

The background features a large, stylized 'V' on the left and a large '9' on the right, both in a light green color. The 'V' is composed of several thick, parallel strokes. The '9' is also composed of thick, parallel strokes, with a circular top and a curved bottom. The overall design is modern and graphic.

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Cezary Smuniewski*

**“The Universe is a labyrinth
made of labyrinths”
Observations Made when Read-
ing Radosław Bielawski’s Book
“Potęgometryczny wymiar mili-
taryzacji przestrzeni kosmicznej”**

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Abstract

Militarisation of outer space is a rapidly developing area of research that is one of the most urgent challenges faced nowadays by the security scholars. The article concerns scientific research made by Radosław Bielawski and presented in his book “Potęgometryczny wymiar militaryzacji przestrzeni kosmicznej” [Powermetric Dimension of Outer Space Militarisation]. The text presents the layout of the monograph and a detailed description of the research process. It also contains conclusions and prospects for future research. There are also references to the texts authored by Stanisław Lem. The paper fits into the area of research on security studies.

Keywords

outer space, outer space security, outer space militarisation, Stanisław Lem

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Introduction

Radosław Bielawski's book "Potęgometryczny wymiar militaryzacji przestrzeni kosmicznej" [Powermetric Dimension of Outer Space Militarisation] has just been released on the Polish publishing market.¹ When setting about the reflection and review of that monograph, which I do with great curiosity, the following words from Stanisław Lem's (d. 2006) novel "Fiasco" come to my mind: "The Universe is a labyrinth made of labyrinths. Each leads to another."² Those sentences provoke exceptional attention when reading the monograph written by the young Scientist, who – perhaps – invites us to enter the labyrinth of labyrinths. Invoking the words of the eminent Polish writer, who incessantly enjoys great authority among millions of readers, I would like to express great appreciation for Radosław Bielawski, who has ventured to deal with a topic that is not only vast, but also extremely precarious scientifically. For a fuller picture, let us add that this is not the first publication of the Polish scientist in which he reveals his interest in outer space security.³ The very title of the monograph – "Powermetric Dimension of Outer Space Militarisation" – arouses its reader's awe. The monograph is composed of eight chapters, the titles of which seem perfectly to illustrate the intention and scientific orientation of the Author: Chapter 1 – "Identification of contemporary weapons used against space-based systems and classification of contemporary military space-based threats"; Chapter 2 – "Militarisation and weaponisation of outer space by the United States of America"; Chapter 3 – "Militarisation and weaponisation of outer space by the Russian Federation"; Chapter 4 – "Militarisation and weaponisation of outer space by the People's Republic of China"; Chapter 5 – "Militarisation and weaponisation of outer space by the Islamic Republic of Iran"; Chapter 6 – "Militarisation and weaponisation of outer space by the Democratic People's Republic of Korea"; Chapter 7 – "Militarisation and weaponisation of outer space by the Republic of India"; Chapter 8 – "Estimation of powermetric indices". For carrying out an analysis according to the division demonstrated in the table of contents, the author needed to specify unequivocally what space-based weapon is. Thus, he assumed that space-based weapons include kinetic physical and non-kinetic physical means of warfare that may be used to impact space assets deployed both in the outer space segment, as well as the ancillary ground and user segments. Elements of space-based systems can nowadays be impacted with four types of weapons: kinetic, non-kinetic, electronic and cyber weapons. As the author assumed, the feature differentiating those types of weapons include: effects attained (destruction), technological advancement level, as well as activation of resources needed for their deployment and use.⁴ The clarifications made by Bielawski correspond with the works of other experts, the most note-

1. R. Bielawski, *Potęgometryczny wymiar militaryzacji przestrzeni kosmicznej*, Wojskowa Akademia Techniczna 2022.

2. S. Lem, *Fiasco*, transl. M. Kandel, Harcourt Brace Jovanovich 1988, p. 116.

3. R. Bielawski, M. Polkowska, *Organisational, Military and Legal Aspects of Space Security*, Wydawnictwo Akademii Sztuki Wojennej 2020.

