RUSSIA

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Anatoly Antonov reports from Moscow:

MILITARY USE OF SPACE

ANNOTATION

Placing weapons in space and turning the outer space into a potential arena of combat action poses a significant threat to strategic stability and global security. The deployment of various types of weapons in space could inflict serious damage on the existing arms control arrangements, especially in the area of nuclear and missile weapons. It could also trigger a new wave of the arms race, which could spiral to a whole new level.

What are the types of weapons that can be placed in space in the foreseeable future? Are these plans feasible? What effects will the development of new types of weapons have on the international system and international security? And what steps could Russia take in a bilateral format or multilaterally to prevent the placement of weapons in space, strengthen strategic stability, and facilitate the next steps in arms control? Find the answers below in the report by Anatoly Antonov.

The use of the outer space for military ends is becoming one of the key problems in the context of strategic stability and international security. New strategic concepts of using space for military purposes have been emerging in recent years, mainly in countries which are pursuing clear military and political ambitions. New opportunities are also opening up, owing to the progress being made in space technologies. Finally, clear gaps still exist in the international legislation governing the use of the outer space. The international community is concerned by the real possibility of weapons being placed in the outer space, turning it into an arena of armed confrontation and potentially into a combat theater.

The idea of placing weapons in space is not new. It was researched in the first decades of the space era; countries were looking into the possible uses of space technology to bolster their defense capability. Over time, however, there has been a certain transformation of national approaches; new concepts of using the outer space for military purposes have emerged. These concepts include the idea of deploying weapons in space.

The problem of weapons in space attracted broad international attention after the United States announced plans to deploy a global missile defense system and made the first steps towards that goal in the area of international law by withdrawing from the ABM Treaty. Now that the treaty is defunct, the international system has lost a very important element of its setup - namely, the ban on developing, testing and deploying space-based missile defense systems and components. The appearance of such instruments could become the first step towards turning the outer space into a new sphere of weapons deployment. Another thing to take into account is that the 1967 Outer Space Treaty has outlawed the deployment of nuclear weapons and other WMD in the outer space – but the ban does not cover other weapon systems.

ASSESSING THE THREAT OF WEAPONS DEPLOYMENT IN SPACE

Placing weapons in space and turning the outer space into a potential arena of combat action poses a significant threat to strategic stability and global security. The deployment of various types of weapons in space could inflict serious damage on the existing arms control arrangements, especially in the area of nuclear and missile weapons. It could also trigger a new wave of the arms race, which could spiral to a whole new level.

The use of space weapons for missile defense, i.e. against ballistic missiles, could substantially change the strategic nuclear balance between the world's leading nuclear powers.

Using space weapons against targets on the ground and in the air would mean that many strategic facilities which play a crucial role in national security would come under a direct threat of an attack from space.

The first country to deploy weapons in the outer space would be able to disable the key space systems of its adversaries almost effortlessly. In such a situation, any manipulation with a spacecraft which belongs to another nation could be seen, especially in a crisis situation, as an act of aggression. Owing to the high degree of integration in the use of spacecraft for military and civilian purposes, the damage will not be limited to the military component of the space fleet. What is more, given that some space systems are used by groups of countries or by international organizations (for example, weather and navigation systems), damaging or disabling such systems would affect interests of a large group of states.

If a country unilaterally acquires such a component of strategic armaments as space weapons, this could give rise to attempts to reshape the world order and impose diktat in international relations. Such a situation would create an atmosphere of mutual distrust and suspicion, and inevitably lead to other countries taking steps in response so as to ensure their own national security. Such measures could negate all the international efforts in the area of disarmament and nonproliferation, and lead to a spiraling arms race in the outer space, in nuclear and missile weapons, and in other spheres.

It is quite clear that other technologically developed nations would not passively observe attempts by a single nation to place weapons in the outer space. This would raise the prospect of another armed confrontation - only this time around the area of confrontation would include the outer space.

In terms of technology, placing weapons in space as part of missile defense and anti-satellite capability would lead to the appearance of large fleets of spacecraft on the low-Earth orbit. That could make it difficult for other actors to use the low-Earth orbit, which is the most commonly used in Earth surveying and manned space flight programs.

