

DEFENSE CAPABILITIES AND CAPABILITY AGAINST BALLISTIC ROCKETS

Colonel (ret.) professor M.D., Viorel ORDEANU Ph.D*
Colonel (ret.) professor Benoni ANDRONIC Ph.D**

Abstract: *After following the research of the bibliography of some authors from abroad and in the country, the authors of the article analyze the existing doctrines, regarding the air defense against nuclear ballistic missiles, as an essential component of the modern war and, as such, formulate their opinions on this subject.*

The authors conclude that the defense against ballistic missiles is the current essential danger, not only for the armed forces but also for the population and, in general, in case of use thereof, for the very existence of life on the Blue Planet.

Analyzing the capabilities and defense capability against ballistic missiles, the authors point out that the existing AEGIS capabilities in Romania, through their technical-tactical characteristics and, in particular, the Deveselu Missile Shield, designed to intercept short or intermediate range ballistic missiles, together with the other anti-aircraft missile and artillery systems for air defense of the territory, represent the ballistic missile defense system of the eastern border of the European Union and the member countries of the North Atlantic Treaty.

Keywords: *anti-aircraft defense, ballistic missiles, anti-ballistic missiles, missile-nuclear warfare.*

Introduction

A new world war is not wanted by any of the great powers, despite the warlike statements that appear in the press. Everyone is convinced of the huge destruction that will be caused by a modern war, in which the use of nuclear weapons could mean the end of our civilization, as we know it. History shows that after the conquest of Rome by the barbarians, the dark Middle Ages followed for a millennium, until the rebirth of European civilization. For this reason, political - military strategists try to imagine

* University Professor at „Titu Maiorescu” University Bucharest, email: ordeanu_viorel@yahoo.com

** University Professor, corresponding member of Academy of Romanian Scientists, email: benoneandronic@yahoo.com

other ways of waging inter - and intra-civilization war, which would bring greater benefits than the expected human and material costs. This is how the *hybrid war*¹ of today appeared, consisting of a network of different small and large hybrid wars, characterized as cold, warm, or hot, and revolutions, constituting the *Cold Peace* that follows the former *Cold War* and foreshadows the new *Cold War 2.0*.

Considering that through its implicit consequences, war is an *epidemic of serious polytrauma*, so the world war is a *pandemic* of serious trauma, which endangers the very existence of civilization or even the human species. The treatment is mainly medical, but the prophylaxis is complex: political, military, social, etc. It is known that in any biological crisis, at individual or social level, prevention is more effective than treatment. As a result, if it cannot be prevented, medical and non-medical countermeasures must be known and applied to minimize losses and limit consequences.

1. Risks

The state of war, declared or undeclared, is a constant in history, from ancient times to the present and probably to the future. Almost every generation has had its war and its veterans. This historical permanence maintains the warrior spirit and resilience of each people in the face of the major catastrophe represented by the war. It is not just about resilience, which also involves the appropriate backlash for defense (action and contraction), but resilience, i.e. the perverse effect of accepting consequences, submission and adaptation to the new situation (hence resignation), including accepting human and material losses. , which can sometimes be higher for winners than for losers. The resilience of the population is very important for *de facto* leaders, so as not to repeat the history of wars followed by revolutions. The uprising of the Russian Decemberists followed the Franco-Russian War, the Paris Commune

¹ Viorel - Cătălin Mihalcea, „Fundamente și ținte hibride în acțiunile beligene contemporane”, *Revista de studii și informații pentru apărare*, Anul X nr. 1/2018, pp. 14 - 16, available at https://www.mapn.ro/publicatii_militare/arhiva_infosfera/documente-/2018/1_2018.pdf, accessed in 10.06. 2021.

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Colonel (ret.) professor Benoni ANDRONIC Ph.D

followed the Franco-Prussian War, the Russian Revolution of 1905 followed the Russo-Japanese War, the Bolshevik Revolution of 1917 followed the First World War, after the Second World War many others followed and almost all of them resonated in our country as well. *"He who does not know history is doomed to repeat it".²*

However, nowadays the major risk is no longer the direct struggle between states. It is cheaper to create multiple popular grievances and opposing governments are overthrown by their own citizens, leaders are assassinated, and freedom allows the shadow aggressor to access the riches of the country, under the guise of democracy and the destruction of competing infrastructure. It was known that at the end of the twentieth century production capacity was five times greater than trade capacity, so the struggle for new markets was doubled by the struggle to annihilate the industrial capacities of others.

