Marek Czajkowski ORCID

The Space Dimension of India's National Security: A Military Perspective[1]

Streszczenie

Wiek dwudziesty pierwszy odznacza się rosnącym zainteresowaniem wykorzystywaniem orbity okołoziemskiej w różnych celach – liczba satelitów przyrasta zatem w ogromnym tempie. Jedną ze szczególnych cech ostatnich kilku dekad „ery kosmicznej" jest relatywnie szybkie rozprzestrzenianie się w świecie aplikacji satelitarnych. Oznacza to, że przestrzeń kosmiczna jest wykorzystywana już nie tylko przez najbardziej zaawansowane technologicznie kraje. Najbardziej znaczącym przykładem tego procesu są Indie. Kraj ten rozpoczął aktywność w sferach związanych z przestrzenią kosmiczną już w 1963 r., by pod koniec dwudziestego stulecia, po trzech dekadach trudnego rozwoju, osiągnąć status mocarstwa kosmicznego. Niniejszy artykuł dotyczy wojskowej strony programu kosmicznego Indii, która jest relatywnie słabo rozwinięta w porównaniu do możliwości i potrzeb kraju.

Słowa kluczowe: stosunki międzynarodowe ● bezpieczeństwo międzynarodowe ● program kosmiczny ● Indie.

Abstract

The 21st century has been marked by the increasing use of Earth's orbit for various purposes, as the number of active satellites are growing by dozens or even hundreds every year. One of the specific features of the last few decades of Space Age is the relatively quick dissemination of satellite applications around the world. This means that the outer space is being used not only by technologically advanced powers. India is the most prominent example of that process. India had started its space-related activities as early as 1963 and became a space-faring nation by the end of the 20th century following over thirty years of painstaking development. This article refers to India's military-related space activities that appear somewhat less developed compared to the country's capabilities and needs.

Keywords: International Relations ● International Security ● Space Security● Indian Space Programme ● India.

---

[1] This text was completed in February 2018, therefore it reflects the knowledge of the Author at that time.

1. Introduction

The 21st century has been marked by the increasing use of Earth's orbit for various purposes, as the number of active satellites are growing by dozens or even hundreds every year. One of the specific features of the last few decades of Space Age is the relatively quick dissemination of satellite applications around the world. It means that the outer space is being used not only by technologically developed powers. India is the most prominent example of that process. India had started its space-related activities as early as in 1963 and became a space-faring nation by the end of the 20th century following over thirty years of painstaking development.

One of the specific attributes of the Indian space programme is its mainly civilian orientation, as it has always been primarily considered part of the overall development effort of the country. Indeed, many of the orbital applications are dual-use technologies which may be utilized to fulfil military tasks as well. Still, they are not as effective as purpose-built ones, which are in short supply in India's quite vast spacecraft inventory.

On the other hand, there are many areas within the realm of national security where the use of orbital systems would be of great benefit. It could enhance the effectiveness of many activities and allow to deal with emerging problems quicker and in a more comprehensive manner. From the point of view of India's national security, there are three complementary arguments which should stimulate increased interest in the military applications of orbital systems. Firstly, the competition with China, the dangerous relations with Pakistan, and other security concerns require augmenting military capabilities. Secondly, the engineering capacity of Indian private companies and state agencies has steadily grown, which enables the creation of increasingly mature space applications. And thirdly, New Delhi pursues an increasingly active foreign policy which needs enhanced instruments, including the effective military capable of executing various combat and noncombat missions in the fast-evolving security environment.

This article is aimed at analyzing, in the most general terms, the Indian space programme. Specifically, we will try to answer the question, how it fits into the requirements of the country's national security, mainly from the military perspective. To do so, we will firstly depict in brief the main security problems that New Delhi has faced so far,

emphasizing their military dimension. Next, we will characterize the Indian space program with particular attention paid to its applications related to national security. And finally, we will try to propose a general assessment of the role of outer space as an instrument of national security of India from the military perspective. This last part will also be supplemented with some thoughts about future developments and prospects.

This article follows the realist perspective as it refers mostly to the military sphere, strategic considerations and the impact of technology on security-related issues. The value of realist thinking concerning these subjects manifests itself twofold. Firstly, as much as the primary goal of the presented research is to describe a part of the military instrument of a particular country – realist perspective provides a useful theoretical framework for that. Secondly, this instrument is portrayed against the background of India's great power, aspirations, and characteristics of the country's strategic environment – realist perspective is particularly suitable for that purpose. We believe that this approach suits the research goals best. The methodology is based on desk research, which entails an analysis of publicly available data and assessment of the existing literature on the subject.