4. R. Bielawski, *Potęgometryczny wymiar...*, op. cit., p. 26.

worthy of whom are: Todd Harrison, Kaitlyn Johnson, Joe Moye, Thomas G. Roberts, Tyler Way, Makena Young, Nicholas Wood, Alyssa Goessler.⁵

The reviewed monograph is an effect of research the main objective of which was to assess the state and define the directions of studies on militarisation of weaponisation of outer space by selected countries. The cognitive (theoretical) purpose has been for the Author to expand and organise knowledge as well as specify the state of militarisation and weaponisation of outer space. On the other hand, the practical (utilitarian) objective was to elaborate quantified numerical values as a proposal to determine the power-generating factors and variables of the models representing the newly created area of warfare – outer space. Given so demarcated direction of his quest, Bielawski defined the main research problem, which he formulated as a question: What is the present state of militarisation and weaponisation of outer space? This problem is accompanied by an adequate working hypothesis: “It is assumed that there is a relationship between the degree of advancement of outer space militarisation and the power of state in that a state that enjoys a high Power Index score and considerable military capabilities also has a high degree of militarisation and weaponisation of outer space.”⁶

In the process of his scientific inquiries, Radosław Bielawski rightly utilised theoretical and empirical research methods. As regards theoretical methods, he used analysis and synthesis. First of all, he completed an analysis of the sources dedicated to the description of space-based weapons. Then, he performed a logical breakdown of the researched contents into their constitutive elements and determined the interactions between individual decomposed elements of research. Synthesis was used to both put together all of the previously analysed elements as well as allowed for discovering interrelations between individual components of the whole issue. Another set of theoretical methods used by Bielawski included induction and deduction. In the first place, he employed induction in order to present the collected data on space-based weapons in possession of the selected state actors – its stockpiles and development levels. In this manner he created a database of similar cases. This step made it possible to employ the method of facts-based deduction and an analysis of the occurrences of the outer space militarisation and weaponisation process. Such use of induction and deduction proved to be complementary. In general, it helped determined the rules regulating the process Bielawski was interested in. Insofar as the above described methods seem to be obvious and are frequently encountered in scientific papers, the historical-logical method used by the Author is not.

5. See: T. Harrison, K. Johnson, M. Young, et al., *Space Threat Assessment 2022*, A Report of the CSIS Aerospace Security Project, Center for Strategic and International Studies 2022; T. Harrison, K. Johnson, J. Moye, et al., *Space Threat Assessment 2021*, A Report of the CSIS Aerospace Security Project, Center for Strategic and International Studies 2021; T. Harrison, K. Johnson, T.G. Roberts, et al., *Space Threat Assessment 2020*, A Report of the CSIS Aerospace Security Project, Center for Strategic and International Studies 2020.

6. R. Bielawski, *Potęgowymetryczny wymiar...*, op. cit., pp. 15–16.

Research methodology and results

This solution that requires much precision consisted in the description of the facts in keeping with their logical development. Thanks to this move, it was possible to make a summary of data concerning the development of individual types of weapons used in outer space. Let us stop here before we pass to presenting other research methods employed by the Scholar. The choice of the historical-logical method is worth of special praise. It allowed to describe the facts basing on their logical development along the time axis, which made the presentation of collected, summarised and analysed data transparent and precise. Let us now return to presenting other research methods. Therefore, the analogy consisted in searching for interrelationships and common areas in similar phenomena. Thanks to its application it was possible to present similarities in the researched material. From the viewpoint of attaining the cognitive objective, it was important to use the method of systematisation, thanks to which an attempt was made to organise the collected data on militarisation and weaponisation of outer space. In turn, the use of the induction method allowed for formulating conclusions as regards further work and directions of military development of outer space.