A modern, rocket-nuclear, war would have led and would lead to extreme material destruction, and no one wants to conquer only a radioactive desert. Neutron bombs have appeared, which preferentially kill the living force and ensure victory, without destroying the infrastructure. But after such a war, who else would you put to work? The situation in the Americas of the Middle Ages cannot be repeated when African slaves were imported instead of the killed Native Americans. The current emigration of the poor to rich countries creates more problems than it solves, hindering demographic evolution and multiculturalism, the latter proving to be a failure.

Paradoxically, the current risk of having a rocket-nuclear war does not come from the great powers of the day, but rather from some *failed states*³ or some pseudo state entities (ISIS, ISIL, Daesh etc.) or from non-state terrorist organizations. They have their own funding or are attracted, directly or indirectly, from international sponsors and despite international bans on the non-proliferation of CBRN weapons and ballistic missiles, they

² Cine nu cunoaște istoria, este condamnat să o repete, Analiză, *Ziarul de Craiova*, available at <https://www.ziaruldecraiova.ro/cine-nu-si-cunoaste-istoria-este-condamnat-sa-o-repete>, accessed in 12.06. 2021.

³ Marius Oncu, „Clasamentul statelor eșuate: Pe ce loc se află România în Clasamentul statelor eșuate”, available at <https://www.mediafax.ro/economic/clasamentul-statelor-esuate-pe-ce-loc-se-afla-romania>, accessed in 18.06. 2021.

buy, manufacture, or improvise appropriate weapons systems. This danger was realized only at the beginning of the 21st century, although it was also described in the literary literature since the 19th century (novels by Jules Verne and others).

2. Threats

Nowadays, several states have nuclear weapons and / or ballistic missiles for transport thereof, while planes being considered relatively vulnerable to air defense (AA). In the 8th decade of the last century there were many small, medium, and intermediate range nuclear missiles belonging to the United States of America (USA) and the North Atlantic Treaty (NATO) in Western Europe and to the Union of Soviet Socialist Republics (USSR) in Eastern Europe (however, not in Romania, so as not to become a nuclear target). There used to be a danger that the *eurorockets*⁴ are to be used in a rocket – nuclear war between the two superpowers, but on European territory. The famous *mutual destruction* would have occurred only on European allies' level, which would have been beneficial only for each superpower, while the winner would have written the history. This would have been extremely convenient for both superpowers, i.e., to get rid of the European competition as it was the case after the World Wars.

Only if the war had escalated would the battle between the two superpowers have gone with intercontinental ballistic missiles (IBM), mainly over the Arctic Cap, the shortest path between them. For the first time, the issue of ballistic defense from the North Pole was raised. Due to the difficulty of two supersonic missiles being close enough for destruction, the explosive force had to be very large, so the nuclear payload was required for this missile-nuclear duel. But side effects were also expected, including the eventual melting of the ice caps, with rising planetary ocean levels followed by flooding of ports and lowlands. This would have been the effect of the enormous energy released by the rocket, anti-rocket, and nuclear anti-rocket systems that would have encountered on the arctic trajectory and

⁴ Manlino Dinucci, „Distrugerea Tratatului INF și Sosirea Noilor Eurorachete. Uniunea Europeană Complice”, *Rețeaua Voltaire*, 4 febr. 2019, available at <https://www.voltairenet.org/article207256.html>, accessed in 20.06. 2021.

consequent reduction of polar cap *albedo*⁵. Another risk would have been radioactive and / or chemical contamination of the air and the underlying terrain, with unpredictable effects on humans, living things and the environment.

As a result of the estimated risks, apparently at the insistence of the Europeans, a treaty banning e-missiles was concluded, and anti-ballistic missile (ABM) systems were perfected and equipped with classic explosives with fragmentation or kinetic impact (collision). Desperate attempts to find ways to combat this new weapon remind us of the futile attempts in World War I to shoot down enemy aircraft with heavy artillery, assuming that the *whirlwind* of projectile air would unbalance the plane and it would fall (!?) or from World War II when British air defense and fighter aircraft (the best in the world at the time) failed to shoot down even one of Germany's more than 3,000 ballistic missiles.