1. The Main Problems of India's National Security

The international position of India is being labelled with the use of various expressions, but usually, the term "power" is invoked in many contexts. We agree that "leading power"[2] is the best phrase coined until now, for such wording is undoubtedly legitimate, especially if we consider the potential of that country[3]. And so, India:

- is the second most populous nation-state in the world; with high dynamics of growth, it is poised to overtake the leader, i.e., China, in the coming years;
- is the third largest economy in terms of purchasing power parity; and
- has the fifth biggest military budget in the world.

Furthermore, geography gives India an opportunity to dominate the Indian Ocean Region (IOR) and Southern Asia, as this country is centrally located within both regions. And finally, India's political tradition displays a particular feature that translates into its current political

---

[2] M. Tewari, B. Gopalaswamy, *Transforming India from a Balancing to Leading Power*, Atlantic Council, June 2017, http://www.atlanticcouncil.org/images/publications/Transforming_India_from_a_Balancing_to_Leading_Power_web_0622.pdf (accessed: 22.02.2018).
[3] A. Ayres, *Will India Start Acting Like a Global Power*, "Foreign Affairs" 2017, vol. 96, no. 6, pp. 83 passim.

culture – it is a firm conviction that the country has an exceptional role to play in the international arena. That is why, as some scholars observe, India "[…] has always aspired to the position of world power"[4].

Today, these ambitions come true, as India performs increasingly assertive policies, striving to shape the regional order increasingly effectively, while at the same time securing the global position as one of the most important players and a welcomed partner. What is more, India has recently emphasized more openly the role of *hard power*[5] in its policies. This does not, however, imply a withdrawal from the traditional pacifist attitude towards the use of force, which is deeply rooted in that nation's political culture and identity. On the other hand, India is still a poor country, despite seven-decade-long development efforts, and it still cannot fully subjugate its own problems. That is why sometimes it is said that there are two Indias at the same time[6] – the modern one, expanding and evolving, and another which is traditionally poor, backward, and hopeless.

India has to deal with the very complex security environment, and this entails a number of internal and external problems, dangers, and opportunities. As we have already noticed, India is a vast country with numerous domestic predicaments and a multitude of external threats. These attributes are matched with an optimistic prospect for internal development and the growing international relevance. It is, therefore, impossible to describe in this paper all issues of national security – we will restrict the discussion to a general outline and focus on military-related matters.

First of all, there is a vast compound of problems associated with domestic security. India is still a relatively poor country with countless economic and social tensions. The rapid population growth, great social and economic inequalities, insufficient infrastructure, and economic weaknesses of many of the country's regions have contributed to the immense potential of social unrest, organized crime, terrorism and anti-state subversive resentments. That is why the human dimension of India's national security is marked with serious threats that undermine the country's stability and development efforts. The deteriorating natural environment also adds up to the already enumerated internal problems, being at

---

[4] J. Zajączkowski, *Indie w stosunkach międzynarodowych* [India in International Relations], Warszawa 2008, p. 100.
[5] S. Joshi, *India Flexes Its Muscle*, "Foreign Affairs", June 23, 2015, https://www.foreignaffairs.com/articles/india/2015-06-23/india-flexes-its-muscle (accessed: 21.02.2018)
[6] C. R. Kaye, J. S. Nye Jr., A. Ayres, *Working With a Rising India. A Joint Venture for the New Century*, Council on Foreign Relations, 2015, p. 9.

_____

the same time an important issue by itself. This enormous set of difficulties is certainly intertwined with an external dimension as the Indian economy is tightly coupled with the global market. Indian society is, to a great extent "connected" globally, and crime, terrorism, and subversion are also linked to the events and processes that occur outside India.

In the international arena, which we are going to consider more specifically, there are first of all global socio-economic developments that the Indian policy must take into consideration. Globalization, rapid development of new technologies, quick local and global evolution of individual and group identities, and a rapid increase of wealth in developing countries pose both dangers and opportunities. They also bring multiple threats along with chances to augment the country's growth and to increase its power. There is no need to describe all accompanying issues, suffice to say that they give the essential background for subsequent analysis of more detailed developments.

