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SPACE AS A NEW THEATER OF WARFARE

Abstract: *Objects located in Earth orbits play a huge role in the functioning of our current, terrestrial reality. Disruption or destruction of satellite communication, navigation, and monitoring systems can have catastrophic consequences for the country whose satellites are destroyed. Countries that are leaders in space technology are working intensively to secure their space objects, as well as technologies that allow for the destruction of objects in space. Currently, four countries have the ability to shoot down satellites: the USA, China, Russia, and India. However, none of these countries has a fully developed defense of their satellites. According to experts, a month of combat operations using anti-satellite missiles is enough for both sides of the conflict to be left without orbital satellite groups. The means of destroying satellites are primarily missiles launched from the ground, but also so-called interceptor satellites (fighter satellites, inspection satellites) and other weapon systems placed on orbital platforms. The article presents the importance of space for modern civil and military systems operating on Earth. It indicates the actions of the USA, Russia and China both in the field of defense of their satellite systems and in the area of active offensive actions against the satellite systems of potential opponents. The results of the analysis of the actions of the main competitors in the space arms race lead to the conclusion that a new theater of warfare is being created - the Space Warfare Theater.*

Keywords: *space, satellite, inspection satellite, anti-missile systems, space force, space shuttle, laser weapon*

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Introduction

The issue of transferring potential combat operations to space is not a new idea. As early as 1983, President Ronald Reagan presented the concept of placing innovative types of weapons in space. His Strategic Defense Initiative (SDI), called “star wars”, was intended to prevent the USSR from carrying out a retaliatory nuclear strike by effectively eliminating Soviet ballistic missiles using kinetic and energy weapons placed on platforms orbiting the Earth. In the 21st century, plans for the militarization of space began to be developed from the very beginning of its activity in 2001, including the administration of George Bush Jr. They were supported in particular by the head of the Pentagon, Donald Rumsfeld. With the arrival of Donald Trump in the White House (during his first presidential term), discussions about transforming space into a Theater of War (TDW) and saturating the new battlefield with appropriate forces and means began to gain momentum in US political and military circles. The Chief of Staff of the US Air Force, General David Goldfein, spoke in February 2018 about the likelihood of a war breaking out in space within just a few years. He claimed that achieving US superiority in space is as important as maintaining US Air Force superiority in airspace. Many representatives of world expert circles claim that the militarization of space is unavoidable, and claims that the 1967 Space Agreement² largely inhibits the processes of transforming space into a new battlefield are simply wrong. Moreover, this agreement only concerns weapons of mass destruction, mainly nuclear weapons, and does not mention other types of weapons at all, such as combat lasers. Even during the Cold War, on the orders of President Reagan, devices for military purposes began to appear outside the Earth's atmosphere. This process is still continuing today.

The importance of space for modern combat operations

Space devices of various types are used, among others, for: conducting satellite reconnaissance, securing communications, naval navigation and land navigation, controlling drones, as well as directing flights of missiles and aerial bombs. Destruction of an orbital enemy group deprives it of satellite

² The Outer Space Treaty was signed in 1967 in a situation in which outer space had been governed only by customary law for 10 years, supported by formally non-binding guidelines expressed in the Declaration of Legal Principles of 1963. An important regulation from the point of view of permissible activities in outer space is introduced by Article IV of this Treaty, providing for the partial demilitarization of outer space and the complete demilitarization of celestial bodies. According to it, it is prohibited to introduce into orbit around the Earth any objects carrying nuclear weapons or any other types of weapons of mass destruction.

communication, the ability to conduct reconnaissance from space and use navigation systems. This is a colossal blow to the combat capabilities of modern armed forces. Without satellites, it is impossible to use precision weapons, and the use of aviation becomes more complicated. It is increasingly common to hear the claim that the experience gained from armed conflicts that took place at the end of the 20th and beginning of the 21st century showed that the use of space support systems can be one of the main factors determining victory on the modern battlefield. Thus, it can be observed that the militarization of space is slowly but inexorably entering a new phase. In the initial period of development of military space assets, only “passive” satellites were placed in space, supporting military operations by collecting and transmitting various necessary information. However, today this situation has changed. Tests are being conducted on special unmanned “active” satellites, which, by equipping them with anti-missile systems, are to be able to destroy designated targets. Currently, there is no strict and appropriate definition of space weapons. This leads to a difficult situation related to the unambiguous classification of certain means of destruction. However, it can be assumed that space means of destruction are such means of destruction that are located in space or are intended to destroy objects located there. Thus, we can speak of the following classification of space warfare assets intended to destroy designated targets³:

