AEROSPACE POWER, A CHALLENGE OF THE NEW MILLENNIUM

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Abstract: *Ensuring the security and stability for the spatial dimension represents priority number one to the great economic and military powers of the world, with effects that can have a direct and negative impact on the environment and international security. For the use with responsibility and in peacefully conditions of this new dimension and in order not to expose ourselves to certain dangers and threats that may spread from space we need diplomacy and cooperation between nations, we need strong economic vectors enabling for the implementation of capabilities and cutting-edge technology, we need a new power.* ***Aerospace power****, critical to strategic decisions, decisive in the armed confrontations and pervasive in everything that stands for communications, command and control on the battlefield. This paper highlights the new challenge occurring with the discovery of the spatial dimension, space power, with missions, operations and technologies they use. It is that category of forces acting in a new battlefield, which, through the conquest of domination and control in the area of enforcement action, creates real advantages in conducting military operations on land, sea and air.*

Keywords: *space, satellite, rocket power, security, orbits, space programs, missions, crew.*

1. INTRODUCTION

The threats, dangers and vulnerabilities to which we are exposed and increasingly diverse and unusual areas in which they propagate, directly influence us and produce a variety of effects on the climate of security.

Outer space is one of the most complex and unpredictable dimensions from action can be taken (especially in military terms), for the creation of a State of insecurity, reason which is why the space security becomes a necessity for military, political, economic and social systems that affect both national security and international security environment.

The Concept of aerospace power, as it was defined by Philip Towle comes down to "use or prohibition of the use of airspace or alien for military purposes by the vehicles capable of controlled and sustained flight beyond the immediate conflict zone" [1].

The authors of the specialty regulations, and also some Americans researchers in the field, define the power of the air and space, "or just space ", as "the ability to use a platform or platforms operating in, or passing through, the air and space for military purposes" [2].

Regardless of how the concept of aerospace power is defined, it deepens the vertical dimension of the armed conflict on a three-dimensional perspective that allows component forces to act when and where necessary, without the geographical and physical limitations imposed on other categories and types of forces. Thus, the future armed conflicts will concentrate on the vertical component, while the surface components will become forces of support for military action in space. This kind of war will not have contact alignments; it will be a military confrontation without a front line.

Changing the face of the war has generated new dimensions and new configurations for modern military conflicts, these being "walked through the extensive use of smart weapons will destroy precisely localized targets with low losses, the enemy is defeated in terms of military and political, in most cases without his Eyrie" [3].

2. MISSIONS AND CHARACTERISTICS OF AEROSPACE POWER

Concerns related to aerospace power focused on the use of cosmic installations for military purposes and, they began in 1953,

before the launch of the first satellite, Sputnik, when the United States Army Air Forces hired, the company RAND (**R**esearch **AN**d **D**evelopment - the company was formed to provide the results of its research to the U.S. Armed Forces), to conduct research and analysis of military applications that can be deployed from satellites.

The results were soon to appear, they highlighted the military actions of spatial installations (satellites), such as: photo recognition, navigation and communications, remote sensing and meteorological research.

In parallel, the USSR started, in 1962, the launchings of the Zenit satellites, from the recognition satellites class. Improved models released later are equipped with optical systems performance, and the program developed by the Soviets includes sending in space of the first autonomous module, " Nauka", intended to carry out experiments with gamma rays, high energy protons that develop energies greater than 100 Mega-electron volts and electrons with energies larger than 20 Mega-electron volts.

Later, on "Nauka" modules there were installed infrared telescopes and microwave systems, all of which were destined to the study of radiation on Earth, especially those areas from the Polar Regions, below the ice caps.

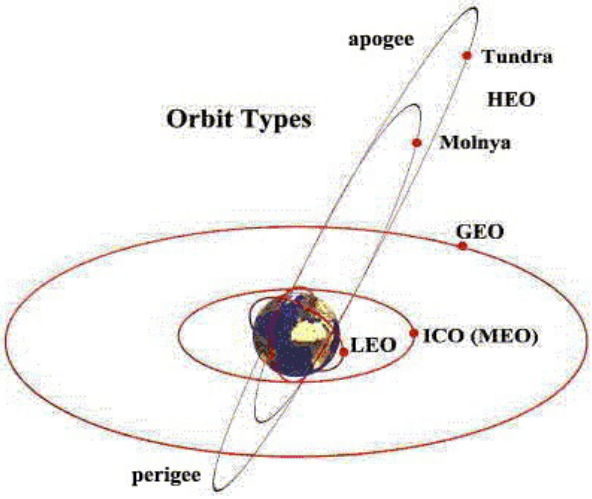

Fig.1 Orbits that currently have military satellites [6]

The main missions of aerospace power, developed by military satellites on their orbits are:

- photographic reconnaissance missions generally carried out by LEO low orbit satellites (elevation 80-2000 km);
- navigation, missions carried out by MEO medium orbit satellites (altitude 2000-35000 km);
- electronic research missions performed by satellites placed on GEO geostationary orbit (altitude around 35000 km);
- communications, missions carried out by satellites that use the elliptical orbits of HEO (apogee of more than 35,000 miles and perigee around 1000 km).