These paradigm shifts led to the conclusion of treaties for the progressive reduction of the number of nuclear weapons (in fact, some were no longer needed, others were already morally or physically worn out), but intercontinental ballistic missiles with multiple charges (improperly called warheads, nukes, etc.). So, the reduction from a global total of almost 25,000 single loads to about 5,000 multi-load is only a political success. The global risk is equally large, while the theory shows a destruction capacity of three times the human civilization⁶. However, after the political progress in the 1980s in the field of nuclear weapons and missiles, new regional actors demonstrate their missile-nuclear capability, together with the 5 official nuclear powers (USA, USSR / Russia, France, Great Britain and PR China), other 3 recognized nuclear powers (India, Pakistan and Israel - it seems that it would also have benefited from the transfer of technology and nuclear weapons from South Africa, which had given up nuclear weapons in view of the transfer of power to the majority black population), the new nuclear powers (DPRK and the Islamic Republic of Iran) and there may be other secret national programs (such as Syria and Iraq). To these, nuclear weapons

⁵ Albedo de pe Pământ. Ce este și cum afectează schimbările climatice, *German Portillo*, available at <https://www.meteorologiaenred.com/ro/albedo-al-pamantului.html>, accessed in 24.06. 2021.

⁶ Al Treilea Război Mondial, Wikipedia, available at https://ro.wikipedia.org/wiki/Al_Treilea_Razboi_Mondial, accessed in 23.06. 2021.

are added that are deployed on the territory of other countries (Germany, Belgium, Italy, Turkey, etc.) from where they could be used as needed, as they were in the Cuban Missile Crisis in 1961, or the case of Ukraine which asked permission to become a nuclear power again.

3. Ballistic defense

The experience of the World War showed that the German ground-to-ground V1 type missiles had a major psychological impact on the enemy in France and Great Britain, caused great material damage, but very few casualties and a large part was neutralized by the British AA defense (AA artillery and fighter aviation). However, V2 ballistic ground-to-ground missiles were never neutralized due to the final vertical target trajectory and supersonic speed. Starting from these, the ballistic missiles of the current Great Powers were developed, and the technology was disseminated despite the non-dissemination treaties. Currently, ballistic technology provides propulsion in atmospheric, extra-atmospheric and cosmic space, being a dual civil - military technology and has been taken over by some private companies.

The US has promoted a ballistic missile *defensive strategy*, the *National Missile Defense* (NMD) based on ballistic and nuclear non-proliferation, as well as anti-ballistic missile treaty (ABM), with a staged algorithm⁷.

- Stage 1 *Capability 1-C1* became operational in 2005; consists of a system of 20 ABM interceptors at a single site in Alaska (on the border with Russia) according to the American principle of "*protecting all eggs in one basket*", as opposed to the Soviet principle of ensuring protection by dispersal. These are associated with 5 quick alert radars and an X-band radar (XBR) in the Aleutian Archipelago, as well as a management system for the simultaneous deployment of several *single-penetration* ballistic missiles.

- Stage 2 *Capability 2-C2* increased, in 2010, the number of ABM interceptors in Alaska to 100 anti-missiles, another 3 XBR radars and the *Space Based Infrared Systems* alert satellite network. This specialized

⁷ Istovant Nkoghe, *La prolifération des missiles balistiques*, pdf, Université Pierre Mendès France, 2005, pp. 36 - 37.

network consists of SBISR-High, i.e., High Orbit Alert Satellites and SBISR-Low, i.e., Low Orbit Alert Satellites. NMD's capacity has increased for defense against a simultaneous attack with dozens of single-penetration missiles and several sophisticated-penetration missiles.

- Stage 3 *Capability 3-C3* began in 2011 and deployed a total of 250 interceptors in Alaska and North Dakota (Grand Forks base), with an enhanced early warning radar and 5 other XBR radars, which allow the interception of hundreds of single-penetration missiles and dozens of complex-penetration missiles. High-definition radars were installed in the United States, Great Britain, and Greenland (territory of Denmark, which US President Donald Trump had offered to buy). High-powered aircrafts equipped with *Airborn laser* also came into the picture. All these missile defense systems alter the balance of terror at the end of the Cold War, and other nuclear powers, especially Russia and China, see their nuclear deterrence capabilities threatened and relaunch the arms race.

- The current stage consists in completing the ground level fixed systems with mobile systems on high-capacity military ships, which we will present separately due to the special current importance of this defensive system.

