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The Inevitability of Militarization of Outer Space

Paweł Bernat

Polish Air Force University, Dęblin, Poland; p.bernat@law.mil.pl, ORCID: 0000-0002-8150-9794

Abstract

At the end of the second decade of the 21st century, we witness a progressive increase of strategic importance of artificial satellites and other orbital systems, which is a consequence of the ever-accelerating development of space technologies that include weapons systems. The outer space becomes a theatre for a potential conflict.

The states possessing sufficient technological potential will further develop and expand those systems, both defensive (for eliminating threats) and offensive (securing the military advantage and serving as a deterrent) to secure their current and future interests.

The main argument of the paper demonstrates the necessity, from the perspective of the strong outer space sector players like the USA, Russia, China, to further develop space weapon systems and military units of space corps.

Keywords: militarization of outer space, space weapons, space corps, orbital weapons, ASAT

1. Introduction

For centuries, we have witnessed the development of space technologies and increasingly ambitious space exploration programs. What has changed lately is the fact that this development is no longer the domain of only of traditionally strong actors – the largest and wealthiest nation-states (e.g. USA, Russia, Japan, China) or international organizations like European Space Agency. Nowadays, we observe an accelerating growth of space technologies (e.g., reusability of rocket boosters, new rockets under testing and development, including SpaceX's Falcon Heavy and Starship, NASA's SLS, Blue Origin's New Shepard) that translates into a growing number of yearly orbital launches (52 orbital launches in 2005, 70 – in 2010, 114 – in 2018, and planned 173 for 2019) (Kyle, 2019a; Kyle 2019b). Currently, the entire space sector is estimated at \$ 350 trillion, and according to the Bank of America Merrill Lynch, the space industry will be worth least \$2.7 trillion over the next three decades (Sheetz, 2017).

From the perspective of the history of technology, we are at the beginning of a new technological revolution that will provide

the humankind the tools to go beyond the Earth and expand the living environment of people by Earth's orbit (including space tourism), the Moon (planned permanent base), or finally Mars, which colonization, according to Elon Musk – the creator and head engineer of SpaceX, should start over the next few years.

In addition to the above expansion plans, we also observe another interesting phenomenon related to the development of the space sector, namely the democratization of technology that so far has been reserved for the most powerful actors. Nowadays, also relatively small countries, like Israel or Norway, achieve successes in the space industry.

The changes briefly described above are a background for the military usage of outer space. We are witnesses, today, of a paradigm change, which stems from a rapid increase of the strategic importance of outer space, Earth orbits in particular. This increase in significance unambiguously translates into a growth in investments in defensive systems securing satellites.

At this point, it has to be mentioned that there are various understandings of what militarization of outer space

is. Many believe, like Bruce DeBlois, of the United States Council on Foreign Relations, that there is a clear distinction between weaponization of space, i.e., deployment of weapons in space, and militarization – “force enhancement including communications, navigational and intelligence gathering activity” (UNIDIR, 2003, p. 3). On the other hand, the term “space weapon” is difficult to define because almost everything can be used as a weapon in space, e.g., a satellite, in operation or not, can be put on a colliding trajectory and destroy or seriously damage any orbiting object (White, 2017). Moreover, it is believed that approximately 95% of satellites have both military and civilian purposes, with the orbital navigation systems like American GPS or Russian GLONASS serving as a primary example (Bartels, 2018).

Although this distinction has its ground and under particular circumstances is valid – there is a real difference between, e.g., using orbital systems to secure military communication and actual deployment of weapon systems on the orbit with the capacity to destroy targets either in space or on the Earth – it is not relevant for a general analysis carried out in this paper. When discussing militarization of outer space, I will refer to the placement and development of weaponry and military technology, i.e., such that can be used for military purposes, in the Earth orbit, and deep space, including ballistic missiles and hypersonic gliders that pass through outer space during their flight.

2. Militarization of Outer Space and the International Legal Solutions Currently in Force

The most important document regulating the use of outer space is the so-called *The Outer Space Treaty* (formally the *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*) (UNOSA, 1967) that has been ratified by 109 countries (status for January 1, 2019) (UNOSA, 2019, p. 10). The Treaty regulates a wide range of space exploration issues, i.e., it prohibits any kind of “appropriation” of space by national-states, which refers to the Moon and other celestial bodies (Art. II.), and obliges States Parties of the Treaty to open to representatives of other Parties of the Treaty all stations, installations, equipment, and space vehicles on the Moon and other celestial bodies (Art. XII.). Apart from the direct prohibition of nuclear and mass destruction weapons in space, the Treaty does not regulate other issues related to the potential militarization of space. The document is a backbone of international space law. Since this Treaty is quite short and general, it was later supplemented by four formal agreements, namely: 1) Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, April 22, 1968 (UNOSA, 1968), 2) Convention on International Liability for Damage Caused by Space Objects, March 29, 1972 (UNOSA, 1972), 3) Convention on Registration of Objects Launched into Outer Space, January 14, 1975 (UNOSA, 1975), 4) Agreement Governing the Activities of States on the Moon and Other