- Earth-to-space assets - placed on the surface of the Earth, and their purpose is to destroy objects located in outer space;
- Space-to-space assets - placed in space, and their purpose is to combat other objects located in near-Earth space;
- Space-to-earth assets - placed in space, and their task is to neutralize targets located on the surface of the Earth.

The greatest hopes for space-based weapons are associated with laser weapons. Work on this type of weapon is being carried out on a very large scale. Currently, there are several types of lasers, such as: free electron lasers, gas-dynamic lasers, X-ray lasers, chemical lasers, and electro-discharge lasers. In addition to laser weapons, large-scale research and development work is also being carried out on particle accelerators (so-called particle weapons), which are designed to destroy objects in space. Research is also being carried out on the creation of kinetic and radiation weapons. All this indicates that in the near future, armed conflicts will be able to take place not only on land, sea and air, but also in space. A huge number of artificial satellites are already orbiting the Earth, one third of which are military devices. In addition, there are thousands of pieces of debris that threaten other objects in orbit. An important role is

³ B. Watson, B. Peniston, *Space Force moves ahead*, <<https://www.defenseone.com/news/2018/07/the-d-brief-july-31-2018/150162/?oref=d-river>> (31.07.2018).

played by spacecraft that have the ability to maneuver in orbit to conduct observations or otherwise interact with other satellites. These satellites are called inspection satellites or inspector satellites.

United States

In general, it can be stated that the Pentagon's position in relation to space struggles is as follows: “We must defend ourselves, but we must also be ready to take offensive action to prevent aggression by a potential adversary”. In implementation of this principle, by decision of President Donald Trump, in 2018, a new branch of the military was created in the United States - the Space Forces. These forces supplemented the existing branches of the US armed forces, i.e. land forces, naval forces, air forces, marines and coastal defense. Within the Space Forces, the first to be created are:

- US Space Command, i.e. the 11th combat command;
- Space Operations Forces (the organization of the SOK, similarly to the creation of the US Special Operations Command, involves the relocation and use of space specialists from the entire military);
- Space Development Agency (dealing with all new major satellite programs from now on).

Two key space initiatives are planned for the coming years. It was agreed to work on:

- creating a new system of warning satellites designed to detect ballistic missiles;
- creating weapons systems deployed in space that would destroy these missiles.

Congressmen have adopted a very aggressive schedule for implementing space programs. They want sensors (elements detecting incoming ballistic missiles) to be deployed in orbit as early as 2022. At the same time, the MDA (Missile Defense Agency - MDA) is to begin work on space weapons systems that are to be deployed in orbit by the end of the present decade.

The Americans have been reaching these decisions gradually. As early as 2001, they conducted the first simulation of a space conflict, placing it in 2017, which showed that the United States would suffer such a conflict. They even established the 527th Space Aggressor Squadron, which for now was to only deal with simulations of attacks on military and civilian facilities located in space. In February 2008, a year after the Chinese experiment with destroying a satellite, the Americans conducted their own test. An SM-3 missile from the American cruiser Lake Erie destroyed a US Army reconnaissance satellite (USA-193) filled with poisonous fuel, which had malfunctioned and could have fallen to Earth. It was hit at an altitude of 210 km, when it was moving at a

speed of 27,000 km/h. The experiment showed that a typical defensive system, such as the American “anti-missile shield”, can become a first-strike weapon against objects in orbit. During the Cold War years, the Americans had an orbital group in the so-called “Medium Earth Orbit” - about 20,000 km from the Earth. For many years, these orbits were considered absolutely safe in terms of potential missile attacks. However, in May 2013, the Chinese tested their interceptor missile at an altitude of 30,000 km, which has caused understandable concern in the US and the need to take new steps to protect its satellite groups. In addition to interceptor missiles, the Americans also have other weapons designed to destroy satellites. These include, among others, missiles fired from high-altitude aircraft. Washington is also developing laser weapons that could be used to destroy enemy satellites without the need for missiles. As early as 2001, designers from Lockheed Martin and Boeing conducted successful tests of a laser to neutralize satellites.

