explore, develop and utilize outer space and its celestial bodies, and that all countries' outer space activities should be beneficial to economic development, the social progress of nations, and to the security, survival and development of mankind.

Our solutions must be built on sustained constructive cooperation. A very effective approach for the international community would be to call for space cooperation in order to reduce mutual suspicion and achieve common benefits in future space security. Given the world's rapidly growing reliance on satellites, coupled with advances in space technology, the development of wider and deeper cooperation to enhance mutual understanding and trust may be demanded to provide adequate space security for all who depend on the ability to access and use the space environment. Fruitful cooperation will promote international exchanges, technical assistance, and cooperation for peaceful purposes so that all countries can share in the economic and technological benefits of scientific advances in outer space.

China has been persistent in strengthening exchanges and cooperation in this field, with other countries, on the basis of the principles of equality, mutual benefit,

peaceful utilization of outer space and common development. [1] China has developed bilateral space cooperation with a host of countries and propelled multilateral cooperation in space technology and its application in the Asia-Pacific region. China has signed a number of cooperation agreements and memoranda on the peaceful utilization of outer space with a many countries, space agencies and international organizations. For instance, China and the European Space Agency (ESA) have signed the 'Status Quo of China-Europe Space Cooperation and the Cooperation Plan Protocol' under the mechanism of the China-Europe Joint Commission on Space Cooperation. The two sides cooperated closely during the lunar exploration missions of Chang'e–1 and Chang'e–2, and signed the 'Agreement on Mutual Support for the TT&C Network and Operation' in September 2011. [2] China and Great Britain have established a joint laboratory on space science and technology, jointly organized a seminar on space science and technology, and conducted exchanges on lunar exploration, earth observation, space science research and experimentation, as well as personnel training and other areas. [3] Meanwhile China has taken part in relevant activities sponsored by the United Nations and other international organizations and supported international space commercial cooperation. The Chinese government actively participates in the cooperation and study of various projects of the Asia–Pacific Space Cooperation Organization (APSCO), including the development of a space data-sharing platform, its demonstration and application; an earth-based optic space target observation network; compatible navigation terminals, particularly in the formulation and release of its policy on small satellite data in the Asia–Pacific.

The solution must also involve the further strengthening of arms control measures. To ensure the peaceful use of outer space, prevent the weaponization of that domain, and avoid an arms race in space, it is now urgent for the international community to begin the negotiation of a treaty on space non-weaponization. The experience of humanity's conquering of space is the same as that of conquering the sea and the sky. When mankind enters a new environment, chaos ensues, because more and more entities seek to acquire their assets for their own interests. Given this scarcely tolerable confusion, which we might regard as a latent crisis, new regulations need to be made by the international community on the basis of the consensus of many nations. Nowadays, space security is at a turning point, which may be the last opportunity for humanity to regulate space technologies and enhance space management for avoiding space weaponization and the protection of the vulnerable space environment. That is why the international community should enhance the sense of urgency of calls for immediate action to put the arms control efforts on the right track.

Since the 1980s, China, Russia, and other countries have been initiating and supporting the idea of keeping space free of weaponization. [4] Outer space belongs to all mankind and should be used exclusively for peaceful purposes to benefit human-

[1] See the full text of China's Space Activities in 2011 at the website of The Information Office of the State Council of China: `http://www.scio.gov.cn`.

[2] ibid

[3] ibid

[4] As early as 1985, China submitted to the UN Conference on Disarmament (CD) a working paper entitled 'The Basic Standpoint on Preventing the Arms Race in Outer Space' (CD/579). In February 2000, in another working paper (CD/1606) put forward to the CD, China expounded on its position and proposals on how the CD should deal with the issue of the prevention of an arms race in outer space, including some tentative ideas about the basic elements of the envisaged legal instrument. In June 2001, China submitted further proposals (CD/1645) on the possible main elements of the proposed legal instrument.

ity. China has consistently maintained that the UN Conference on Disarmament in Geneva should negotiate and conclude an international legal instrument on preventing the weaponization of outer space. In order to adapt to the new space security situation, China and Russia proposed the draft 'Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects' (PPWT) [5] on February 2008 as an international legally-binding treaty that would outlaw the weaponization of space. In fact, this draft goes further than the 1967 Outer Space Treaty, which forbids placing nuclear weapons and other weapons of mass destruction in space.