The above theoretical research methods may be considered as a background for those employed by Radosław Bielawski at the later stage of research analysis. In the process of modelling power-generating indices, he used the analysis of existing data, which is pretty obvious and at the same time right. It is by no means surprising, that the source of this data were chiefly reports on space matters. This method boils down to investigating data sources, including in particular their compilation, mutual verification and processing. In order to attain high research effectiveness, those methods were used to determine the following conceptualisation: "the so-called zero audit (identification of available data sets, indices and objects, identification of the researched time period), elaboration of a set of potential variables, preparation of a data set, exploration of data, analysis of data relevant for implementing the research project, analysis of trends of fundamental characteristics associated with the research object. In addition, used were the methods of the analysis of time series, including the trend model (linear, non-linear), indices of dynamics, mean rate of changes, multidimensional comparative analysis of the present results as compared with global data. The resultant effect was the assessment of the state of research on militarisation and weaponisation of outer space."⁷

Apart from theoretical methods, Radosław Bielawski also used empirical methods in his research. In the first place, already at the stage of preliminary investigations, he used the dialogue methods, participant observation and IDIs with Professor Mirosław Sułek. The owing to so planned conceptualisation the Author could construct his own original power-generating indicators. The ac-

7. Ibidem, p. 17.

quired detailed information were used as the input data for modelling by the Delphi method and the factor analysis method. The former was used to determine the quantified values of proposed power-generating factors referring to the space element, whereas the latter was used to reduce the number of variables in order to optimise the model.

The reviewed monograph features an extensive range of methodological tools used by the Researcher in order to get to the roots of the researched issue. This wealth should be recognised as a permanent equipment of the scientist allowing him to carry out research in various areas of social sciences, the security studies in particular. The latter require ever more courage from their "masters" in reaching for the achievements of other scientific domains and disciplines.

Radosław Bielawski's work fits into the new directions of research, into the new areas of exploration and inquiries. The invoked or discussed documents, studies and views of various researchers were selected primarily from the viewpoint of their relationship with the securitological/space-based/semantic problem area presented by the volume under review. The selection of sources reveals indubitable respect of the Author for earlier scientific accomplishments in the area of space exploration as well as their useful gradation. He was absolutely right going beyond the works of military provenance in his selection of sources. He looked for contents in the research and analyses of scholars dealing with law, communications, physics and other sciences. He reached to specialised literature concentrated on the issues associated with outer space, where he searched for and found larger and smaller elements of knowledge that could be useful for buildings a narration focused on what was of direct interest to him – the securitological view of the powermetric dimension of outer space militarisation.

The aim of the investigations, research methods and sources indisputably placed the monograph among the studies in the area of social sciences, and more precisely – the security studies. The very motif of security was treated by Bielawski as a background for in-depth analyses and investigations, which repeatedly reminds the reader that it should be looked at in multiple contexts. Thus, the monograph takes into account the context of security,⁸ increasing the security of satellites, in particular satellite systems,⁹ military and civilian security services,¹⁰ national security systems, security policy vis-à-vis space-based systems supporting national security, protection and security of satellite systems used for safeguarding national security, accreditation of cybersecurity, policy of cybersecurity of space-based systems supporting national security, potential violations of security,¹¹ change

8. Ibidem, p. 14.

9. Ibidem, p. 31.

10. Ibidem, p. 33.

11. Ibidem, p. 37.

of the security environment determined by acquiring military capabilities in outer space by Russia and China,¹² NATO security,¹³ outer space security, military doctrine of US space force, maintaining a high level of international security and its stability as a guarantee of holding off any aggression and protection of national interests,¹⁴ threats to security associated with space debris.¹⁵ Let us stop in this place to give the floor again to Stanisław Lem, who in "The Star Diaries", and more precisely in the chapter entitled "The Twenty-first Voyage", first published in 1971, wrote among other things about trash in outer space: "[There were] three principles which enabled one, infallibly, to locate highly advanced societies. These were the Laws of Trash, of Noise, and of Spots. Every civilization at the technological stage gradually finds itself up to its ears in garbage, which causes tremendous problems, until the dumps are moved out into cosmic space put – moreover – in a specially designated orbit, to keep them from getting too much in the way of the astronauts. In this fashion one obtains a growing ring of refuse, and it is precisely its presence that indicates a higher level of development."¹⁶