A separate issue related to the US military space systems are two very intensively developed programs: “Ballistic Missile Defense” (BMD) and “Prompt Global Strike” (PGS).

According to Russian assessments, both systems were designed as two mutually complementary types of weapons, intended to eliminate Moscow's ability to deliver a nuclear strike on the United States under the principle of "mutual assured destruction". The essence of the PGS is that its weapon systems should destroy the maximum number of Russian ballistic missiles while still in their launch positions. However, those that do manage to launch would be destroyed by the “Anti-Ballistic Missile Shield” anti-missiles. The beginnings of these programs date back to 2002, when the US government withdrew from the 30-year-old ABM Treaty, a ban on anti-ballistic missiles - concluded between the US and the defunct USSR and began to intensively develop anti-missile systems. Currently, the concept of the “Anti-Ballistic Missile Shield” is being implemented - the widely known American multi-layer anti-ballistic defense system, designed as a means against short-range (SRBM), medium-range (MRBM), intermediate-range (IRBM) and long-range (ICBM) ballistic missiles. One of the elements of this system, the SM-3 anti-missile missile base, has just been launched in the Polish town of Redzikowo.

It is worth noting, however, that although the BMD system is of a typically defensive nature, as can be seen from the example of the shooting down of the USA-193 satellite, the “Anti-Missile Shield” anti-missiles can be successfully used not only to destroy ballistic missiles, but also objects in orbit, including satellites or platforms with weapon systems deployed there. Shooting down objects moving along specific ballistic trajectories does not pose a particular problem for specialists. For example, the destroyed American satellite No. 193 flew along a specific orbit, known to the American military. The missile, or rather the SM-3 interceptor anti-missile, was fired towards a previously

calculated rendezvous point and destroyed it with a direct hit⁴. Currently, the Americans are working on modernizing their kinetic means of destruction and are trying to “teach” them to maneuver. In such a case, they will be able to correct the missile's combat mission during its flight. Moreover, as a result of increasing the potential of the low-orbit detection system, data on enemy ballistic missiles, i.e. data on potential targets, will be transmitted to the anti-missile directly from the satellite, correcting its flight.

As for the Prompt Global Strike (PGS) system, there is little published information about it in the United States. Some information can be obtained from statements by Russian experts, who for obvious reasons analyze its potential to harm the Russian strategic missile forces. In recent years, the United States has given absolute priority to the development of the PGS. As part of this program, the Pentagon is creating promising strike systems, and one of the priority weapons systems developed as part of this project is hypersonic missiles (e.g. Falcon HCV)⁵. According to the first deputy head of the operational directorate of the Russian General Staff, Gen. Viktor Poznikhir, the weapons systems developed as part of the PGS are designed to destroy any target within an hour of the decision to attack⁶. Among the systems being developed are those that allow for precise strikes from Earth's orbit on command posts and ballistic missile launchers in Russia. In the conventional (non-nuclear) version, PGS systems are to perform the same tasks that strategic nuclear forces are currently responsible for. According to another Russian military expert, Aleksei Leonkov, the United States has developed several projects for the militarization of space as part of the PGS concept. One of the versions of space weapons developed as part of this concept is the so-called “Rods from God” - a system that operates by “dropping” specially prepared cores made of refractory alloys from orbit onto specific targets on the Earth's surface. In April 2005, together with the first mentions of PGS, information also appeared about plans to build an aircraft orbiting the Earth in the stratosphere and equipped with precisely controlled rockets and bombs weighing half a ton in total. It would be capable of “destroying command centers and missile bases anywhere in the world”. Some experts claim that the X-37B mini-shuttle currently being tested not only serves as a spy, but also carries on board weapons systems for destroying satellites, and perhaps even

⁴ American (and also Chinese) satellite interceptor missiles operate on the principle of kinetic impact – they destroy the target by colliding with it.

⁵ From the speech of the representative of the Ministry of Defence of the Russian Federation Alexander Yemelyanov during the session of the First Committee of the UN General Assembly on 13 October 2017.

