The main stages of the US missile defense system and their features

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Abstract

The essence of the main stages of creation and development of the missile defense system by the United States of America is revealed. The main driving force for the development of the missile defense system is constantly the missile threat. In the initial stages, the main tasks of the missile defense system were to protect certain important facilities and the largest American cities from Soviet ballistic missiles. In the future, the emphasis was on the creation of missile defense of the national territory from a massive nuclear missile strike or the creation of missile defense systems of the theater of operations. At the present stage, the United States plans to create a global tiered missile defense system to protect American territory from a limited number of intercontinental ballistic missiles and regional missile defense systems to protect US allies and deployed US troops from medium-range and short-range ballistic missiles.

Key words: missile, nuclear, system, ballistic missile.

Introduction

It is believed that the question of the need to create a missile defense system arose with the advent of the missile threat, which was preceded by the use of Nazi Germany during World War II BM “V-1” and “V-2” for the shelling of London. Due to the technical imperfections of these missiles, their launches did not significantly affect the course and outcome of the war, but the threat of massive use of BM with improved characteristics prompted experts to begin work to find effective means of counteraction.

Material and methods

Issues of creation and development of the US missile defense system have been studied by many scientists, such as: Koltunov V., Belous V., Esin V., Kozin V., Shatskaya V. The methodological basis of the article was the logical-semantic method, which determines the essence, direction, the role and place of missile defense in the United States; method of historical approach – to consider the main stages of formation and changes in US policy on missile defense in historical retrospect.

Results and discussion

Given the extreme technical complexity and high cost of developing and creating means of detecting, tracking and defeating BR in the United States, such work has been going on for more than 60 years with varying degrees of success. During this time, there have been some changes in the views of the American leadership on the creation of a missile defense system, as well as its role and place in shaping the country's defense policy. This transformation is taking place under the influence of changes in the military-political situation in the world, primarily in the context of the growing

missile threat, the development of scientific and technological base in the field of anti-missile technology, US economic opportunities and more.

The first stage (1956–1972) – the main US efforts are focused on solving the problems of intercepting ballistic targets, finding the optimal architecture of the missile defense system, forming a promising concept for its construction, as well as creating the first missile defense systems.

In 1956, on the instructions of US President D. Eisenhower, the Defender program was launched to identify ways to create missile defense systems and facilities, the principles of their construction, to study the detection and maintenance of the main parts of the BM. The first successful test by the Soviet Union of the R-7 multistage ICBM on August 21, 1957, as well as the launch of the first artificial satellite of the Earth by the Sputnik launch vehicle on October 4, 1957, became the catalyst for missile defense work. These events testified to the vulnerability of American territory to Soviet ICBMs and convinced the US military and political leadership of the need to create a missile defense system as soon as possible (Koltunov V., 2017).

In 1957, the Nike-Zeus system began to be developed to protect objects from Soviet ICBMs. The Nike Zeus deployment plan called for the construction of about 120 missile defense bases with 50 anti-missile systems on each to protect key military infrastructure and major human settlements in the United States.

During the implementation of this program, the American military-political leadership, primarily US President D. Eisenhower, Defense Ministers N. McElroy (1957-1959) and T. Gates (1959-1961), as well as a number of influential scientists countries were rather skeptical about the Nike Zeus system's ability to provide effective missile defense of certain facilities and doubted the need to spend such significant funds on its development and accelerated deployment.

The question of the need to create a missile defense system for the United States became most relevant during the Cuban Missile Crisis in October 1962, when the Soviet Union deployed its nuclear ballistic missiles in Cuba. In this way, the Soviet Union was able to launch powerful nuclear missile strikes on the most important US targets without hindrance in the shortest possible time.

However, the Nike Zeus tests revealed a number of technical problems that affected its development prospects. In January 1963, this program was officially closed and it was decided to develop a new, more advanced system Nike-X. It included two anti-missiles – long-range Spartan with an interception range of up to 640 km and high-speed short-range anti-aircraft missile Sprint with an interception range of up to 40 km to ensure two interception lines of ICBMs. In addition, new, more advanced multifunctional radar stations have been developed for Nike-X. The decision to create such a system was also due to reports from US intelligence, which reported on the Soviet Union's plans to create an ICBM by 1966.

The Nike-X system was planned to be deployed in two echelons by 1970 to protect the most important areas (zones), that is to provide zonal missile defense. However, in the course of its further development, it turned out that the Nike-X system also did not provide guaranteed and complete protection of certain areas from massive missile strikes, due to which work on this program was suspended (Seize the High Ground: The Army in Space and Missile Defense, 2018).

Without the consent of the Soviet Union to discuss the limitation of anti-missile weapons and strategic offensive weapons, as well as taking into account China's first test of the hydrogen bomb in June 1967, the United States announced the launch of the Sentinel missile defense system in September of that year. It was based on technologies developed under the Nike-X program and was announced as a system of "subtle" protection of the American population from the missile threat from Chinese ICBMs.