4. National Missile Defense Technology (NMD)

Anti-nuclear and anti-ballistic defense, although very complex and expensive, is theoretically feasible: single or multiple missiles and / or loads must be destroyed before hitting the target, so in the atmosphere. The debris, including radioactive waste, will fall into areas that are likely to be neutral, or without nuclear weapons, with foreseeable consequences, considered as *collateral losses*.

In principle, the ballistic missile has 4 phases of flight, each being theoretically vulnerable to the attack of interceptor missiles^{8,9}.

⁸ James M. Lindsay, Michael E. O'Hanlon, *Defending America: The Case for Limited National Missile Defense* Hardcover - April 30, 2001, PDF, pp. 20 - 22. available at <http://brookingsnap.edu/books/0815700083/html/index.html>, accessed in 27.06. 2021.

⁹ Aris Rubis, Michel Wartelet, „National Missile Defense: Le retour de la Guerre des Etoiles et les enjeux stratégiques” Rapport du Groupe de recherche et d'information sur la paix et la securite, 2000, pp. 13 - 16, accessed in 02.07. 2021.

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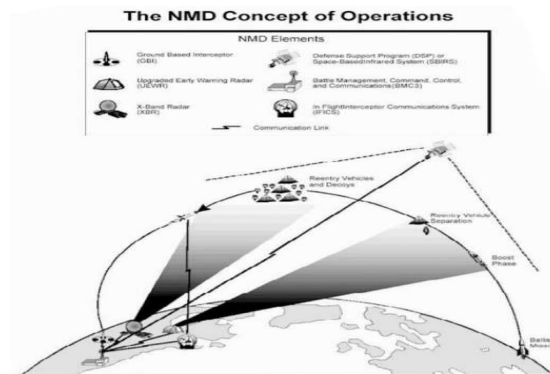


Figure 1. Operational concept¹⁰

- - Phase 1 *Boost*, starts with the combustion of the fuel with the oxidizer, the rocket takes off and climbs almost vertically into the troposphere; it is seen from space by the infrared (IR) signature and has all the combat charges and false targets, so it is ideal to be hit, but this phase only takes a few minutes. At launch, *early-warning satellites* (EWS) with IR detectors that are placed in geostationary orbits detect the plasma signature emitted by the rocket as it rises above the cloud ceiling. The satellite announces the command center that a launch has taken place, the place, the direction and discriminates, i.e., it tries to determine if it is a military missile, if it is an enemy, in which direction it is moving, etc. to trigger the retaliation.

- - Phase 2 *Post-boost*, lasts a few minutes, the rocket passively follows the upward trajectory in the stratosphere and releases the combat charges and false targets, which can be tracked by alert systems; the defender launches *kill vehicle* (ground, naval or space) interceptor missiles, which separate from the carrier rocket and continue its ascent with corrections with small *thruster* engines, to directly hit the target ballistic missile (RB).

- Phase 3 *Midcourse*, in which the ballistic trajectory continues in

¹⁰ Available <http://www.fas.org/spp/starwars/program/nmd.htm>, accessed in 27.06. 2021.

the upper layers of the atmosphere, lasts a few minutes, depending on the distance traveled, the components are separated on different final trajectories, according to the schedule; they are small (less than 1 m in diameter) and cold, so it is difficult to spot or differentiate them from false targets. When the two missiles approach each other at supersonic speeds, the interceptor uses its own detectors and guidance algorithms to distinguish between real charges and false targets to directly hit the target and destroy it kinetically. This algorithm is difficult to implement in practice due to supersonic speeds, more recently hypersonic, of the order of km / sec, small target diameter and very short time, about 5 minutes for Scud operational missiles (which also equipped the Romanian Army) and 15 minutes for long-range strategic missiles (over 3,500 km)

- Phase 4 *Terminal*, is followed by the exact orientation of the battle loads towards the chosen targets, can be easily spotted by radars due to heating on air friction, but lasts only 1 min until the impact with the ground target, so they are harder to intercept.

In practice, the *reliability* of a missile defense system requires that a series of technical - tactical problems be solved, from detection to validation of tests. The defense dilemma, *defense versus offense*, is not easy to solve in this area. The defense has several drawbacks that the attack does not present, because the attacker can choose the scenario, the weapon, and the moment: *the attack is the best defense*. The defender must estimate scenarios that the attacker could use, the choice of weapons and their characteristics, the place and time of the attack and others that are just as difficult to estimate. Probably a future possible attack will be given by surprise, as a *preventive blow* and not in response to the opponent's initiative, so he commits an act of aggression.