Let us now return to Radosław Bielawski's text. It is easy to notice that he described the issue of security in various ways and from many points of view. He problematized the issues he was interested in on many levels, compared the data that would seem incomparable – militarisation and weaponisation of outer space by the following countries: the United States of America, Russian Federation, People's Republic of China, Islamic Republic of Iran, People's Democratic Republic of Korea and Republic of India. It was no doubt his investigative passion, though also thoroughness of the analyses that led him to the reflection on estimation of powermetric indices (cf. Chapter 8). In that chapter, which should be seen as the crowning of earlier in-depth considerations, the Author presented "a proposal for assumptions to the modelling of power-generating factors and variables relating to outer space."¹⁷ I see this fragment as the starting point for further research carried out by Bielawski. I encourage the young Scientist to elaborate subsequent texts providing the readers with the results of observations as well as summaries of the activities and development of individual actors in outer space. Bielawski noticed something that is very important: "From the analysed four contemporary powermetric models and eight publications – powermetric reports and ranking it follows that despite a considerable degree of development with respect to the military capabilities of state actors, a presentation of their space resources as a value affecting state power or military might is missing. This should be noted, all the more so that some of the analysed states do have space military units in the structure of their armed forces (People's Republic of China), while others distinguish them as a separate kind of the armed forces (United States, Russian Federation). Therefore, it would be a logical move to expand (update) the available models with such features. One of the invoked powermetric

12. Ibidem, p. 51.

13. Ibidem, p. 53.

14. Ibidem, p. 54.

15. Ibidem, p. 55.

16. S. Lem, *The Star Diaries*, transl. M. Kandel, Mandarin 1990, pp. 166–167.

17. R. Bielawski, *Potęgowymetryczny wymiar...*, op. cit., pp. 194–201.

models – the Orłowski model – contains military potential, which accounts for 1/4 of the estimated power of a state. It is divided into three kinds of armed forces: the land force, the air force and the navy in an equal proportion of 1/3 each. Assuming the decomposition and their current division into five kinds of armed forces (e.g. according to NATO) and the ensuing five operational domains, such model should be updated. The estimations of the power of state would be undoubtedly more objective with such an approach. In the analysed model, only the Hafeznia approach refers to space-based resources. From among 86 variables, it indicates only three outer space variables, which refer to the number of satellites owned by a state. They refer to all satellites of a state: communication and research satellites. The third factor is the number of satellites of military application.”¹⁸ The facts noted by Bielawski, which undoubtedly require profound reflection and a change in the approach to thinking about the power of the actors on the global arena, are underlain by the following causes: “The powermetric reports and ranking studies usually focus on state actors, and in much rarer cases both state and non-state actors are analysed together. The publications provide little information on new battle grounds – outer space or cyberspace. They are usually based on hard numerical data, e.g. the GDP, number of troops, quantity of military equipment – aircraft, tanks, submarines and other equipment. Half of them (four reports) present the international balance of forces (e.g. Power of States Index Ranking or 2025 Global Governance Ranking). The majority of the reports do not include the fact of having nuclear weapons in their models and estimations (it is included in the RAND Corporation’s *Measuring National Power*).”¹⁹ After this statement one would be inclined to say – alas! On the positive side, it is good that Bielawski noticed it. The development of power actors capable of waging wars in outer space must not escape the scrutiny of securitologists. Future wars in outer space will certainly be something bigger than the armed conflicts between states or international coalitions that we know. Therefore, their magnitude should be seen without losing sight of the boundlessness of their site.

Assessing the implementation of the research process carried out by Bielawski it should be stressed that the young Scientist proved that the states with a large power index and considerable military capabilities also have a substantial potential to militarise and weaponise outer space. Making a comparison of the largest state powers and superpowers the Author noticed that there was full analogy of their military potential with the possession and development of a high degree of militarisation and weaponisation of outer space. He rightly included the following state actors in this group: the United States of America, Russian Federation, People’s Republic of China and Republic of India.