⁶ General Lance Lord, head of the U.S. Air Force Space Command, delivered a speech to Congress in April 2005.

the aforementioned “Rods of God”, tungsten rods that are to fall from orbit and destroy bunkers hidden deep underground with the force of impact alone.

American military expert John Pike, director of the Globalsecurity.org website, asked directly in the Los Angeles Times: “Are we dealing with a new spacecraft or an orbital bomber?”. Work on the creation of the Boeing X-37 unmanned shuttle, initially known as the flying orbital laboratory, began in 1999. The X-37 was designed to operate at altitudes of 200-750 km, and it can also change orbits and maneuver. Its design allows it to return to Earth just 10-15 days after returning to Earth. could start another expedition. The actual purpose of this orbital aircraft is unknown, although initially, the purpose of its creation was given as the renovation of Earth satellites. It was officially confirmed that the device is testing a new type of ion engine. According to some unofficial information, the X-37 can also perform reconnaissance functions. In the Western media, you can find different versions about the purpose of the development program of this secret, military shuttle. It is said that it can track the Chinese orbital station “Tjangun”, that it can destroy satellites or test technologies related to the deployment of weapons in space in orbit. It is also said that a special chamber has been provided in this device, in which nuclear weapons can be placed.

The problem of protecting satellites, and even entire satellite groups, is absolutely fundamental. According to the commander of the US Space Command, General James Raymond, potential adversaries of the US, namely Russia and China, not only have missiles that can reach American satellites from the ground, but have already introduced systems capable of combating them into Earth orbit. General Raymond claims that in order to “tame space aggressors, the US Air Force is preparing specialized, maneuverable space fighters, the so-called warfighters, whose sole task will be to protect American satellites”. In fact, the discussion in the US about the need to have space fighters with astronauts on board began in 2007, when China tested a ground-based anti-satellite weapon by attacking one of its old satellites at an altitude of about 800 km. The American media suspects that such a warfighter may be the aforementioned X-37B, but John Hutten, a senior official from the Space Command, responded negatively to a direct question on this matter. The X-37B program should be replaced soon by the so-called aerospace system program. The American press reported that the first reusable device of this type will fly to the International Space Station. It is obvious that this type of system will also be used for military purposes. According to Russian military experts (Aleksei Leonkov), the aerospace system will pose a significant threat to the Russian system for warning about ballistic missile launches, which will not be able to notice the launch of these aerospace, orbital mini-shuttles. If such a space vehicle is equipped with space-to-earth class rockets, then registering the launch of such a rocket will be practically

impossible. The space control system will identify it as an artificial satellite of the Earth. Currently, experts doubt that the space shuttle (X-37) could be used as a warfighter or orbital bomber. It is too small to accommodate complex weapons systems.

On the other hand, the futuristic rocket plane of the US Armed Forces, XS-1, is presented as an example of an aerospace system. It is to cover several thousand kilometers per hour, brush against space and once a day place a satellite into orbit, which will replace those destroyed by the enemy. The new machine is to be built by Boeing in cooperation with DARPA⁷, which is managing the entire undertaking. XS-1 is to be a combination of a launch vehicle and an airplane. In appearance, it will be similar to NASA's space shuttle, although it will not be strictly a space vehicle, because it is not to cross the conventional boundary of the atmosphere at an altitude of one hundred kilometers. It is to take off vertically using a rocket engine, just like a regular rocket, and then turn into an exceptionally fast plane reaching high supersonic speeds - even over 10 thousand km/h. On its back, the XS-1 will carry a smaller rocket with a satellite. When it accelerates sufficiently and gets as close as possible to the edge of space, the rocket will be launched and fly higher, carrying its payload into orbit. After launching the rocket, the vehicle itself will turn around and land like a normal plane - at an airport. It will be ready for the next launch within 24 hours. The main advantage of the XS-1 is to be the ability to perform frequent launches. A maximum of 10 times in 10 days. Americans are very keen on a device that is to be able to launch satellites frequently and quickly. The US armed forces are dependent on numerous communication, navigation and spy satellites. It is assumed that in the event of a major war, satellites will be one of the first targets and at least some of them will be destroyed. Americans are therefore working on a way to quickly replace such losses. The XS-1 is to serve precisely this purpose, not to mention actively influencing the space objects of a potential enemy.