Defense management must be continuous, with non-stop surveillance, the objective being similar to the *destruction of one rifle bullet with another rifle bullet*. In practice, all AA defense systems are vulnerable, for example: the US bombings of three large airliners that hit the Twin Towers and the Pentagon without being intercepted, the Cessna plane that left Germany and landed in the Red Square in Moscow and was detained by police, air incidents during the Romanian Revolution in 1989, etc.

In the current scenarios, strategists believe that a missile-nuclear attack would occur in a period of international tension. But the danger is

more likely to come from *failed states* (*rogue states*, *voyou*), which do not comply with international norms, which also include the right to war (*jus ad bellum*) and the right to fight (*jus in bello*). But conflicts can also be approached *asymmetrically* against a great power, and other countries can intervene alongside one or the other, with or without a declaration of war. In addition, there may be real or virtual *accidental launches* (alert system errors), as has happened before. It is very difficult to quickly differentiate the real danger and to counteract it effectively.

In the military field, except for war, everything is simulation. And the effectiveness of ballistic defense (ABD) is based on simulations and mathematical models. In tactics it is considered that if the enemy has planes as good as ours, so the success rate is 50%, we will have to use two planes against them to be 100% successful. The same principle is applicable to ships, armored vehicles, etc. It follows that to ensure success, both qualitative and quantitative superiority must be created. *The Union of Concerned Scientists* (UCS) has calculated that for a series of 20 independent tests, all of them should be successful so that statistically we can have 95% certainty that the probability of interception is over 85%, that is, only 3 missiles continue their trajectory towards the set objectives. Nevertheless, their effect can be catastrophic. In addition, the calculation does not consider the possibility that these missiles may be passively and / or actively defended¹¹.

To date, it appears that no military has conducted enough successful tests and has not used ballistic missile (BM) countermeasures at the same time. Testing is extremely expensive, and the results are quite poor, with an unfavorable cost / benefit ratio¹². *Star Wars* is more of a competition of the military-industrial complex for sophisticated armament, with huge financial costs, in which only the competitor with the strongest economy wins, and the others, one by one, will abandon the race becoming pacifists due to lack of funding.

Anti-ballistic systems (ABM) are primarily *political weapons*, as are

¹¹ Aris Rubis, Michel Wartelet, „National Missile Defense: Le retour de la Guerre des Etoiles et les enjeux stratégiques” Rapport du Groupe de recherche et d’information sur la paix et la sécurité, 2000, p. 20, accessed in 05.07. 2021.

¹² Istovant Nkoghe, *Op.cit.*, p.35.

aircraft carriers. Their role may not be decisive in the war, but it projects military and political power in areas of economic interest, strengthens the military presence and confirms the attachment to defend that ally, as is the case with the US / NATO base in Deveselu, Romania. The strategic context of 1972, when the ABM Treaty was signed between the two superpowers of the time, changed radically in today's multipolar world. The world is reorienting itself towards a new paradigm: *Global Protection Against General and Massive Strike*, in which the great nuclear powers cannot exceed 2000 BMs each.

5. The ballistic defense of the Theater of Operations

In parallel with the *Nuclear Missile Defense* (NMD) systems, there are systems called *Theater Missile Defense* (TMD) for the protection of theaters of operations (TO) against short- and medium-range ballistic missiles. The United States has also deployed *Terminal High Altitude Area Defense* (THAAD) ground systems in the United States, the Far East (Japan and Taiwan), the Middle East (Iraq, Saudi Arabia), the Near East (Israel), Central Europe (Romania) etc. Examples are *Patriot* missiles (the perfect equivalent of the Soviet *Neva* AA missile), which were used in combat in the 1991 Gulf War. They were used as AA missile systems for anti-ballistic protection in the TO and intercepted some Iraqi Scud missiles targeting Tel Aviv. There are TMD type PAC -1 and PAC -2 with lower-ceiling (*Lower-tier TMD system*) for intercepting short- and medium-range ballistic missiles (less than 3,500 km) that comply with the ABM treaty. But there are also TMDs with a high-ceiling PAC -3 (*Upper-tier TMD system*) that have a longer range up to the limit of intermediate-range missiles and create discussions about their inclusion in a permitted or prohibited category.