With the first results obtained by the use of satellites for the recognition, the problem of counteracting their actions was raised, and the first step in protecting the objectives was the development of means of detection and tracking of satellites.

Thus arose the first operational system of satellite tracking, Minitrack system, built by the U.S. in 1957, in the same period in which, the USSR launched Sputnik-1.

The system was designed for both the detection of Sputnik satellites, as well as for keeping track of their own satellites, Explorer and Vanguard.

Subsequently, such systems have improved and developed using constellations of satellites and they diversified in terms of belonging to the structures and use of surveillance/ reconnaissance systems, enhancing its monitoring networks.

Currently, strategic changes and emergence of destabilizing situations led to the extension of these networks for surveillance space to the Space Surveillance Network (SSN), founded by the USA Network, which operates on the basis of 31 locations around the world, equipped with optical sensors and cameras that have a dedicated satellite.

In parallel, the space surveillance systems developed by Russia, called Okno and Krona, operates in 14 locations, with over 20 cutting-edge optical instruments, imaging radar and a high powered telescope that can be adjusted to provide weather data from Russia, the most accurate, as well as the ability to obtain high resolution images from satellites

Thus, out of the carousel of changes and innovations experimented by spatial military actions, some features stand out, whose importance will grow in the future, offering space power, the dominant role of strategic power.

Application of the concept "high-tech" and the use of the latest technology advancements in the field is a premium feature of military space operations. For example, a new generation of satellites with optical hard detectable radar has already appeared, under the code name "Misty".

They evolve with an inflatable balloon, whose wrapper is reinforced under the action of UV rays and which has also been designed to reflect electromagnetic radiation and to reduce the footprint in the visible spectrum.

Another important feature of the military space operations is given by the decisive effect on the character of the joint military action obtained by joining of components by land, air and naval forces.

This feature requires the ability to organize joint actions on tactical field, based on the information received from the surveillance/reconnaissance systems, achieving interoperability between elements of the forces categories, by using identification data and by establishing positioning with precision through spatial networks that monitor the battlefield.

The execution of the decisive hit, the fire, is a characteristic of spatial, decisive military action. Vectors used to transport fire to target are placed on spatial systems that allow simultaneous slamming of several targets of the strategic adversary, regardless of the degree of their dispersion and geolocation.

Technologies used allow data collection and processing the information, while near-real, providing in-depth knowledge of the space battle and creating ideal conditions for timely intervention in the opponent's device, where it coagulates centers of gravity.

All these characteristics of space-based military action create the ideal conditions for achieving absolute supremacy on the battlefield, wherever they are, and offer the possibility of military action in terms of less favorable physical forces, making invisible the relationship between offensive and defensive and in accelerated paces, with immediate finality.

3. SPATIAL TECHNOLOGIES

The exponential evolution of science and new discoveries in the fields of engineering and technology have created a technological revolution with a direct impact on human society and with major effects in the military, leading to changes in military strategy and tactics.

Once the gate to outer space is open, the newest inventions of the engineering and technology are applied to space vehicles.

The launch of the first satellite, Sputnik 1, on October 4, 1957, and its evolution on orbit around the Earth, for several months, was the beginning.

Some of the general characteristics of Sputnik 1 are:

- a sphere made of aluminum, with a diameter of 58 cm.;
- 83.6 kg weight;
- equipped with four antennas;
- Silver-zinc batteries;
- radio transmitter power: 1 W;
- pressure and temperature sensors;
- made up of two shields, one serving for thermal protection, the other being pressurized.

Its mission was to check out pressure and thermal throttling, principles for this, inside, the satellite there was a quantity of nitrogen, maintained at a slightly higher pressure than the atmospheric pressure of Earth (1.3 atmospheres) and a fan for cooling the equipment.

On the other side of the globe, the United States started the space exploration by launching, in 1956, the first world's military space program "117L" Weapon System (WS-117L). That program evolved and materialized through the arrangement of the orbit of a satellite constellations for photographic reconnaissance, "Corona" type (fig. 3) [7], KH-1, KH-2, KH-3, KH-4, KH-4A andKH-4B.