In the context of aerospace systems, it is worth mentioning the pilots who would operate these systems. It is understandable that piloting a warfighter requires special skills and predispositions. It turns out that the preparation of pilots is already being carried out. According to the specialist magazine "Defense Tech", at the "Nellis" Air Force Base (Nevada), at the US Air Force Preparation Center, a program is being carried out to prepare 70 pilots from the 527th Air Force Squadron, which in the future is to protect the orbital grouping

⁷ DARPA (Defense Advanced Research Projects Agency) – American government agency dealing with the development of military technology operating within the structures of the U.S. Department of Defense.

of American satellites from missile attacks and electronic warfare (EW)⁸. The general goal of this training program is to obtain appropriate habits by pilots in the scope of responding to any “new and changing threats to space infrastructure objects”.

Russian Federation

The Russians have built their own space defense system. The Aerospace Forces of the Russian Federation (Vozdushno-Kosmicheskiye Sily – VKS) began operating in accordance with the decree of the President of the Russian Federation on August 1, 2015, as a new branch of the Russian Armed Forces⁹. The new forces included aviation, air defense and anti-missile defense forces and means, space systems of the so-called "Russian orbital group", and missile attack warning and space control systems. The Russian Space Command (part of the VKS) has three main operational and research centers: the Main Center for Testing, Testing and Control of Space named after G.S. Titov in Krasnoznamensk, the Main Center for Missile Attack Warning (SPRN) in Solnechnogorsk, and the Main Center for Space Surveillance (SKKP) in Noginsky-9, Moscow Oblast. There is no official and reliable data on what specific Russian missiles or other carriers can be used to destroy satellites in orbit. If we talk about modern and promising systems for destroying satellites, then there have been mentions in the press about the use of A-235 “Nudol” anti-missile defense missiles and S-500 “Prometey” anti-aircraft and anti-missile system for this purpose. The A-235 system will have anti-missiles of short, medium and long range in its equipment. Anti-missiles of the earlier A-135 Moscow defense anti-missile system are also being tested. On November 24, at the Sary-Shagan test site in Kazakhstan, as well as on February 12 and April 2, 2018, Russia successfully tested a new version of the PRS-1M anti-

⁸ O. Pawlyk, *US Air Force Preparing for War in Space*, <<https://www.military.com/daily-news/2017/04/04/us-air-force-preparing-war-space.html>> (04.04.2017).

⁹ Changes in the airspace command system are a consequence of the integration process that began in the Russian army on July 16, 1997, when a new type of armed forces was created: the Air Force. At that time, the Air Force and the Air Defense Forces were combined under one command. After major structural and organizational changes, the Main Staff and the Command Post of the Commander-in-Chief of the “new” Air Force were finally created. In parallel, work was carried out on integrating all elements related to the use of space and creating management and command system structures - dealing with this area. As a result of these activities, on December 1, 2011, even a new type of armed forces - the “Airspace Defense Forces” - the VKO Troops was created. However, as it turned out, the demarcation of space and air defense systems and aviation is increasingly difficult and many programs must be closely synchronized with each other. Therefore, it was decided to combine everything and thus the Aerospace Forces were created, which joined the other branches of the Armed Forces of the Russian Federation.

missile, which is to replace the PRS-1 (53T6) (Gazelle, according to NATO classification) closer interception anti-missiles in service with the Russian Armed Forces, first tested in 1979. The new anti-missile is to be used in the A-135 “Amur” Moscow defense anti-missile system. With its dimensions preserved, the PRS-1M is in fact a new anti-missile, with a new engine, new electronic equipment, increased flight speed and range. According to preliminary assessments, this new version of the anti-missile is capable of destroying objects in near space. In 2016, 68 shorter-range PRS-1 anti-missiles of the A-135 system were in operation in Moscow's defense. The A-135 system also previously had long-range 51T6 “Azov” anti-missiles (D=670 km, H=70 km), capable of hitting targets in closer space, which were however removed from service due to the expiration of their service life. The original warheads of Russian anti-missiles designed to destroy satellites are equipped with a 10 kT nuclear charge. Unlike the American and Chinese solutions, which use the destruction of satellites in the tests carried out by kinetic impact of the anti-missile on the target, in Russia it is planned to use thermonuclear charges as an anti-satellite weapon. The advantage of this approach is that when such a charge explodes in space, ionizing radiation and a number of other damaging factors destroy not just one satellite, but the entire group of them. This approach does not take into account the enormous damage to the entire planet, but assumes that such a solution will only be used in the event of a nuclear conflict.