In June 1968, President L. Johnson and his supporters in the US Senate agreed on a decision to expand the capabilities of the Sentinel missile defense system. It should also provide reliable protection for ICBM mine launchers and the entire territory of the country from the limited number of ballistic missiles of the Soviet Union. To this end, it was planned to include advanced Spartan-2 anti-missiles in the Sentinel system and to deploy an additional number of Sprint interceptors. The system was to consist of at least 17 missile defense

bases, including one each in Alaska and Hawaii, where 700 Spartan-2 and Sprint missiles were planned to be deployed (Ballistic Missile Defense Then and Now, 2017).

However, due to the promising excessive costs of creating this system, as well as the start of negotiations with the USSR to limit missile defense systems, US President R. Nixon on March 14, 1969 announced the cessation of Sentinel and the creation of a new missile defense system Safeguard. Its main tasks were: to cover the deployed American troops from a missile strike by the Soviet Union; protecting the US population from a nuclear missile attack by China and possible accidental missile attacks from any other source.

It was planned to include up to 1,000 Spartan-2 and Sprint anti-missiles in the Safeguard. Construction of the first two Safeguard facilities began in the early 1970s: at Grand Forks (North Dakota) and at Malmström Air Force Base (Montana). In many respects, this system was a step forward compared to the Nike-Zeus, but it also remained extremely vulnerable to measures to suppress missile defense, especially direct strikes on its radar.

The second stage (1972-1983) is related to the conclusion and implementation of the terms of the Treaty between the USSR and the USA on the limitation of missile defense systems. The nuclear missile proliferation race between the two superpowers has led to the need to understand the impact of missile defense on strategic stability in the world. The parties have become increasingly aware that the creation of missile defense systems is a destabilizing factor that initiates the development of strategic offensive weapons (Dogovor mezhdu SSSR i SShA ob ogranichenii sistem protivoraketnoy oboronyi, 2020). Therefore, on May 26, 1972, the ABM Treaty was signed, according to which the USSR and the USA undertook:

limit their missile defense systems to the number of interceptors and objects being defended;

not to deploy missile defense to protect the entire territory of the country;

not to create missile defense systems for sea, air, space and mobile ground bases. Not to provide non-strategic missile defense means, first of all anti-missile defense systems of the theater of operations, with opportunities to solve the tasks of combating ICBMs.

According to Art. III of the ABM Treaty, each of the parties was given the opportunity to deploy two ABM areas: a missile defense system with a radius of 150 km with a center located in the capital of the Party and a missile defense system with a radius of 150 km, which houses ICBM mine launchers. No more than 100 fixed anti-missile launchers could be deployed in each such area. Article XV sets out the procedure for any party to withdraw from the Treaty with six months' notice, “if it has decided that the extraordinary circumstances which have arisen threaten its national security”.

In July 1974, the USSR and the USA signed a Protocol to the ABM Treaty (entered into force on May 24, 1976), according to which each party was allowed to have only one such system: either around the capital or in the area of ICBM mine launchers (Protocol k Dogovoru mezhdu SSSR i SShA ob ogranichenii sistem protivoraketnoy oboronyi, 2018).

The United States has focused its efforts on establishing a missile defense system to protect the ICBM's base area in Grand Forks, the USSR, which has chosen Moscow and the Moscow Industrial District, where senior government and military leadership and significant human and industrial potential are concentrated.

To protect the ICBM's Grand Forks base, the United States deployed the 98 Safeguard anti-missile system, which entered combat duty on October 1, 1975. However, in February 1976, the US Congress voted to discontinue the system, which was withdrawn a few months later. weapons and canned. The main reasons were its low efficiency after the appearance of missiles with detachable main parts in the Soviet Union, high cost of operation, as well as changes in US policy to give priority to the placement of ballistic missiles on submarines. At the same time, in the late 1970s, the USSR intensified measures to strengthen the combat potential of strategic nuclear forces by increasing the number and improving the characteristics of ICBMs based on the R-36M type, which potentially threatened US ICBM bases (Belous V. S., 2020).

In this regard, the United States has again raised the issue of protecting ICBM bases by creating a promising tiered missile defense system equipped with anti-missiles with non-nuclear warheads. At that time there were already some developments in this area. As part of the development of the Safeguard system, the US Army developed a missile that would defeat a ballistic target through kinetic energy by hitting it directly. In addition, the United States Agency for Advanced Defense Research Projects in 1980 formed the Office of Directed Energy to create a laser system capable of solving missile defense problems.