To begin with, we have to identify a cluster of issues associated with China and Pakistan, the actors that are often depicted together from the Indian perspective[7]. It makes sense not only because both countries closely co-operate but also because, in both instances, territorial disputes are the most tangible core of their disagreements with India. However, there are also significant distinctions between those two countries, both from the Indian point of view and regarding the way China and Pakistan perceive India. The dispute over Kashmir is a matter of fundamental importance for Pakistan as it reaches the heart of its national identity. What is more, Islamabad understands well its inferiority – Pakistan is much weaker than India by any economic and military standards, save nuclear weapons. The Chinese perception is quite different – a border dispute with the southern neighbour is of secondary importance, and Beijing does not feel a substantial military threat from that direction. However, on the other hand, an increasingly assertive China[8] considers India as an important peer competitor in Asia and elsewhere. Although the Indian economic potential is still much smaller than that of China, and New Delhi's ability to project power, be it *hard* or *soft*, is limited too, the Chinese authorities expect them to grow. This makes India, both for natural reasons and because of its ambitions, an active opponent

---

[7] J. Zajączkowski, op.cit, p. 151.
[8] See for example: B. Gopalaswamy, R. A. Manning, *The Sino-Indian Clash and the New Geopolitics of the Indo-Pacific*, The Atlantic Council, November 2017.

of the Chinese strategic aspirations in Asia and IOR[9]. This adds up to the intensifying economic competition and translates into the struggle for political influence in the region[10], and it contributes especially to the growing rivalry in the Indian Ocean and adjacent quarters[11]. Furthermore, it is worth to remember that Indo-Chinese and Indo-Pakistani antagonisms have important nuclear dimensions[12].

While analyzing the complex situation in Southern Asia, it is also worth mentioning the American presence there. The United States has been deeply involved in that region having its strategic interests there. On the one hand, Washington has been in relatively good, although steadily deteriorating relations with Islamabad; on the other hand, it feels increasingly compelled to compete with Beijing. At the same time, the Americans have offered New Delhi broad, although still vague, co-operation opportunities[13].

The external dimension of national security of India also involves some important issues related to the international trade, especially the ones concerning the security of maritime trade routes, which still bear 80% of world trade's volume and 70% of its value[14]. It is essential from the Indian point of view because the country's vital exports, such as raw materials, chemicals, textiles, and machinery, travel mostly along sea lines originating in large maritime ports: Mumbai, Paradip, Kandla or Jawaharlal Nehru Container Terminal in Mumbai – the 33rd biggest in the world[15]. Imports are even more critical for the Indian economy, especially for the energy sector, as the country is the third largest producer of energy in the world, generating 723.9 Mtoe, which represents 5.5% of the world production.

---

[9] See, for example: C. Wagner, S. Tripathi, *India's Response to the Chinese Belt and Road Initiative*, SWP Comment 7, January 2018, https://www.swp-berlin.org/fileadmin/contents/products/comments/2018C07_wgn_Tripathi.pdf (accessed: 26.02.2018).

[10] A. Small, *A Backlash to Belt and Road,* "Foreign Affairs", February 16, 2018, https://www.foreignaffairs.com/articles/china/2018-02-16/backlash-belt-and-road (dostep: 21.02.2018).

[11] E. Albert, *Competition in the Indian Ocean,* Council on Foreign Relations, May 19, 2016, https://www.cfr.org/backgrounder/competition-indian-ocean (22.02.2018).

[12] See for example: G. Kampani, B. Gopalaswamy, *Asia in the "Second Nuclear Age",* Atlantic Council, November 2017.

[13] See for example: A. B. Carter: *America's New Strategic Partner?,* "Foreign Affairs", July/August 2006 https://www.foreignaffairs.com/articles/asia/2006-07-01/americas-new-strategic-partner (assessed: 25.02.2018).

[14] *Review of Maritime Transport 2017*, UNCTAD, October 2017, https://www.safety4sea.com/wp-content/uploads/2017/10/UNCTAD-Review-of-Maritime-Transport-2017-2017_10.pdf (24.02.2018).

[15] *Ibidem.*

Around 47% of this energy is produced with the use of fuel imported through sea lines – 91% of crude oil, 45% of natural gas and 30% of coal[16].

The Indian Ocean is also one of the most important sea transit routes in the world. It is particularly crucial for imports and exports to and from the Far East and South-East Asia, where first-class trade powers: China and Japan, and second-class ones: Vietnam, Singapore, Republic of Korea and Indonesia are located. The distinct feature of the Indian Ocean is that its two main entrances used by commercial shipping are also the most significant world trade chokepoints: the Arab Sea with the Strait of Hormuz and the Gulf of Aden in the west, and the Strait of Malacca in the east. The latter is, for example, crossed by 17 million barrels of crude oil every day, bound mostly for China and Japan – that is, more than a fourth of the world overall maritime trade of this commodity[17]. By its potential and geography, India is destined to control these sea routes, and it is continuously interacting with other countries which are also interested in a safe and uninterrupted flow of goods through the Indian Ocean. These interactions are increasingly important as the trade grows and, simultaneously, as India asserts its position of maritime power. And here we can also notice its important relations with the United States, still dominant in the world ocean, and with China, which is actively penetrating this area, considering it a sphere of its vital interests. This dimension of the Indian relations with the world is marked by competition, with a potential of conflict, and co-operation, with prospects for abundant benefits – it is also heavily laden with military-related implications.