Celestial Bodies, December 18, 1979 (UNOSA, 1979). All the five documents constitute the legal framework of using outer space, although it has to be noted that the last of the listed documents has not been ratified by any state with the current of planned potential of launching humans into space, i.e., United States, Russia, China, Japan, and the majority of the member states of the European Space Agency (UNOSA, 2019, pp. 5-10).

The Treaty so far has relatively well served its purpose, i.e. there have been no severe cases of violation of its provisions. From this perspective, the most controversial is the postulate to use outer space only for peaceful purposes (Art. IV.), e.g., in the context of orbiting spy satellites, which exact number, for obvious reasons, is unknown (however, as it was mentioned above, about 95% of satellites may be used for military purposes), or shooting down by China one of their own weather satellites with a medium-range ground-to-air missile in 2007.

Due to the growing development of space technologies, as well as the recently observed increased frequency of space launches, i.e., thanks to commercial companies such as SpaceX or Blue Origin, there are more and more doubts regarding the validity of the current law, especially in the context of the further development and expansion. The two most important international legal challenges, which, as it seems, will require preparation and consensus are militarization and commercialization of outer space.

The declarations of the leaders of the most important states on the space market, i.e., the United States, Russia, China, and India, indicate planned activities that directly or indirectly break the letter, if not the spirit of the Outer Space and the SALT II Treaties. In 2018, the United States President Donald J. Trump declared the establishment of Space Forces (Insinna, 2019). In 2019 India decided to set up a military space agency – Space Defense Agency (Lele, 2019), Russian Space Forces, in their current, were created in 2015 (GSO, 2019), and in the same year, China established their Strategic Support Force, which includes the Space Systems Department (Keck, 2014).

From the Treaty perspective, the problem of potential commercialization of space refers to Article II that reads:

Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means (UNOSA, 1967).

According to the arguments provided in the 2015 US Commercial Space Launch Competitiveness Act (GPO, 2015), the Treaty treats national states as parties, not private entities. In consequence, such an interpretation of the law leads to the consent for private, commercial exploitation of, e.g., the objects of the main asteroid belt (so-called space mining), which, of course, met with negative reception from other countries like Russia.

From the perspective of the militarization of space, the most important is Article IV of the Treaty, according to which:

States Parties to the Treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner (...) (UNOSA, 1967).

Currently, the dominant interpretations of this article argue that the placement of conventional weapons, including systems with nuclear drives, in orbit does not violate the provisions of the Treaty (Bourbonniere & Lee, 2008). The Treaty, according to these elucidations, does not also prohibit nuclear weapons or weapons of mass destruction on trajectory passing through space, as it is the case with the Russian ballistic missile RS-28 *Sarmat*. However, it prohibits placing and keeping biological, bacteriological, chemical, and nuclear weapons in orbit (Boothby, 2017).

Of course, there are also other interpretations, according to which the Treaty has been infringed more than once. They are based on the quite right belief that in the case of modern weapons, one should talk about systems rather than a single ballistic missile. After all, the satellite navigation system was created as part of a ballistic missile guidance system with thermonuclear warheads (LaGrone, 2014). Therefore, we are dealing here with a very important philosophical and legal question whether the satellite being a part of such a system is a weapon and hence prohibited by the Treaty. This brings us back to the difficulty of clear and sound definition of the term “space weapon” addressed before. Does the fact that a civil communication satellite can be used (and often is) for military purposes make it a part of a weapon system? If so, what would be the consequences, especially if we took into consideration the fact that approximately 95% of satellites could be used that way? These questions, although theoretical in nature, bear significant consequences for the binding power of the Treaty, and therefore the whole outer space legal framework.