Another thing to take into account is that the development of space weapons would require numerous tests. Such tests would create a lot of space debris on the Earth orbit, i.e. fragments of the satellites carrying weapons and of the targets used during the tests. That would exacerbate the problem of space junk.

Also, possible effects of space weapons on the biosphere of our planet could have grave consequences for the entire humankind.

It is therefore clear that the appearance of weapons in space could have extremely negative consequences for strategic stability, international security and the environment.

At present there are no weapons in the outer space, but plans for developing such weapons have existed for a long time. The types of weaponry slated for use in the outer space include laser weapons, beam weapons, kinetic weapons and electromagnetic pulse (EMP) weapons.

LASER WEAPONS

When the laser was invented in 1961, military researchers immediately began to think about using lasers as a weapon. In the late 1970s, when scientists developed lasers with an output of several Megawatt, the idea actually became practical. The main advantage of laser weapons is that the impact against the target is achieved almost instantaneously because the laser beam travels at light speed. This obviates the need for anticipating the target's trajectory so as to enable the weapon to intercept that target. The laser disables or destroys the target mainly by heating it up, and also as a result of the shockwave generated when the surface of the target missile is struck by a pulsed laser beam.

Several types of lasers are now being considered for military uses. The most suitable type for destroying missiles and their components in the outer space is believed to be the chemical laser, which relies on a chemical reaction between hydrogen and fluorine. Replacing hydrogen with

its heavy isotope, deuterium, increases the wave length of the laser from 2.7 micron to 3.8 micron. That wave length falls into the low-loss transmission window, meaning that the laser beam can travel to the planet's surface almost unimpeded. In terms of focusing the laser, the most promising technology is the excimer laser, which relies on molecular argon and krypton fluoride. The problem is, however, that the wave length of such a laser is 2,000-3,000 angstrom, which means that the Earth's atmosphere is not transparent for it. In order to reduce laser beam divergence, it is necessary to reduce the wavelength. That requires a huge density of the pumping energy, which can only be achieved during a nuclear explosion. Such a solution has been considered for direct nuclear-pumped X-ray lasers. Research into X-ray lasers has been under way in the United States for many years.

PARTICLE BEAM WEAPONS

Beam weapons use narrow beams consisting, as a rule, of neutral particles. The beam is generated by particle accelerators which can be based on the ground or in the outer space. High-energy beams can impact only the target's surface or penetrate deep within it, depending on the nature of the particles and on their energy. Absorption of relatively low-energy particles in the thin surface layer of the target produces effects similar to those of a laser beam. However, every accelerated particle has vastly higher energy (by a factor of millions) than a single photon in a laser beam. Higher-energy particles can penetrate deeper within the target; their energy is dissipated as they ionize the atoms of the target material, which mostly leads to various radiation effects. The particles which are potentially suitable for beam weapons include neutral hydrogen atoms; such beams will not be distorted by the geomagnetic field, and the particles themselves will not be repelled from each other within the beam, thereby increasing its divergence. Various assessments suggest that beam weapons are suitable for use at a relatively short range (up to 1,000 km, according to the most optimistic estimates). The main problem of the beam weapons is the size and weight of the particle accelerators they rely on.

EMP WEAPONS

EMP weapons disable the target by subjecting it to a massive electromagnetic pulse. In that sense they have much in common with the electromagnetic effects of a nuclear explosion – although the EM pulse produced by EMP weapons is a lot shorter. EMP weapons can be used to remotely disable the electronic components of various IT and command-and-control systems. For example, the currents generated by an EM pulse in the electric circuits of the detonators in various munitions may be sufficient to set them off. High-energy currents can even initiate the detonation of explosives in missile warheads. EMP weapons can destroy or disable semiconductor components in radio-electronic systems, even if these systems are switched off during the pulse. Such weapons can take the form of fixed-position or mobile systems generating narrow EM beams, as well as EMP ammunition delivered to the target by missiles, bombs or other delivery systems.