Summing up the Indian national security agenda from the military perspective, it should be noted first of all that the dispute with Pakistan is surely the most direct and tangible threat. It is not only the interstate regular struggle marked with military and political tensions, but it also has an important asymmetrical aspect which manifests itself in terrorism and subversive activities with the Indian soil. Therefore, both countries, Pakistan in particular, perceive their mutual relations as a source of clear and present danger and the main reference point for current policies pertaining to the national security domain. It is also worth reminding again that both countries possess nuclear weapons and sufficient means

---

[16] All data from: *BP Statistical Review of World Energy 2017*, BP, June 2017, https://www.bp.com/content/dam/bp/en/corporate/pdf/energy-economics/statistical-review-2017/bp-statistical-review-of-world-energy-2017-full-report.pdf (22.02.2018).

[17] As of 2015, see: *World Oil Transit Chokepoints*, U.S. Energy Information Agency, July 25, 2017, p. 2., https://www.eia.gov/beta/international/analysis_includes/special_topics/World_Oil_Transit_Chokepoints/wotc.pdf (accessed: 24.02.1018).

_____

of delivery. Furthermore, the Pakistani nuclear doctrine envisages the first use of nuclear weapons in case of war with another nuclear-armed state[18] – which, of course, means India. The Chinese dimension of Indian security is less an issue of a direct threat, and more of a long-standing and prospective competition for influence within the IOR and South Asia, which also encompasses essential issues of maritime control. Atop it all, the American presence and Washington's interests and policies loom over the region.

On the basis of the abovementioned problems, a list of the following security issues that should be addressed by current policies includes:

-   Nuclear weapons of China and Pakistan,
-   Conventional arms balance *vis-a-vis* Pakistan,
-   the Chinese military potential in the neighbouring regions,
-   effectiveness of the Indian armed forces as a deterrent and as a warfighting tool capable of conducting extensive non-combat operations as well,
-   effective control of the Indian Ocean,
-   Irregular warfare and counterterrorism,
-   cybersecurity,
-   socio-economic domestic problems, and
-   environmental concerns.

All these topics must be addressed by the nation's security strategy with the use of various tools and methods, according to the doctrines and policies devised by the authorities. Almost every one of them has some military aspects, which means that the armed forces may be instrumental in achieving the respective goals and aims. The military is, therefore, an instrument supposed not only to conduct combat operations but, with increasing frequency, to perform non-combat duties as well. The latter means day-to-day missions to support the capabilities and readiness of combat components, and the use of military units to carry out various peacetime operations routinely.

_____

[18] P. K. Kerr, M. B. Nikitin, *Pakistan's Nuclear Weapons*, Congressional Research Service, August 1, 2016, p. 10, http://www.fas.org/sgp/crs/nuke/RL34248.pdf (accessed: 20.02.2018).

2. The Indian Space Systems Inventory – Military Applications

The development of technology which finally led to the creation of the Indian space system had begun in 1963 with the testing of sounding rockets, but the long-term goal was to establish an indigenous space launch capacity. It is worth noticing that the Indian space programme did not have military origins, that were the case of its American and Soviet analogues; the development of the Indian ballistic missiles officially started as late as 1985[19]. Currently, all space activities are conducted under the supervision of the Indian Space Research Organization[20] established in 1969.

The Space Launch Vehicle – 3 (SLV–3), the earliest successful Indian orbital launch system experimental in itself, was first tested in July 1980 – this date marks India's emergence as a space-faring nation. Only four launches (two of them successful) were undertaken, resulting in the placing of two small satellites in orbit[21]. The next, still experimental, Advanced Space Launch Vehicle, flew four times with one success[22], but its development was terminated in 1994. The first fully operational and effective launch system, the Polar Satellite Launch Vehicle (PSLV), had been first tested in September 1993 and scored its first success the next year, on October 15. The PSLV is able to lift payloads of over 1,000 kg into orbit[23]. This is a very reliable system, already used 42 times, 39 of them with full success; many more are planned for the future[24]. By 2001, the Indian inventory of space launchers was supplemented by a much more powerful rocket, the Geostationary Launch Vehicle (GSLV), that can send a payload of 5,000 kg to the Low Earth Orbit (LEO); this vehicle is also able to place over 2,000 kg in the Geostationary Transfer Orbit (GTO). It has already managed to score 6 fully successful flights out of 11 attempted, and more are scheduled for the future[25]. The newest Indian orbital launch system, first tested in 2014, is the GLSV Mk III. Despite the name, it is essentially a new design, capable of lifting 10,000 kg to LEO and

---

[19] R. Nagappa, *Development of Space Launch Vehicles in India*, "Astropolitics" 2016, vol 14, no. 2-3, p. 158, https://doi.org/10.1080/14777622.2016.1244877 (accessed: 21.02.2018).