The third stage (1983-1991) began with the announcement by US President Reagan on March 23, 1983 of a program to create a tiered missile defense system throughout the country against a massive nuclear missile strike "Strategic Defense Initiative" (The Strategic Defense Initiative and the end of the cold war, 2017).

On March 25, 1983, the US Administration promulgated the National Security Directive № 85, which provided administrative and financial support for the implementation of this program. The establishment of the Executive Committee on Defense (Anti-Missile) Technologies was approved. In April 1984, in accordance with the recommendations of the above-mentioned committee, the US Department of Defense formed the SOI Organization, which planned and monitored the implementation of missile defense activities.

As part of this program, large-scale R&D has been launched to develop ground, air and space-based missile defense systems based on various physical principles in order to defeat ICBMs on almost the entire trajectory of their flight. At the same time, the United States finally abandoned plans to use anti-missiles with nuclear warheads, the detonation of which in the atmosphere also negatively affected the operation of its own missile defense radars, and focused its efforts on the development of kinetic action. The main priority in the SOI was given to the creation of promising space-based anti-missile weapons using elements of destruction on new physical principles.

At the end of 1986, the US military and political leadership decided to begin the practical implementation of the SOI program. In the autumn of 1987, a promising missile defense system was introduced, which included anti-missiles and space-based and ground-based sensors, as well as a combat control subsystem. According to the plans of the American administration, such a missile defense system should ensure the interception of the vast majority of Soviet ICBMs.

In 1990, the most ambitious project of the SOI program was published – Brilliant Pebbles, which provided for the creation and launch into orbit of about 4,000 miniature spacecraft, equipped with 40-50 missiles each. According to the developers, the satellites were planned to be sent to ballistic missiles in space and hit them by a direct collision at a speed of 10-15 km/s, which guaranteed the complete destruction of ICBMs or their warheads.

However, the development of the SOI system contradicted Article V of the ABM Treaty, which states that "each Party undertakes not to establish, test or deploy naval, air, space or mobile ground-based missile defense systems or components". In addition, in the process of implementing the SOI, the views of the US leadership on the tasks, architecture and timing of the missile defense system have changed significantly, as a result of which this concept was abandoned. This was also facilitated by the enormous financial costs of the program (estimated at more than $ 30 billion), the extraordinary technical difficulties of building weapons on new physical principles, the end of the Cold War, and the improvement of Soviet-American and later Russian-American relations. , a growing threat from third countries that have intensified the development of medium-range and short-range BR. Subsequently, the SOI program was refocused on tackling non-strategic ballistic missiles (Esin V. I., 2020).

In late 1989, the administration of US President George W. Bush Sr. initiated a revision of the SOI program. A study was prepared in March 1990, according to which the main threat to US national interests, especially the deployed US troops abroad, are medium-range and short-range ballistic missiles. This was confirmed by Hussein's 1991 use of Scud ballistic missiles on targets in

Israel and Saudi Arabia in response to the beginning of the United States and its allies in Operation Desert Storm. For the first time, American Patriot anti-aircraft missile systems were used to intercept these missiles.

The fourth stage (1991-2001). Given the geopolitical changes in the world, especially the end of the Cold War and the improvement of relations between the United States and the Soviet Union, on January 28, 1991, US President George W. Bush ordered the Secretary of Defense to refocus the SOI program to create a missile defense system – Global Protection Against Limited Strikes.

Under the Missile Defense Act of 1995, policy in this area was initially focused on creating and deploying an effective anti-missile defense system to protect advanced groups and expeditions of US troops, strengthening the forces and means of missile defense of US allies and partners. In this context, the main attention was paid to the development of anti-missile capabilities of Patriot SAMs due to the development of a new ERINT anti-missile for him. At the same time, the creation of weapons based on new physical principles and space-based interceptors, which were considered in the framework of the SOI, was postponed to a more distant perspective.

This led to the start of negotiations between the United States and Russia on the demarcation of strategic and non-strategic defense systems, which lasted from 1994 to 1997. As a result of these negotiations, during the Helsinki Summit in March 1997, the parties agreed in principle on anti-missile parameters for missile defense missiles, which are defined in the new package of agreements (Kozin VP, 2013).

On September 26, 1997, in New York, with the participation of the Ministers of Foreign Affairs of the Republic of Belarus, the Republic of Kazakhstan, the Russian Federation, Ukraine and the United States, agreements on demarcation of strategic and non-strategic ABM and succession to the ABM Treaty were signed, which reflects the multilateral nature of the ABM Treaty and the equal legal status of the parties in decision-making in the Commission.

In March 1996, the United States adopted a compromise decision in the form of a program to create a national missile defense system "3 + 3", which provided for work to create a technological base for strategic anti-missile systems without violating the provisions of the ABM Treaty. Initially, it was planned to have only one position area with long-range anti-missiles (in Alaska) and to limit the deployment of means of detecting BR within the framework of the ABM Treaty.