In response to the American future aerospace system, which could make it difficult, if not impossible, for the Russians to track American space-to-ground missile launches, Russia has a number of space programs dating back to the Soviet era that have been frozen due to funding constraints. However, if necessary, it can activate them. These programs include the R-36orb missile project, which could strike any point on the globe from space, and the so-called “sputnik hunter” program developed during the Cold War, which supposedly performed a close-in maneuver with a target and hit it with a fragmentation warhead explosion. The first Russian maneuvering device, “Poliot-1”, was launched into orbit in 1963, and the first satellite interception by a satellite was carried out on November 1, 1968. In 1973-76, Moscow sent three Almaz military space stations into orbit. In subsequent years, dozens of tests of interceptor satellites were carried out. The last comprehensive test of the interceptor satellite was carried out in June 1982. This test differed from others in that it was carried out in the conditions of mass launches of ground and sea ballistic missiles, anti-missiles and military satellites. Russians are also working on new systems for combat in space. On April 24, 2017, Pavel Sozinov, the general designer of the Almaz Antey concern, in an interview for the magazine “Национальная оборона” reported that his company, based on the decision of the Russian authorities, had begun implementing the task of

creating a system for countering space-based means. The work involves neutralizing navigational reconnaissance, electro-optical reconnaissance and space-based communication means, as well as direct, physical destruction of these elements moving in orbit.

The Americans claim that the Russians are also conducting secret tests with objects capable of maneuvering in orbit. In 2016, employees of the US Joint Space Operations Center shared with journalists their observations from observing a seemingly routine launch of three Russian communications satellites into orbit. The employees were surprised to find that some small objects identified as fragments of the Russian carrier rocket began maneuvering in orbit. This process lasted several minutes¹⁰. If we are to believe the bulletin of the American expert-astrophysicist Jonathan McDawell, who conducts observations of various space objects, Russian inspection satellites are also currently conducting maneuvers in orbit. On June 23, 2017, the maneuvering satellite separated from the orbital platform "Kosmos-2519", changed orbit in autonomous flight, then returned to the platform and conducted its inspection. The test tested ground and orbital communication systems, ballistic calculation methods and new satellite software. According to McDawell, the Russian inspection satellite experiment that began in 2017 is still ongoing. Between June 27 and July 19, 2017, the Kosmos-2519 satellite performed a series of engine starts that changed its orbit from 644 x 659 km to 318 x 664 km. Similarly, the Kosmos-2523 satellite performed a maneuver on July 20, 2017 that changed its orbit from 346 x 362 km to 292 x 348 km.

In August 2017, the Russian Defense Ministry confirmed that it had indeed placed a maneuvering inspection satellite into Earth orbit, which had separated from its carrier satellite. It is believed that this satellite is equipped with sensors that allow it to recognize other satellites and transmit the data to Earth for analysis. The Russian Defense Ministry also confirmed the construction of a secret program to build new spy satellites of the Liana system with the Lotos-S and Pion-NKS satellites¹¹. It is also expected that the EW system, Buroviestnik-2, which is currently being developed, will be included in electronic warfare with communications satellites. The "Okno" optoelectronic system for detecting space objects, located in the Sangalok Mountains (Pamir) in Tajikistan, at an altitude of 2.2 km above sea level, is also of no small importance to the Russian Aerospace Forces. The system was modernized in 2014 and can now detect any space objects in the altitude range from 2,000 to 40,000 km.

¹⁰ A statement by Lt. Col. Todd Benson of the U.S. Space Command's GPS Division to CBS in 2017.

¹¹ Based on the statement of Russian Defense Minister Sergei Shoigu from 10.01.2017.