[20] ISRO, https://www.isro.gov.in (accessed: 24.02.2018).

[21] *SLV-3*, Gunther's Space Page, http://space.skyrocket.de/doc_lau_det/slv-3.htm (accessed: 24.02.2018).

[22] *ASLV*, Department of Space, Indian Space research Organization, https://www.isro.gov.in/launchers/aslv (accessed: 21.02.2018).

[23] R. Nagappa, *Development of Space Launch Vehicles in India*, "Astropolitics" 2016, vol 14, no. 2-3, p. 167, https://doi.org/10.1080/14777622.2016.1244877 (accessed: 21.02.2018).

[24] As of February 2018, see: *PSLV*, Gunther's Space Page 2018, http://space.skyrocket.de/doc_lau/pslv.htm (accessed: 21.02.2018).

[25] *GSLV*, Gunther's Space Page 2018, http://space.skyrocket.de/doc_lau/pslv.htm, (accessed: 21.02.2018).

4,000 to GTO[26]. Note that this rocket, already launched successfully twice with some more flights planned[27], is more powerful than the Soyuz, the Russian space "workhorse". India is also developing next-generation launch systems which will have even better capabilities.

Open source satellite catalogues indicate 50 orbital spacecrafts registered in India, out of the overall number of 1,738 active satellites. Additionally, there are three more that are registered as Indian/French and Indian/Canadian ones. Only four of Indian orbiters are labelled as "military", three are marked as "earth observation" and one as "communications". Another 44 are categorized as "government", of which 15 are "earth observation" craft including weather satellites, 16 are "communications" systems, and seven are used for "positioning"[28].

The abovementioned numbers do not fully represent the satellite capabilities that may be used for national security, including military purposes. That is why we will now describe Indian satellite constellations with respect to their functions and potential military applications. This description will follow the ISRO classification with some additional data derived from other sources.

1. The Indian National Satellite System (INSS) currently comprises 16 active spacecrafts located in the Geostationary Orbit (GEO)[29] which are suitable to carry out various tasks. Most of them are used for communications, but there are also weather satellites in the system; some of the others may perform disaster warning and support search and rescue (SAR) operations. The Indian government agencies have manufactured them in co-operation with public state-owned broadcasters. One of the satellites officially listed in this constellation, the GSAT-7, is catalogued[30] as a military one. It is a multiband communications satellite used exclusively by the Indian Navy[31].

---

[26] *GSLV Mk III*, Indian Space Research Organization 2018, https://www.isro.gov.in/launchers/gslv-mk-iii, (accessed: 21.02.2018).

[27] *GSLV Mk.3 (LVM-3)*, Gunther's Space Page, http://space.skyrocket.de/doc_lau/gslv-mk3.htm (accessed: 24.02.2018).

[28] All the numbers extracted from: *UCS Satellite Database*, Union of Concerned Scientists, 31 August 2017, https://www.ucsusa.org/nuclear-weapons/space-weapons/satellite-database# (dostep: 21.02.2018).

[29] *Communication Satellites*; ISRO 2018, https://www.isro.gov.in/spacecraft/communication-satellites (accessed: 21.02.2018).

[30] Every instance that we use the word "catalogue" it refers to: *UCS Satellite Database*, op.cit.

[31] *GSat 7, 7A (Insat 4F, Rukmini)*, Gunther's Space Page 2018, http://space.skyrocket.de/doc_sdat/gsat-7.htm (accessed: 21.02.2018).

2. The Indian Earth Observation satellite system is composed of four weather satellites, which are also part of the abovementioned geostationary constellation INSS, and 13 additional satellites with much lower sun-synchronous orbits[32]. This constellation is able to conduct various observation tasks with the use of optical and radar sensors for cartography, oceanography, and other scientific purposes. Among them, the Cartosat 2 subsystem, which currently is comprised of 6 satellites, features panchromatic imaging with 1m resolution[33], which represents the current worldwide standard. The Cartosat 2A craft is catalogued as "military", which may suggest that it is used exclusively by the military, al-though it does not differ from the other members of the family, at least officially. ISRO also lists Risat-1 and Risat-2 as earth observation satellites, which are catalogued as "military" and attributed to the Ministry of Defence. They are radar imaging systems using modern synthetic aperture sensors, of which Risat-1 is fully made in India, while Risat-2 is equipped with the more advanced radar produced in Israel[34].