Meanwhile, considering lack of effective monitoring and norms in outer space, it is also necessary for the international community to establish confidence building measures (CBM) and a Code of Conduct for activities in outer space. The EU has issued a draft code of conduct for outer space activities, [6] after revising two versions in 2008 and 2012, it calls for states, subscribing voluntarily, to 'minimize the possibility of accidents in space... or any form of harmful interference' and to 'refrain from any action which will or might bring about, directly or indirectly, the damage or destruction of outer space objects.' However, the draft code omits or bypasses the key problems of ensuring space security. The draft does not provide the definition of weapons in outer space nor prohibits their placement in space. In addition, it also does not express the desire for limiting full-scale missile defense systems in space.

There is one vivid analogy that illustrates its shortcomings in protecting space security. The red-green light system is designed for avoiding traffic accidents but it is as if we have permitted tanks to wander about the streets. It is thus urgent to negotiate the treaty that forbids the placement of weapons in space and the threat or use of force against outer space objects than a code of conduct which only focusing on the regulation of behavior in space by working out norms.

The solution must take into consideration the establishment of a mechanism of crisis management. Considering the increasingly congested space environment and more frequent occurrence of troubling 'incidents' in space, it is pressing for the human community to establish confidence-building measures and a crisis management system that avoids space incidents, including conflicts and the protection of space assets. First, the enhancement of mutual exchanges and understanding is an important strategic measure for space crisis management. Official channels, especially track–two exchanges, are proven confidence-building measures. It is through strategic-level talks and academic exchanges with different forums that the international community can convey a clear and consistent message, improve dialogue, and lay a foundation of moving toward greater cooperation. Second, elaborate pre-crisis planning and an effective organizational structure coupled with clear decision-making procedures are essential ingredients for collaborative space crisis management. Third, timely situational awareness and crisis response capability should be enhanced as the technical basis for reducing the possibility of satellite collisions.

[5] Available online at: `http://www.cfr.org/space/treaty-prevention-placement-weapons-outer-space-threat-use-force-against-outer-space-objects-ppwt/p26678`; accessed on 15 March 2016.

[6] Available online at: `http://eeas.europa.eu/non-proliferation-and-disarmament/pdf/space_code_conduct_draft_vers_16_sept_2013_en.pdf`; accessed on 15 March 2016.

Conclusion

Space, as a territory that is still unconquered by mankind, is increasingly related with the security of the world's nations. Greater complexity, uncertainty and unpredictability have become hallmarks of the world space security situation in the new century. The rapid development of advanced space technologies and the extensive use of space in high technology warfare suggests that space weaponization, space security and its relationship to global strategic stability has become a major topic of debate in the international community.

It is clear that space weaponization will lead inevitably to a power unbalance due to its counteraction of nuclear weapons and the associated effects in undermining strategy stability and international arms control mechanisms. In particular, with space deterrence overlapping with nuclear deterrence and cyber deterrence, strategic stability in the future will become more complicated and based on a new type integrated deterrence. The establishment and continuity of strategic stability in the future will rely on integrated deterrence and change the world order, international mechanisms and norms of behavior in international relations. There will be corresponding changes take place in arms control territory. Due to the interdependence of different strategic powers, it is necessary to shape the framework of future arms control mechanisms from a holistic perspective rather than from a narrow approach that only considers each domain in isolation. Faced with these new challenges and their implications for space security and strategic stability, the most important point is that it is now urgent for states to begin negotiations on treaty of space non–weaponization, to prevent an arms race, and to reduce rising tension in outer space. The international community cannot wait any longer.

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