The expansion of TMD systems in the Asia-Pacific has been challenged by China because it nullifies its ability to hit these strategic targets. The situation is similar to NATO's reaction to the *AA defense bubbles* in Kaliningrad and Crimea, which would nullify the missile-attack capability on Russian territory¹³.

Romania currently has, like the US Army, multi-role anti-aircraft

¹³ Magda Grădinaru, Interviu ministrului Bogdan Aurescu, *Spotmedia*, 16.06. 2021, „Deciziile adoptate la summit-ul NATO sunt de natură să întărească securitatea României”, available at <https://www.mae.ro/node>, accessed in 06.07.2021.

missile systems Patriot PAC -3 (Raytheon) with medium / long range (which will replace the missiles SA Volkhov), at Capul Midia and Giurgiu, and five others are in training phase in the territory, totaling 450 missiles, forming the 74th Patriot Regiment¹⁴. All this will make an impenetrable defense for the Deveselu Shield, which also has its own AA defense. It is considered that the best defense is through the right combination of systems with proven efficiency in combat¹⁵.

In our geographical region, Central Europe, which is divided between the European Union (EU) and the Commonwealth of Independent States (CIS) and is contiguous to the Middle East, there are a multitude of ballistic missiles, with all the characteristics of range, classic cargo or CBRN, which belong to Russia, Iran, Ukraine, Turkey etc.¹⁶ If initially it was stated that the missile defense would be mainly against Iran, now the US and NATO military doctrine designates Russia as the main enemy. However, not the CIS as a whole, as it is estimated that US troops withdrawn from Afghanistan will be deployed to bases in Central Asia. A Russian and an American base already coexist in Uzbekistan. In our opinion, the future is to be decided politically.

6. AEGIS capacities in Romania

The Aegis Ballistic Missile Defense System (Aegis BMD or ABMD) is a program of the US Department of Defense Missile Defense Agency designed to intercept short- or intermediate-range ballistic missiles after Phase 2 and before phase 4 of ballistic flight, so in outer space. This *Sea-Based Midcourse* defense strategy originated in the *Strategic Defense Initiative (Star Wars)* in the 1980s. RIM-156 Standard Missile (SM-3) interceptor missiles were installed on 33 military ships (cruisers and destroyers) deployed in

¹⁴ Feri Predescu, „România devine o putere militară! ...”, available at <https://evz.ro>, 17.09.2020, accessed in 08.07. 2021.

¹⁵ Sabina Fati, „România are rachete Patriot pe malul mării ...”, *Radio Europa Liberă România*, 17.09. 2020, available at <https://romania.europalibera.org/a/...>, accessed in 11.07. 2021.

¹⁶ Home Știri Actualitate „Care este diferența dintre rachetele balistice și interceptorii de la Deveselu” 01.08.2018, available at <https://www.digi24.ro/stiri/actualitate/...>, accessed in 15.07. 2021.

Atlantic Ocean, Pacific Ocean, and Mediterranean Sea. But NATO's eastern flank remained uncovered, so it was complemented by the US Navy's Aegis Ashore ground system, with a base in Romania at Deveselu, operational since 2015, and one in Poland, operational since 2020, which defends both American bases in Europe as well as European allies. The launch is made from the same VLS vertical launchers type MK41 (manufactured by Lockheed Martin) as on ships, with interchangeable modules with different lengths for different types of missiles (5.3 m for AA and BMD self-defense, 6.8 m for tactical missiles - anti-submarine and anti-ship) and 7.7 m for surface-to-air missiles, including long-range Tomahawk and thermonuclear payload¹⁷.

At Deveselu there are 3 groups of multiple short model launchers for SM-3 interceptors (manufactured by Raytheon), with a length of 5.3 m, diameter of 0.36 m, range of 500 km, flight ceiling of 160 km and hypersonic speed of 9,600 km / h, without explosive, but with kinetic effect, i.e., collision with the intercepted ballistic missile¹⁸. It follows that this facility, from a technical point of view, can only be used for the stated purpose of defense against ballistic missiles, and together with the other missile and AA artillery systems for the air defense and for the eastern border of the EU and NATO¹⁹. As such, this facility is strictly defensive.