3. India is currently in the final stage of the establishment of its own satellite navigation system, called the Indian Regional Navigation Satellite System (IRNSS or NavIC[35]). It currently comprises seven satellites, three on the GEO and four more on the Geosynchronous Orbit (GSO)[36]. The system is supposed to provide positioning within the distance up to 1,500 km from the borders of India, with a capability to expand in the future.

Summing up, it is worth reminding that the Indian space program is civilian in origin and has been developed as such since its inception. That is why its military component is largely underdeveloped in comparison with other space-faring nations. For example, China operates 203 active satellites; 59 of them are catalogued with the label "military" or "military/government". Such disproportion is striking, but, as we know, it stems from the Indian approach to the use of space.

---

[32] *Earth Observation Satellites*; ISRO 2018, https://www.isro.gov.in/spacecraft/earth-observation-satellites (accessed 21.02.2018).
[33] *Cartosat 2, 2A, 2B, 2C, 2D, 2E, 2F*, Gunther's Space Page 2018, http://space.skyrocket.de/doc_sdat/cartosat-2.htm (accessed: 21.02.2018).
[34] *RISAT 1, 1A*, Gunther's Space Page 2018, http://space.skyrocket.de/doc_sdat/risat-1.htm (accessed: 21.02.2018).
[35] This abbreviation may be understood in two ways: firstly, it means "sailor" or "navigator" in Sanskrit; secondly, it is an abbreviation for Navigation with Indian Constellation.
[36] *Indian Regional Navigation Satellite System (IRNSS): NavIC*, ISRO 2018, https://www.isro.gov.in/irnss-programme (accessed 21.02.2018)

3. India's Military Space – Needs and Prospects

Let us reaffirm an important fact which forms the clue to understanding India's space programme – it is an effort oriented mostly to meet national overall development demands. The pursuit of international prestige has been another important purpose. This is because advanced technology capabilities in space engineering allow India "[...] to derive soft-power benefits from various achievements in the space area"[37]. Ambitious scientific missions, specifically the most prominent interplanetary ventures of the Moon orbiter Chandrayaan-1 with its Moon Impact Probe and the Mars orbiter Mangalyaan, successfully inserted into the Mars' orbit in September 2014 and still active[38], are supposed to provide a solid proof that India is a nation which is developing fast and has great prospects in sight.

In effect, we might agree in principle that India's "[...] space policy is not comprehensive, in that it deals only with satellite communications [...] and remote sensing"[39], there is no national space doctrine in the sense of a complete, detailed set of guidelines that would contain definitions, assessments of current reality, and programs of activities related to proclaimed goals and aims. There are only two short government documents that reflect the official space strategy: Satellite Communication Policy issued in 1997 and Remote Sensing Data Policy from 2011[40]. There is also no comprehensive strategy to develop space-based military capabilities. That is why the system of national security lacks a sufficient number of purpose-built orbital applications which could be effectively used to increase the effectiveness of military operations.

This situation may be considered as at least inconvenient or even dangerous. As we have already mentioned, the security problems India faces amass quickly and become increasingly complicated. And while the ambitions and assertiveness of the Indian foreign policy grow, the requirements for various military capabilities which satellite systems may provide mount. As an Indian expert notes, "[i]gnoring the growing requirements in the security domain can be detrimental to India's strategic interests."[41] The weakness of the

---

[37] A. Lele, *Power Dynamic's of India's Space* Program, "Astropolitics" 2016, vol. 14, no. 2-3 p. 131, https://doi.org/10.1080/14777622.2016.1237212 (accessed: 21.02.2018).
[38] As of February 2018.
[39] K. K. Nair, *The Challenge of Indian National Space Policy*, "Astropolitics" 2016, vol. 14, no. 2-3 p. 177, http://dx.doi.org/10.1080/14777622.2016.1242029 (accessed: 21.02.2018).
[40] *India's Space Policy*, ISRO 2018, https://www.isro.gov.in/indias-space-policy-0 (accessed: 28.02.2018).
[41] R. P. Rajagopalan, *What's Next for India's Space Program?*, "The Diplomat", January 20, 2018, https://thediplomat.com/2018/01/whats-next-for-indias-space-program/