18. Ibidem, p. 199.

19. Ibidem.

As regards the novelties of the reviewed monograph, there are three issues that should without doubt be distinguished. First, the Author responded to the new scientific demand and successfully synthesized the knowledge on the powermetric dimension of outer space militarisation. Secondly, he effected a unique compilation of data on militarisation and weaponisation of outer space for the following entities: the United States of America, Russian Federation, People's Republic of China, Islamic Republic of Iran, People's Democratic Republic of Korea and Republic of India. This compilation allowed him to make a praiseworthy research move – an analysis of “the development of space-based capabilities” in the power states. Thirdly, a novelty of the monograph is the submitted proposal of assumptions for modelling power-generating factors and variables with respect to outer space. Bielawski's investigation expands the research field of security studies and opens up new prospects. I decidedly support the recommendation formulated by the Author in the final part of the monograph under review. The Researcher recommends the need in the forthcoming future to work out rankings concerning space-based capabilities of state and non-state actors, as well as update the existing powermetric models for the structural development of the armed forces of states.²⁰ Indispensable for this project may be the quantified values of power-generating variable of the space power factor proposed by Bielawski on the basis of the assessment of the capabilities developed by individual actors. This example shows that Bielawski's research opens up a new path to collaborations of scientists: securitologists, politologists and all others occupied with international relations. Undoubtedly, their efforts will have to be supported by specialists in the area of engineering and sciences.

Radosław Bielawski very convincingly and confidently expresses his own opinions. Worthy of much praise is e.g. the following statement made by the Author: “Nuclear capabilities are an element of the projection of strength and military deterrence. From the political-military point of view, an important direction is the establishment and development of the military structures of the armed forces the operational area of which is outer space. An example is the newly set up United States Space Force and its acquiring military space power. The subsequent development directions involve building of situational awareness as well as the expansion and improvement of local and global satellite systems, which are required to be very precise, resistant to interference and independent of other states.”²¹ Similarly, another fragment of Bielawski's study testifies to his clear scientific convictions and the certainty of his opinions. “The results of powermetric studies may be treated as validation of the proposed power-generating indices and variables. Evident is the analogy between the strength of a state and its space power. States with a high power status also have advanced space technology (space-based weapons), which allows them to make much progress in the process of militarisation

20. Ibidem, p. 207.

21. Ibidem.

and weaponisation of outer space and specific advantage in this type of warfare. However, states characterised by a high militarisation index are not states with the largest and most developed capabilities in the area of militarisation and weaponisation of outer space.”²²

However, not the entire monograph by Radosław Bielawski may remain free from any criticism. First, I believe that the Author passed in silence the Polish arena of efforts for security implemented in the context of outer space. From the viewpoint of the Polish reader it is a noticeable shortcoming, while the text of the monograph was written in the Polish language. Let us add that under a decision of the Minister of National Defence the Plenipotentiary of the Minister for Outer Space has been appointed.²³ Its competences include international cooperation, in particular “elaboration of the Guidelines of the Minister of National Defence as regards implementation in the area of national defence of the NATO space policies concerning strategic, operational and industrial-scientific planning.”²⁴ It should be expected that Bielawski will shortly publish the recommendations, directions of activity and prospects for utilisation of the Polish scientific potential for space security. Polish universities should get a clear message as regards the directions of research in this area, for instance through the National Centre for Research and Development. Secondly, Bielawski did not dare present a forecast for the future as regards the subject of the monograph. Having read numerous detailed analyses the monograph is full of, I would like to learn “What’s next?”, “What can we expect in the future?” Meanwhile, the Author suggest merely future directions of research, which – let us add – are by all means legitimate. After all, he can afford leaning into the future through forecasts since he outlined “the proposal of assumptions for modelling outer space power-generating factors and variables,” including “the guidelines for estimating outer space power-generating indices and variables.”²⁵ It seems that Bielawski’s shortcomings of this kind may be justified hoping that the Scholar will shortly publish subsequent texts on this subject. I have in mind here not only scientific but also popular texts Works oscillating around the subject of space security may contribute to popularisation and interdisciplinary perception of research in the area of Poland’s national security as well as the power and indispensability of supranational alliances.

22. *Ibidem*.