In 2000, the United States offered Russia a package of proposals to modify the ABM Treaty to enable Washington to deploy a national missile defense system with 100 missile launchers with non-nuclear warheads. Russia's leadership has rejected these proposals. In September 2000, US President Bill Clinton announced that the decision to deploy a national missile defense system had been temporarily postponed until the next US administration came to power.

The fifth stage (2001-present) is the United States's move to create a global missile defense system to protect national territory, as well as US allies and US troops abroad. After the coming to power of US President George W. Bush, this issue became more relevant. In 2001, the United States abandoned the term "national missile defense" because it assumed a single defined system to protect only US territory and did not take into account the interests of the Allies. The next landmark event was the United States' unilateral withdrawal from the ABM Treaty on June 13, 2002, which prevented full-scale measures to launch a missile defense system.

On December 17, 2002, US President George W. Bush officially announced plans to deploy a missile defense system to protect national territory in 2004-2005, comprising up to 20 mine-based anti-missiles (16 at Fort Grill, Alaska and 4 at Vandenberg Air Force Base/California), equipped with non-nuclear kinetic warheads; up to 20 anti-missiles on ships equipped with a multifunctional weapon system "Aegis"; anti-aircraft missile systems "Patriot" PAC-3; Radar and ground, sea and space based sensors.

In addition, in 2006 the United States intensified its efforts to establish a regional missile defense system in Europe and began negotiations with Poland and the Czech Republic on the deployment of anti-missile weapons on their territories. During 2011-2013, it was planned to

deploy 10 mine-based anti-missiles in Poland (such as in the USA), and by 2011 in the Czech Republic – a multifunctional radar to detect targets and aim anti-missiles.

In September 2009, the Obama administration presented an updated plan that provides a phased adaptive approach to missile defense in the European region (Shatskaya V. I., 2013). It was decided to build a missile defense system in Europe by 2020 on the basis of mobile means, primarily SM-3 naval and ground-based missiles, as well as THAAD, Patriot PAC-3, etc., which can be quickly relocated to the most profitable for organization of missile defense of districts. Within the framework of such approach it is planned:

at the first stage (by the end of 2011) – to deploy in the Mediterranean, Adriatic and Aegean Seas to three surface ships of the US Navy with SM-3 Block IA anti-missiles, and in Turkey – a mobile radar advanced base;

at the second stage (2012-2015) – to re-equip the surface ships of the US Navy with advanced modifications of SM-3 Block IB missiles and to deploy in Romania a missile defense system "Aegis Ashore" with SM-3 Block IB missiles;

at the third stage (2016-2018) – to deploy in the North and Baltic Seas ships of the US Navy, equipped with a new modification of anti-missile SM-3 Block IIA with extended range, in Poland – missile defense system "Aegis Ashore" with anti-missile SM-3 Block IIA;

at the fourth stage (2019-2020) – to place in Europe the most advanced anti-missile SM-3 Block IIB ground and sea-based. In this way, it is planned to protect all European countries from short-range, medium and intercontinental long-range BMs.

By the end of 2020, the United States has completed the implementation of the first and second stages of the updated plan to create a missile defense system in Europe. Four Arleigh Burke destroyers have been deployed at the Spanish naval base Rota, namely: Donald Cook (since February 11, 2014), Ross (since June 16, 2014), and Porter (from April 30, 2015) and Carney (from September 25, 2015). Each ship can accommodate up to 90 units of missile weapons for various purposes, including anti-missile type SM-3. Also, on the territory of Turkey is located the American radar AN/TPY-2, which operates in the US missile defense system in Europe.

On December 18, 2015, a missile defense base was put into operation in Romania. The territory of the base consists of two perimeters – external and internal. The inner perimeter is a closed US military base under the command of the US Navy in Europe. The Aegis Ashore complex with AN / SPY-1 round-the-clock radar and 24 SM-3 Block IB anti-missiles is located on the territory of the inner perimeter. A representative of the US Armed Forces has been appointed commander of the missile defense base.

According to the plans of the US ABM Agency, after the deployment of a similar missile defense base in Poland (by 2022) it is planned to upgrade anti-missile weapons in Romania and install new SM-3 Block IIA anti-missiles with improved characteristics instead of SM-3 Block IB.

As part of the implementation of the third stage of the phased plan, the missile defense base in Poland is being deployed. The United States, together with Japan, continues to build a promising SM-3 Block IIA anti-missile and conducted a number of successful tests, including on November 16, 2020.

Conclusions

Thus, for more than 60 years, the United States has been taking consistent steps to establish an effective missile defense system. During this historical period, the views of the US leadership in this area have evolved due to the growing missile threats in the world, changes in the military-political situation, the development of scientific and technological progress and economic opportunities of the state.

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