Indian military space program has indeed become an obstacle to the development of the country's security policy. It is especially visible once we have noticed that New Delhi is pursuing an increasingly active policy of international engagement which is supposed to elevate the country to the role of one of the leading world powers. It requires, among others, armed forces able to execute successfully complex and difficult combat and noncombat missions while relying on an effective information-gathering mechanism. Satellite systems are well suited to support many tasks as a *force multiplier* during peacetime, in crisis, or in the case of regular war. Therefore, the development of military space applications is often portrayed in India as a necessity, which also stems from the fact that China is developing the same capabilities which must be offset accordingly. As another expert clearly states:

> "SSA[42] and a robust C4ISR[43] are the main pillars for a space strategy for India. Achieving parity in SSA and C4ISR with other major players is a critical priority. The technology gaps will have to be addressed, along with the organizational and institutional bottlenecks that currently pervade the Indian national security complex. This is an internal challenge that is significantly more complex than any challenge from the outside. Major structural changes to deal with the changes in the connections between space assets, nuclear war, and conventional war are needed. The role of space assets via the C4ISR route is the driver of this reorganization."[44]

Incorporating space-based capabilities into the list of security issues which have been presented above – confined to military problems with the exclusion of other dimensions – we could notice the following benefits:

- Nuclear weapons of China and Pakistan – space assets may be used as means of Intelligence, Surveillance and Reconnaissance (ISR), facilitating the assessment of the quantity and readiness of the enemy's nuclear forces; they may also significantly contribute to the early warning; robust capability in that field would also foster the effectiveness of the deterrence policy, convincing the enemies that India is aware of their capabilities and ready to respond accordingly;

---

[42] Space Situational Awareness.
[43] Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance.
[44] S. Chandrashekar, *Space, War, and Deterrence: A Strategy for India*, "Astropolitics" 2016, vol. 14, no. 2-3, p. 152, https://doi.org/10.1080/14777622.2016.1244747 (accessed: 21.02.2018).

- Conventional arms balance *vis-a-vis* Pakistan – as noted in the paragraph above, ISR capabilities may contribute to the gathering of information about the opponent's overall potential and force build-up, thus revealing his intentions; however, because of the absence of similar capabilities in the adversary's inventory, it may unsettle Pakistan and make it think that India is gaining advantage and is preparing a first, preemptive strike;

- Chinese military potential in the regions neighbouring China – with respect to that effect is similar to that presented above, with one difference stemming from the fact that China's space ISR capabilities are well established;

- Effectiveness of India's own armed forces as a deterrent and as a warfighting tool, capable of conducting extensive non-combat operations as well – there is no need to enumerate all the benefits of space systems acting as a *force multiplier*, it is a well-known issue demonstrated for the first time in full during the operations Desert Shield and Desert Storm in the Persian Gulf in 1990 and 1991; in the modern world, space-borne assets are indispensable in every military combat or non-combat activity;

- the effective control of the Indian Ocean – in connection with the abovementioned role of supporting the military purpose-built military observation and communication orbital assets may be of a decisive advantage in a tug-of-war for the control over that vital area;

- Irregular warfare and counterterrorism – signals intelligence gathered by purpose-built military satellites, together with means of disruption of communications and observation capabilities may be crucial for the foiling of attacks, ousting rebels from their strongholds and neutralizing terrorists.

Therefore, if the national security of India is to benefit from the country's own technological prowess, shortcomings in several crucial areas must be addressed. According to a noted Indian expert, the following capabilities need to be augmented:

- given that space situational awareness, that means the ability to track space objects to identify and quantify potential threats, is highly insufficient, this requires the creation of a robust network of ground-based radar and optical tracking devices;

- The space-borne segment of C4[45] system consists in fact of just one dedicated communications satellite, and it is necessary to augment it by advanced systems; three geosynchronous satellites for each service, augmented by a constellation of smaller satellites operating at lower orbits would be the most practicable solution for that purpose;
- space-based ISR assets are also mostly of civilian origin and need replacement preferably by constellations of smaller satellites that would be more robust; what is more; there is virtually no ELINT[46] satellite cluster, and that a serious gap should be addressed as well;
- India should also place telemetry, tracking, and command satellites in space to relay information from other orbital systems, and should also augment its weather reporting structure by supplementing existing geostationary satellites with the ones operating on polar orbits.[47]

The abovementioned list of needs shows that India should pursue a more assertive space security policy to derive benefits from the use of space applications adequate to evolving security requirements and to secure space-borne capabilities for their unhindered use. This requires concentrated effort and generous funding for all necessary systems. Some estimates hold that India needs over 120 satellites (except for a proposed swarm of smallsats[48]) for military purposes – some dual-use, like radar and optical observation, weather, or navigation crafts, but most of them purpose-built C4, ELINT, or military communications satellites[49]. We may surely deem this proposal "plan maximum" designed for many years of execution, unrealistic in fact. However, on the other hand, it defines the needs according to requirements analyzed against a background of the strategic reality and with technical capabilities and political requirements in mind. It is, therefore, an indication of real needs from a purely military point of view and clearly informative as such.