So far, however, the Treaty has been fulfilling its task quite well, and its provisions have been relatively seldom broken or violated. On the other hand, we are currently witnessing an undoubted renaissance of the space sector, which also applies to offensive and defensive military technologies and programs. The structure of the sector has changed as well – the twentieth-century traditional bipolar competition between the United States and the Soviet Union is long gone. New entities have appeared in the game, both, private companies, such as SpaceX, Blue Origin, Virgin Galactic and Virgin Orbit, Bigelow Aerospace, Rocket Lab, and national agencies – Indian ISRO (Indian Space Research Organization) or Chinese CNSA (China National Space Administration), which joined the key global actors like American NASA, Russian Roscosmos, European ESA, or Japanese JAXA. The record of orbital launches – 139, was set in 1967 (Kyle, 2019a). It may seem surprising that humanity has not been able to break this record for over 50 years. However, since the middle of the first decade of the 21st century, we have been observing a steady increase

in the number of orbital launches (52 in 2005, 70 in 2010, 114 in 2018), and it seems that this record will be broken in 2019 because 173 starts are planned (Kyle, 2019b). The space sector is also growing as a market. It is estimated that it is currently worth about USD 350 billion, and according to various consulting companies, it should reach a value of between USD 1 and 2.7 trillion in 2040 (Foust, 2018).

The change in the sector means that the existing solutions, including the Space Treaty, are losing their significance (e.g., space mining cannot be reconciled with Article II of the Treaty), and the current geopolitical situation seems to exclude new, more adequate agreement that would be adapted to modern technologies. This situation, in turn, translates into more and more bolder violations of the existing laws, e.g., the already mentioned SPACE Act of 2015 or increasingly explicit orbital or suborbital weapons systems, which are clearly not developed “in the interest of maintaining international peace and security and promoting international co-operation and understanding” as it is stated in the Art. III of the Outer Space Treaty (UNOSA, 1967), as, e.g., the programs of Prompt Global Strike (CRS, 2019).

3. Outer Space as a Theatre for Potential Conflict

The progressive development of the space sector brings forth, as a natural consequence, the growth of its strategic importance. Every year we launch more and more satellites into the orbit. They are part of communication, navigation, reconnaissance, or security systems, which are used more and more and play an increasingly important role in the economy and security. Among many examples, one may point to the already mentioned Prompt Global Strike guidance system, the European Galileo navigation system, or Starlink - a constellation of satellites, which is expected to provide broadband internet for the entire globe and consist of approximately 42,000 satellites (SpaceX has already obtained a permission to launch 12,000 satellites, and in October 2019 the company asked the International Telecommunication Union to arrange spectrum for 30,000 new ones) (Henry, 2019).

On the other hand, there is a growing threat of the democratization of weapons capable of destroying satellite systems. According to the *2018 Worldwide Threat Assessment of the US Intelligence Community* describes the space threat as one of the most significant ones (Coats, 2018, p. 13). ASAT The anti-satellite weapons (ASAT) are currently in possession of four countries – the United States, Russia, China, and, more recently, India. However, it is reported that other nation-states have the potential to develop direct-ascent (DA) ASAT systems on the basis of their ballistic missiles, e.g., Iran and North Korea (Weeden, Samson, 2019, pp. 4.1-2, 5.1-2), and some believe that Israel's Arrow 3 missile has been developed to gain such a capability (Opall-Rome, 2009). There are many indications that this technology will eventually also be available to traditionally weak actors who will acquire it through purchase or by developing their own systems. As it was already mentioned,

the space sector is growing by leaps and bounds. National-states and private entities that did not invest much or at all in the space industry before are now developing launching technologies (e.g., New Zealand, Norway, Poland), what, as a consequence, must lead to the democratization of the technology. What is more, in addition to traditional ground-space or air-space ASAT missiles, new types of that kind of weapon can be developed (potentially it could also become available for traditionally weak actors), such as small kamikaze satellites¹, cyber-hacking involving redirecting the object to a cloud of cosmic debris leading to its destruction or a weapon system that would be capable of “blinding” the satellite or destroy its sensors without physically destroying the object.

Considering the above facts, it should not come as a surprise that in order to ensure the operability of increasingly important, also for national security, satellite systems, there are programs being implemented to create offensive and defensive systems for objects in orbit. And that, in turn, has generated the construction of countermeasures – weapons that would be able to neutralize the new systems – by the potential adversaries. As a consequence, we are witnessing an expansion of the potential conflict arena where outer space becomes a possible theatre for military operations. This process is still in its early stages, but there should be no doubts that it is taking place already. Countries with sufficient technological potential caring for their current and future interests have been developing and will continue working on defensive systems (also aimed at eliminating the threat from traditionally weak actors) and offensive systems (ensuring military superiority and deterrence factor). Space corps are established and developed for exactly these purposes.

There is no indication that this process will stop. On the contrary, it seems that due to the progressive development of space technologies and the privatization of the sector, as well as substantial potential revenues from space mining or the global satellite broadband internet system, it will accelerate. As it was demonstrated in the section dedicated to the legal framework of operating in outer space, the current laws and treaties have lost their significance, and they are not taken into account while planning future operations. The United Nations and its Office for Outer Space Affairs (UNOOSA) are structurally and legally too weak to inflict punishment or sanction for breaking the rules. One may then risk the claim that further militarization of space is inevitable. It will undoubtedly further affect the validity of the Outer Space Treaty, which, over time, will not be respected at all. That, in turn, will open the door to the development of various kinds of space offensive weapon systems.