Fig. 2 SPUTNIK – 1 Satellite

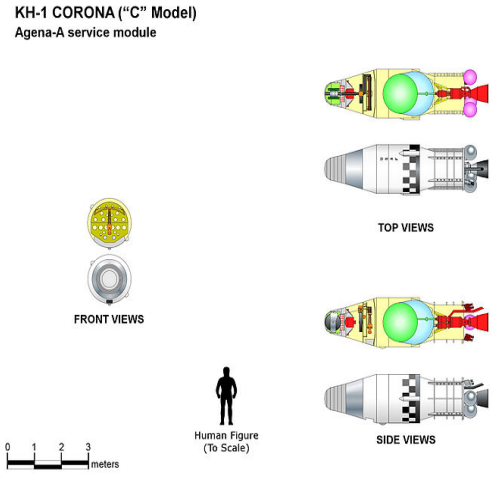

Fig. 3 Corona KH – 1 Satellite

The operating program of strategic research satellites "Corona" was subordinated in the period 1958-1969 to the Department of science and technology of the CIA (Central Intelligence Agency), which benefited from the support of experts and missile launch bases belonging to the U.S. Air Force.

Thus, in the first instance it succeeded to take photos of the strategic objectives within the territory of China, the Soviet Union and other communist States, and at the end of its mission, the CIA launched 22 satellites on orbit, under the code-named KH, short for "Key Hole".

Important is the fact that 9 of them (models KH-4A and KH-4B), were placed on a high orbit and were equipped with ELINT equipment [8].

The second phase of the space program "Corona" corresponded to the placement on different orbits of satellites from Discoverer class.

The last mission was a great success when the capsule of Discoverer-38, released on 26 February, 1962, was recovered in its entirety, and the information collected could be used by the CIA.

Feeling threatened by developments in the field of American space programs, the USSR starts the production of medium-range ballistic missile and intermediate action, which obliges US to build a defensive system of early warning of the attacks of the polar regions of the northern hemisphere, BMEWS (the Ballistic Missile Early Warning System). Having received the consent of the Governments of Canada and Denmark (under which lies the Greenland tutelage), US builds a chain of radar stations designed for the detection and tracking of ballistic missiles.

In parallel, the US develops as part of program WS-117L, a sub-program, "G-System", intended for the production and use of infrared sensors on satellites, which will refer the matter, from orbit, the launch of any ballistic missiles.

The sensors were manufactured by ARPA (Advanced Research Projects Agency), an agency subordinated to the Pentagon, and shedding satellites, MIDAS (Missile Defense Alarm System), had owned the conjugated system alerting distant radars, BMEWS.

The Soviet approach, in terms of the development of spatial capabilities was different from that of the U.S.

While Americans developed technology, Russians preferred to alter and to adapt the technology that was already in use, using the systems tested in the early stages of the space program, managing to lower the cost and reduce the time required for development and construction.

Priority of the Soviet space programs focused on the development of the research on the use of permanent human presence in space and the implementation of plans that would allow human activity on future space stations.

Thus, since 1971, the Soviet Union developed the first program to build a space station placed in low orbit of the Earth, space station “Saliut”, which commenced from the program of secret military space station, “Almaz“.

In addition to the military teams, on the space station and were teams of researchers who studied the effects of living in space for long on the human body. Saliut is the first space station in history which has been inhabited by people, they succeeding the first modular space station "Mir", in 1986.

The basis of this level and addressing progressive directions in terms of operations and the use of outer space, space activities are carried out in the form of programs, are becoming the preserve of all States and benefits from the latest technological inventions, engineering and those in IT [9].

The U.S. Space Agency develops through NASA, a series of space missions and programs, of which the most important are:

-Mercury Program-1958-1963 with six manned flights;

-Gemini-1962-1966 with twelve flights ten of them manned;

-Apollo Programs from 1 to 17, conducted during the period from 1967 to 1972, with eleven manned flights and six moon landing of monthly modules, of which the most important, the Apollo 11 mission, when the first manned arrives on the Moon's surface;

-Since 1983, was modeled on the US-Russian Mir Space Station project, much more complex, with multiple bins and modules to fit out the labs, berthing compartments, crew compartments, storage spaces.

The high costs of production and installation on orbit make the Washington administration to invite other countries to participate in starting the project.

Thus, Space Station gets International Space Station (SSI), after accepting the: Russian space agencies - RKA Japanese space agencies - JAXA, Canadian space agencies -

CSA and ESA - European space agencies (an Association of several European countries) that together with NASA work to launch International Space Station project. Currently, 16 Nations participating in this project, 11 of them are from Europe.

In parallel with the ISS, United States and Russia both focuses on programs such as STS (Space Transportation System) like "Space Shuttle", respectively on the "Buran", (fig.4) [10], programs that including missions to launch satellites and space probes, transport people into space, carrying supplies for the international space station, another mission of maintenance and repairs for spatial systems already in use.