_____

[45] Command, Control, Communications, Computers.
[46] Electronic Intelligence – information gathering by means of receiving and analyzing electromagnetic emissions.
[47] S. Chandrashekar, op.cit., p. 139-146.
[48] SmallSat – according to NASA definition the satellites weighing less than 180 kg. Single smallsats do not possess extensive capabilities but arranged in vast constellations may be very useful, perhaps more than powerful multi-tone conventional crafts. See: *What are SmallSats and CubeSats?*, NASA, February 26, 2015, https://www.nasa.gov/content/what-are-smallsats-and-cubesats (28.02.2018).
[49] S. Chandrashekar, op.cit., p. 151.

4. Conclusions

It is rather clear that the current level of utilization of space systems for military purposes by India is very low in relation to the engineering potential of the country. Only four purpose-built military satellites, and some dual-use but primarily civilian ones in addition may be considered just a demonstration of the technology, not a real asset that could make a real difference for India's security. On the other hand, there is an increasing need to augment the military space components since security challenges have grown in number and significance and activeness in foreign policy has also been on the rise.

An expansion of the Indian military space capabilities is crucial because growing aspirations and amounting problems require more active use of the military to promote the country's interests. The Indian armed forces are poised to fulfil not only their leading combat role of deterrence and defence, but the military must also actively support foreign policy with non-combat missions or low-level combat engagements of a different kind. Other countries' experience shows that satellite systems are crucial for increasing the effectiveness of militaries in all of their missions. India, as a leading power, must not lag behind others in space applications dedicated for military purposes. It is because India without these capabilities will not be able to compete with other countries, especially with China. Therefore, C4 capabilities, specifically wide-band military communications and ISR assets, are necessary to assess an adversary's potential. Efficient control over the Indian Ocean and adjacent straits is also difficult or even impossible without space assets. All of this is not a folly of military planners or overoptimistic space enthusiasts but a strategic necessity.

Despite all these arguments, India still does not have any comprehensive space policy, let alone a partial program for the military use of space. However, many aspects of space security are being contemplated by the government, including such sensitive issues as the weaponization of space[50] prompted by a Chinese anti-satellite test conducted in 2007. That is why the development of similar indigenous weapons systems began in 2010. Of course, India is still refining its capabilities, the development of new generation of observation satellites of the CartoSat and Risat families, and on follow-on communications systems are being pursued. India is also augmenting its international co-operation in space,

---

[50] M. Aliberti, _India in Space: Between Utility and_ Geopolitics, Cham 2018, pp. 182-185.

most notably a fifty-year-old[51] collaboration with France. Additionally, the formal agreement on the co-operation between NASA and ISRO was signed in 2008[52]. The most recent example is a rapprochement with Japan that entails strong references to space co-operation[53].

However, still, all abovementioned developments do not translate into prospects of a rapid increase of Indian military capabilities. Neither we should also expect any quick expansion of New Delhi's military space programmes, as the space effort will remain oriented mostly towards the needs of overall development of the nation. Therefore, the Indian military space capabilities will remain in the foreseeable future, below the requirements generated by the evolving security environment.

[51] A. Lele, _Space Collaboration between India and France -Towards a New Era_, Asie.Visions 78, Center for Asian Studies (Institut français des relations internationales), September 2015, https://www.ifri.org/sites/default/files/atoms/files/av78_lele_space_collaboration_india_france_final.pdf (accessed: 28.02.2018).

[52] _Framework Agreement Between the National Aeronautics and Space Administration and the Indian Space Research Organization for Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes_, U.S. Department of State, 2008, https://www.state.gov/documents/organization/108925.pdf (accessed: 28.02.2018).

[53] _India-Japan Joint Statement during visit of Prime Minister of Japan to India (September 14, 2017)_, Ministry of External Affairs, Government of India, September 14, 2017, http://www.mea.gov.in/bilateral-documents.htm?dtl/28946/IndiaJapan+Joint+Statement+during+visit+of+Prime+Minister+of+Japan+to+India+September+14+2017 (accessed: 26.02.2018).