The main problem facing EMP weapons projects is developing a source of EM radiation small enough to fit into the warheads of missiles or other delivery systems. Analysts believe, however, that this weapons type is

very promising in terms of the modalities and scale of its possible use. The most extensive research into EMP systems designed to disable radio-electronic components is under way in the United States (at the Los Alamos National Laboratory, the Lawrence Livermore National Laboratory, the U.S. Army Research Laboratory, the Texas Tech University, etc.). According to media reports, research into military EMP systems is also under way in Britain, China, Israel, Sweden, France and South Korea.

INTERCEPTOR MISSILES

The latest types of weaponry are not limited to sources of electromagnetic radiation. The vacuum of the outer space makes it possible to use interceptor missiles equipped with nuclear or conventional warheads. They destroy the target either through direct collision with it, or by using HE fragmentation warheads. The idea of using space-based missile interceptors to destroy ballistic missiles at the boost phase of their trajectory first appeared in the late 1950s – early 1960s. But the technology available at the time was not sufficiently advanced to put that idea into practice. Nevertheless, the idea was explored in the United States as part of the Brilliant Pebbles program. The essence of the proposal was to deploy a large fleet of autonomous satellites, each carrying a single interceptor. The interceptors were to be equipped with an independent target-seeking system, a navigation system to determine the position of the interceptor in space, and an autonomous combat control system to enable the interceptor to select its target. It is believed that such space-based interceptor missiles could potentially become the first weapons system to be deployed in the outer space.

U.S. STRATEGIES

Under the George W. Bush Administration (2001-2009) and in accordance with a presidential directive issued in August 31, 2006, Washington outlined the main principles of its space policy. Following the arrival of the Obama administration those principles were revised (the new space policy was announced on June 28, 2010). That new policy appears non-confrontational and on the whole, it establishes the necessary climate for the development of space cooperation between Russia and the United States. But despite its non-confrontational nature, the new policy still reflects some of the hawkish elements of the American military-political strategy. The policy rejects any claims to sovereignty over the outer space by other nations. It says that intentional interference with the operation of space systems will be considered as an encroachment on the rights of sovereign states. Neither does the new document abandon the approach proclaimed in the 2006 U.S. space doctrine, which aims to ensure the maximum freedom of action for the United States in space while at the same time denying such freedom to America's adversaries. Such an approach means a clear ambition to gain supremacy in the outer space. The new document merely attempts to disguise that ambition by means of a different wording. Another related element of the policy is the clause dealing with free access to the outer space and the goal of strengthening U.S. leadership in space. In essence, it is the same *philosophy* of freedom of action in the outer space, which translates, in the absence of any legal restrictions, into the freedom to place American weapons in space, while at the same time essentially preventing other countries from doing the same. The United States currently has all the necessary

prerequisites – including a strong economy and a powerful R&D and manufacturing capability – to attempt a big leap in advanced space technologies, including the development of complex and expensive space-borne weapons systems.

THE RUSSIAN POSITION

Russia, meanwhile, has only two real options to choose from. It can reconcile itself to the prospect of becoming a second-rate space power - or it can pursue a strategy of preserving its space technology potential.

Will Russia accept the role of a second fiddle in space exploration? Probably not. That would run counter to its self-identification as a great space power which has vast experience in this field of human endeavor.
The second strategy does not just seem preferable – it is in fact the only acceptable option. Preserving its space technology capability and focusing its efforts on space R&D and related projects would enable Russia not to fall behind in developing new space technologies and to implement them in a new generation of space systems and instruments. Decades of experience of dealing with the United States in the area of disarmament and arms control suggest that Washington is prepared to negotiate only with a strong partner who can stand its ground. That is why ensuring that Russia and the United States have a similar level of space capability will preserve the preconditions for further resolution of the problem of weapons in the outer space through international legislation.

Anatoly Antonov is the member of PIR Center Advisory Board, the Deputy Minister of Defense of the Russian Federation.

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Edited by Irina Mironova.

Moscow – Geneva, August 2012

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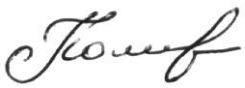

Dr. Dmitry V. Polikanov
Chairman of the Trialogue Club International

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