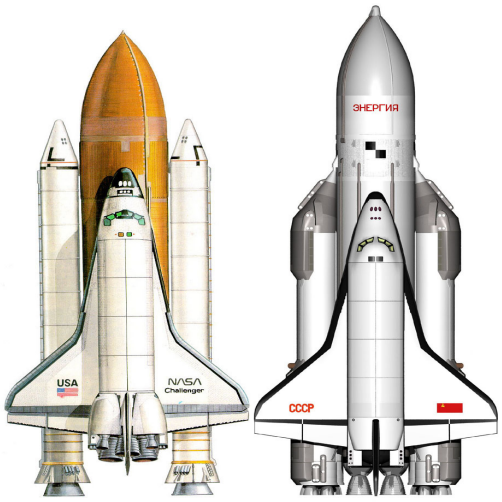

Fig. 4 Space vehicles Challenger (USA) and BTS-002 or OK-GLI (Soviet Union)

4. OPERATIONS AND MILITARY SPACE ACTIONS

Modern military actions have proven to be more effective when they had integrated into their operations and capabilities information provided by space-based systems.

Providing global communications, insurance with data about the position/navigation, creating possibilities for synchronization of actions, providing surveillance services/smart and recognition of the environmental monitoring, together with the development of the system for warning of combat forces, confirming the importance and need for space forces involvement in military operations.

Starting from the basic mission of any category of forces, namely to ensure the safety and security of our own nation, or that of the Alliance, the space forces and integrate them into military operations by ensuring the deployment of space-based missions, specific, such as:

- knowledge of the general situation and the spacecraft, while muddling permanent alertness;
- increase the effectiveness of space-based military forces through the processing and transmission of data and information;
- providing support to the forces supporting elements from space;
- ensuring the supervision of space;
- spatial forces intervention.

All these missions are designed to contribute to the integration of spatial forces in joint operations and increase the effectiveness of military operations.

Knowledge of the general situation and the space is fundamental in the direction of spatial operations. It involves the existence and use of General knowledge about the operational environment, in consonance with the processing and interpretation of data and information specific to each spatial operation in hand.

Knowledge of the general situation in detail and mastery to the smallest detail of the spatial situation depend to a large extent, on getting information about the enemy's capabilities and capacities, information provided by the sources of "intelligence" and which may reveal the intentions and actions of the upcoming opponent.

Increasing the effectiveness of space-based military forces operations is carried out by the processing and the transmission of data and information and represents a basic mission of the space forces, which determines the amplification efficiency of joint forces participating in military action, by increasing the potential for fighting strength by providing combat support for other joint forces, support.

To ensure this mission is due to information systems, surveillance and reconnaissance (ISR), the use of warning devices, missile tracking and interception, detection sensors of positions and of the moment of launching ballistic missiles, as well as the equipments of environmental monitoring and ensuring communications and satellite.

Providing support with support forces from outer space is another mission to space forces that includes essential capabilities, functions, activities and tasks required to support all forces, across the range of military operations.

It is achieved through the actions of implementation, support and organization of certain constellations of satellites, with clear,

predetermined missions, aiming at supporting military operations in order to ensure national and international security.

Checks from space provides for their own forces, freedom of action in space and, and when necessary, the development of military operations which lead to the Suppression of any of the actions or intentions of the adversary to attack in space or on Earth's surface, with systems that have the capabilities to evolve into space or in circum-terrestrial space.

Control of space and spatial operations is growing in two directions, depending on the character of military operations in space.

Thus, one can speak of spatial operations offensive, when you develop some actions intended to remove temporarily or definitively spatial systems capabilities of the adversary, or defensive, when it preserves a quiet space, when they held only passive action, designed to protect the space and taking place without representation possible, future threats or hazards to the safety and security of national and international.

5. CONCLUSIONS

Space forces intervention holds decisive influence over military operations and especially the armed confrontations, regardless of the conflict zone where it takes place. In addition, the discovery and delivery of data which can result in the removal of some targets, even at the strategic level, the surface of the Earth, the space forces can perform missions involving the management of weapons systems on the platforms space or in the depth of its territory to combat launches of intercontinental ballistic missiles of the enemy.

Therefore, the spatial power, through its military actions and operations, represents a very important vector, omnipresent and decisive for total security, with shares more than those of the other discharges during storm periods category forces, characterized by quickness, precision and maximum efficiency at target.

In the present paper there are presented, in chronological order, some of the programs, projects and concerns related to the safety of circum- terrestrial space as well as the reactions of the great powers, in front of threats that can come from the outer space.

The most important conclusion of the analysis is that it confirms once again that the future Aerospace Power will be part of the National Safety Systems of the countries of the world, and we have the space to deal with the space policy, space strategies, laws and norms that regulate the activity in space and why not even justice and policing space.

We must be prepared to scale the ladder of knowledge up to the top step, where it is necessary to provide a geospatial environment security, through an extension of security in space and the fourth dimension and an overall understanding of the new trends of conflictuality and war, in an era of Cybernetics and a society of knowledge particularly advanced.

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