People's Republic of China

The prospects for the development of China's space forces revolve around goals outlined in the early 21st century. One of them is to “gain control of low Earth orbit in order to defeat the United States on Earth”. China continues to implement complex satellite maneuvers in Earth orbit, such as: course intersection, conducting operations in close proximity to other satellites. Some of these operations can be viewed as research into dual-purpose technologies with an anti-satellite component. For example, systems for servicing satellites in orbit and technologies for collecting space debris can be used to develop systems for combating satellites¹². In January 2007, Beijing shot down its own weather satellite Fengyun-1C with a KT-1 anti-missile. This was the first case of a satellite being destroyed by a missile fired from Earth. This sparked strong protests from around the world, the strongest from Washington. Here is another competitor who has gained the ability to conduct warfare in space.

China has been conducting regular tests of interception of extra-atmospheric ballistic targets since 2010. Three years later, Beijing successfully conducted a test of the KT-2 (in Western terminology SC-19) anti-missile to implement such an interception. This system for intercepting orbital targets was given the name Dong Ning-2¹³ in China. The Chinese conducted successful tests of this ground-to-space missile (which is an equivalent of the American ballistic missile SM-3), designed to destroy communication satellites, but is also capable of destroying a spy satellite flying at an altitude of 247 km.

For five years, the remotely controlled Chinese inspection satellite Shiyan-7 has been placed in orbit, which has a system for detecting weapons in satellites belonging to other countries. Some experts believe that it is also adapted to destroy such satellites. The consistency in achieving China's goals is also evidenced by the tests of the DF-ZF hypersonic glide vehicle conducted in 2015. It reaches speeds of Mach 5 to 10 and is capable of carrying a nuclear warhead¹⁴.

China has also formed units and is already conducting initial exercises of its anti-space capabilities, directed against the anti-satellite ground-based missile systems of a potential adversary. Similar systems are also likely to be developed in Russia. Both countries are also developing directed energy systems that can “blind” or damage sensitive optical sensors of satellites, such as satellite sensors warning of missile attacks”. The possibilities of China’s

¹² From the report of the Director of National Intelligence D. Coats to Congress on May 10, 2017.

¹³ A. Rezhikov, M. Voronova, Kitay sumel priblizit'sya k protivoraketnym vozmozhnostyam Rossii i SSHA, gazeta VZGLYAD, 6 fevralya 2018.

¹⁴ P. Łepkowski, *Militaryzacja kosmosu: Powrót do gwiazdnych wojen*, <<https://www.rp.pl/kosmos/art2049101-militaryzacja-kosmosu-powrot-do-gwiazdnych-wojen>> (22.03.2018).

(and Russia's) actions in space were discussed by the head of US National Intelligence, D. Coats, who stated that "Russia and China are developing anti-satellite weapons systems that will reach combat readiness within the next few years". Among the weapons systems being developed in these countries, D. Coats mentions, among others, missile systems and laser weapons.

Summary

The current activities of the US administration and Congress related to the organization of the Space Force and military programs in space are basically the sanctioning and ordering of activities that were actually conducted earlier by the United States. They are also an expression of American assessments of the activities of their main competitors in space. According to the May 2017 report by the Director of National Intelligence, Daniel Coats, the reforms of the armed forces conducted in China and Russia in recent years indicate that these countries are increasingly focusing on creating operational forces that will integrate attacks against American space systems and the functions performed with their help. The Americans are aware that if a war with a serious adversary broke out, their satellite systems would be attacked in the first minutes of the conflict. According to Coats, "Russia and China are developing a whole range of anti-satellite weapons as a means of limiting the effectiveness of the US armed forces, although publicly and at the diplomatic level they will strive for the demilitarization of space and talk about the principle of not deploying weapons in space, first". According to the forecasts of a special commission of the US Congress, China will obtain a full anti-satellite arsenal within the next five years. The Americans intend to use this time to create new radar systems (their production has already begun), which will allow for an anti-missile maneuver or the destruction of a Chinese anti-missile by a space fighter (warfighter). However, if lasers are used to destroy American satellites, the situation will become dangerous for the Americans. In such a situation, no warfighter with astronauts on board will help.