¹ The fact of launching into orbit four unregistered satellites by the Indian PSLV rocket on January 12, 2018, is worth mentioning here. These satellites belonged to the American company Swarm Technologies, which had not received permission to launch them due to their small size and inability to monitor them in space (Christensen, 2018). This situation, of course, did not have a negative impact on global security but showed that the placing of “undefined” objects in orbit is possible even in today’s reality, where there is still a relatively small number of orbital launches.

4. Militarization of Outer Space Is Imminent

The main argument of the paper provides the information why there will be a progressive increase of weapon systems placed in orbit, and various types of space corps will be further developed by national-states.

As was demonstrated above, we, as humankind, rely more and more on orbital communication, navigation, and security systems. Global and regional navigation satellite systems are continually developed and perfected by a progressive number of entities, mainly national states. Examples of GNSS include Europe’s Galileo, the US’s NAVSTAR Global Positioning System (GPS), Russia’s Global’naya Navigatsionnaya Sputnikovaya Sistema (GLONASS) and China’s BeiDou Navigation Satellite System. There are, however, another two regional systems under development, i.e., Indian Regional Navigation Satellite System (IRNSS) and Japanese Quasi-Zenith Satellite System (QZSS). All of those satellites, apart from securing civil safety (e.g., in transportation, logistics, communication), play a crucial role in national security.

Another example is the mentioned already Starlink system that will provide broadband internet for the Northern US and parts of Canada already in 2020, and the plan is to create the global system before 2027 (Mosher, 2019). Again, the system, although designed for civil purposes, will be used by the military – the US Air Force is testing SpaceX’s Starlink technology in military aircraft to deliver high bandwidth into the cockpit of Air Force planes under a program called Global Lightning (Malik, 2019). The facts are straightforward – there are more and more satellite systems that play an essential role in countries’ security and are part of critical infrastructure, so in order to secure their interests and protect that infrastructure, these national states keep developing both defensive and offensive means. The *Worldwide Threat Assessment of the US Intelligence Community* is very clear in its predictions in this regard:

We assess that, if a future conflict were to occur involving Russia or China, either country would justify attacks against US and allied satellites as necessary to offset any perceived US military advantage derived from military, civil, or commercial space systems (Coats, 2018).

However, we must not forget about the democratization of the weapon systems that may pose a serious and real threat to satellite systems. Currently, there are four countries in possession of the ASAT weapons that could destroy a satellite in orbit. However, more and more entities, both national states and private companies have been working on their launch technologies, like New Zealand, Norway, Poland, just to name a few. Moreover, it should be remembered that not only ASAT missile systems may be used to attack and destroy satellites – one may use small kamikaze satellites to crash into the target, cyber-hacking to direct the object into the cloud of space debris, “blinding” the satellites with ground-based lasers (Mizokami, 2019). These technologies

are much more reachable. Therefore, in time, we should expect that traditionally weak actors, like rogue states or terrorist organizations, will gain have access to them (Bernat, Posluszna, 2018).

5. Conclusions

We are witnesses to a new arms race that has been expanded by the space technologies and weapon systems. It is not bipolar as it was the case in the 20th century – there are more players involved – there are US, Russia, and China in the leader group followed by increasingly developing India, and there is Europe with its European Space Agency that has to decide whether it should develop their own space forces. It seems no likely due to the lack of a joint European army and common command center (as well as Brexit – the United Kingdom leaving the European Union). What is more probable is creating of space forces by particular European states, e.g., in July 2019, French President Emmanuel Macron announced that he had approved the creation of a space command within the French air force to improve the country's defense capabilities (Weitering, 2019).

Due to the development of space technologies, their democratization, there are more and more objects in orbit that serve various purposes, including maybe the most important one – national security. The growth of the strategic importance of satellites, which have become part of critical infrastructure for many countries, has generated the development of defensive and offensive measures to secure the safety (and hence the interests) of these countries. As a consequence, we have ended up with outer space being treated more and more as a theatre for potential conflict. Old legal obstacles to weaponize space are not really in force anymore and will not limit the ambitions of the leading players to militarize the orbit further.

The most technologically advanced states in this area will keep securing their interests, both military and commercial, in space and thus develop defensive means (also designed to eliminate the threat posed by traditionally weak actors) and offensive weapons to secure military dominance and deter potential adversaries. Space forces are necessary in this context to coordinate, plan, and command all these activities.

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