Due to mistakes in interpreting the technical data published by the manufacturing companies, which underlined the versatility of these weapons systems, some non-compliant statements were made, which were taken over by the press and speculated by some non-NATO entities to unfoundedly accuse the role of the anti-aircraft base from Deveselu, which is actually a defensive structure. Former President Traian Basescu said it was "the most wrong post-December statement." But it can be considered that this event would not necessarily be an error, because the real defense capacity must be

¹⁷ Mk-41 Vertical Launching System VLS Missile Tomahawk ESSM, available at [seaforces.org, Naval Information, MK-41, seaforces.org, Naval Information...](https://seaforces.org/Naval-Information/MK-41), accessed in 15.07. 2021.

¹⁸ Terminal High Altitude Area Defense - *Wikipedia*, available at https://en.wikipedia.org/wiki/Terminal_High_Altitude_Area_Defense, accessed in 18.07. 2021.

¹⁹ Home Știri Actualitate „Care este diferența dintre rachetele balistice și interceptorii de la Deveselu” 01.08.2018, available at <https://www.digi24.ro/stiri/actualitate/...>, accessed in 15.07. 2021.

secret, and the creation of a reasonable suspicion of its enhancement can contribute to the preventive defense.

As a result, a hostile press campaign took place, trying to link some local scandals to the presence of the base. It was assumed that at the US-Russia Summit in July 2021, this controversial topic will also be discussed, but either it was not of sufficient interest, or the topic is so important that it could not be approached politically. However, from a technical-tactical point of view, it seems that this system would not be as effective against hypersonic and cruise missiles, so the competition for weapons versus counter-weapons will expand in this area as well.

Commentary

By centralizing the available information, Ballistic Missiles have relatively low chances of success due to technical reasons (excessive complexity), technical-tactical, acquisition and maintenance costs, weather, countermeasures before and after launch, anti-missiles, aircraft, lasers, radiation, etc. as demonstrated by the massive use in World War II by the German army, which bombed France, Britain, and the Netherlands with thousands of missiles, but with modest results. It would probably require missile bursts (saturation) or CBRN payloads, mainly thermonuclear. It should be noted that of all CBRN weapons, the use of chemical, biological, and radiological agents is prohibited by international treaties, but the use of nuclear explosions of any kind is not prohibited. In January 2021, the UN Treaty on the Prohibition of Nuclear Weapons was signed and entered into force at the UN, but only 56 of the 195 officially recognized states have signed. Countries that have (officially or unofficially) nuclear weapons and all their allies have not signed the document, so they are free to use nuclear weapons, their own or others', but they can also be legitimate targets for nuclear bombing. Although it is assumed that all peoples want to live in peace, only 28.7% of governments have shown that they want peace, so the military profession has a secure future. But the future of mankind is no longer very certain.

On the other hand, ballistic missiles (BMs) have a low chance of intercepting all targets, as shown by published statistics (influencing factors being numerous: technical, alert, trajectory, false targets, point targets, cold

Colonel (ret.) professor M.D., Viorel ORDEANU Ph.D

Colonel (ret.) professor Benoni ANDRONIC Ph.D

targets, active and passive defense, weather, radiation, saturation) being probably necessary for safety at least 2 interceptors for each nuclear ballistic missile. There are some uncertainties because the use of ballistic missiles in combat has been experienced, but much less interception, tests are still few and not all are successful²⁰. BM's capabilities are multiple, sophisticated, extremely expensive, the resource is limited, but their capability is not sufficiently tested in combat, and it is not good to validate it directly in real situations. There will probably be some local or regional wars in which this system will be tested. So far, the analysis of open-source information (OSINT) does not demonstrate an absolute effectiveness of these defensive systems, but shows the degree of political-military involvement in the alliance.

Conclusions

Air defense is an essential component of modern warfare, and within it, defense against nuclear ballistic missiles, which pose the greatest danger, not only to the armed forces but also to the general population. The modernization of the Romanian Army also includes capacities that have the declared ability to counter air attacks, including against ballistic missiles.

We believe that we have the advantage of having high-performance capabilities, including for AA defense, Romanian and American, among the best that exist today and that we are part of the strongest military alliance that has ever existed under the motto *Si vis pacem, parabellum*.



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²⁰ Terminal High Altitude Area Defense (THAAD), available at <https://missilethreat.csis.org/system/thaad/>, accessed in 20.07. 2021.

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