In Russia, Trump's decision to create the Space Forces was received with great concern. The chairman of the Federation Council's Committee on Defense and Security, Viktor Bondarev, stated in a statement for RIA Novosti that "if the United States violates the treaty banning nuclear weapons in outer space during the creation of the Space Forces, Russia will resolutely resist the United States". According to him, the militarization of space is a path to disaster. He emphasized that "if the United States withdraws from the 1967 agreement banning nuclear weapons in outer space, there will be a decisive reaction from Russia, as well as from other countries possessing such weapons". American initiatives related to space, and primarily the Prompt Global Strike (PGS) program, have been and are being very closely monitored in Moscow. This is

evidenced by the statements of many Russian politicians and experts, including Russian Deputy Prime Minister Dmitry Rogozin (from 17.03.2018), who stated that “all current concepts held by the US and its allies assume the possibility of an immediate global strike against Russia using space”.

There are also opinions in Russia that Washington's recent steps are intended to force Moscow to increase its defense spending to a level that would cause it serious economic problems, i.e. lead to a situation in which the USSR found itself in 1989. However, awareness of this situation is rather widespread among Russian decision-makers. According to military experts, “Russia will not repeat the mistakes of the USSR and will develop hypersonic weapons systems, the models of which it already has, and whose potential allows it to eliminate the capabilities of hypothetical space interceptors of the US”. Observing the events of recent years related to the activities of world powers in space, it can be stated that both the USA, Russia and China are conducting scientific research and testing of reconnaissance systems and space weapons systems, which in the near future may become indispensable components of the armed forces of these countries. The following picture emerges from the analysis of these activities.

The United States, many years ago, developed concepts of operations in space that would allow them to gain a strategic advantage over their competitors, especially over Russia. These include, among others, the BMD and PGS programs described above, programs to deploy particle and laser weapons in space, etc. For many years, the United States has used pretexts to create these systems, such as Iran's and North Korea's nuclear weapons and ballistic missiles. However, the time has come to “drop the visor” and show that their main opponents in space are Russia and China. Hence the decision to create the US Space Force, as well as the official call from Congress for the actual militarization of space (placing sensor and weapon platform groups in orbit). It is also clear that the Americans are taking the organization of their forces in space seriously and comprehensively. Hence the long-term implementation of the BMD and PGS programs, independent of the host in the White House, as well as projects related to the protection of satellite groups (aerospace system). China is consistently implementing its plan to use space for military purposes, although it distances itself from accusations related to the desire to militarize space. In relation to the United States, it has a lot to catch up on, but the country's significant financial capabilities, the first achievements in offensive actions against objects in orbit presented above, as well as the many space science programs that it is implementing, testify to its great capabilities in this area. Russia, declaratively, is currently not interested in militarizing space. This is due to several reasons, including a limited budget and awareness of the risks associated with the implementation of American programs (mainly PGS and BMD). However, it has extensive experience in implementing space programs, gained from the Soviet era, which it is now trying to use. Due to

limited possibilities of financing expensive space projects, Moscow is not able to join the arms race in space and will certainly not repeat the mistake that the Soviet leaders made in connection with Ronald Reagan's SDI program. Instead, it is looking for cheaper alternative solutions that would allow its satellites and ballistic missiles to avoid destruction, for example, by American anti-missiles. Hence the tests of maneuvering satellites in orbit, the introduction of new ballistic missile systems whose warheads can maneuver on different flight sections (RS-24 Jars, Oresznik on the base of RS-26 Rubież), as well as the introduction of hypersonic weapon systems (Avangard), which after entering space reach speeds of 27 M, re-enter the Earth's atmosphere and maneuver towards the target.

In summary, we can say that a change in the approach to the issue of military use of space is taking place before our eyes. The previous acceptance of the use of military satellites for reconnaissance, navigation and communication purposes is beginning to be expanded to include additional functionalities, and attempts related to maneuvering satellites in orbit are not questioned by anyone. Aerospace units are being created and trained (we know about those in the USA). We can therefore say that a new space theater of warfare is emerging before our eyes. Assuming that the transfer of certain weapons systems to space is basically inevitable, we should hope that politicians and military will have enough imagination not to place weapons of mass destruction in space, and above all nuclear weapons.

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