23. See: Decyzja Nr 66/MON, z dnia 15 maja 2020 r. w sprawie ustanowienia Pełnomocnika Ministra Obrony Narodowej do spraw przestrzeni kosmicznej, Dziennik Urzędowy Ministra Obrony Narodowej, Warszawa, dnia 18 maja 2020 r., Poz. 82, [Decision No. 66/MON, of 15 May 2020, concerning the appointment of the Plenipotentiary of the Minister of National Defence for Outer Space, Official Journal of the Minister of National Defence, Warsaw, 18 May 2020, item 82].

24. *Ibidem*, § 2.2.2.

25. R. Bielawski, *Potęgometryczny wymiar...*, op. cit., pp. 197–198.

Excursus

As an excursus to the review monograph entitled “Powermetric Dimension of Outer Space Militarisation”, let us invoke the words of Stanisław Lem, who has been perhaps the greatest Polish representative of hard science fiction, that is the subgenre of science fiction which puts a stress on science and technology, outlines many technical details. Let us first refer to “Solaris”, a novel first

published – which is probably important given the subject we are interested in – by the Ministry of National Defence Publishers in 1961. The futurologist and philosopher wrote the following in that book: “We take off into the cosmos, ready for anything: for solitude, for hardship, for exhaustion, death. Modesty forbids us to say so, but there are times when we think pretty well of ourselves. And yet, if we examine it more closely, our enthusiasm turns out to be all sham. We don’t want to conquer the cosmos, we simply want to extend the boundaries of Earth to the frontiers of the cosmos. For us, such and such a planet is as arid as the Sahara, another as frozen as the North Pole, yet another as lush as the Amazon basin. We are humanitarian and chivalrous; we don’t want to enslave other races, we simply want to bequeath them our values and take over their heritage in exchange. We think of ourselves as the Knights of the Holy Contact. This is another lie. We are only seeking Man. We have no need of other worlds. We need mirrors. We don’t know what to do with other worlds. A single world, our own, suffices us; but we can’t accept it for what it is.”²⁶ The motif of the Cosmos was particularly close to Stanisław Lem. It also appears in “Mortal Engines” first published in 1964. Provoking are the words of the sage that were listened to with fury by King Globares (“King Globares and the Sages”): “Behold and hearken! (...) I am speaking here of everything that exists, on other words the Universe. Yet if you thing upon it, O King, you will see...”²⁷ I am quoting the words of Stanisław Lem since I am deeply convinced that thinking about security, about a secure future, the challenges faced by security studies, we have to reflect on the Cosmos. It has to be seen as our future, perhaps salvation from Earth, but also a constant encouragement to look farther than what can be seen with a naked eye, what we already know. It should be seen as an object of the ongoing conquest, which means that potential future wars in outer space must be taken into account. Passing from fiction to the real world is already known and described in security studies. In his book “A New Magnificent Soldier, Biotechnological Revolution and War in the 21st Century”, Łukasz Kamiński wrote as follows: “when I try to visualise an American soldier of the future I see the heroes of the world created by William Gibson in his cult cyberpunk novel “Neuromancer” (1984). He will be like Case – the main protagonist and a hacker – not only immersed in the virtual world of digital communication in real time, because this has already become true, but also reconfigured with the use of pharmaceuticals, bionic implant and genetic interventions. In Gibson’s world, technically upgraded people become super-creatures. The Americans want super-soldiers. (...) When I read Gibson and other authors of science fiction it is as if I was reading a description of «a new magnificent soldier», the creation of which is the goal of intense efforts of the Americans, and whose coming seems ever more realistic in the forthcoming future.”²⁸ It is worth stressing that Łukasz Kamiński published his book almost a decade ago. It is a very long time for science, the development of technology and armaments. Returning to the reflec-

26. S. Lem, *Solaris*, transl. J. Kilmartin, S. Cox, A Harvest Book 1987, p. 72.

27. S. Lem, *Mortal Engines*, transl. M. Kandel, Penguin Books 2016, p. 103.

28. Ł. Kamiński, *Nowy wspaniały żołnierz. Rewolucja biotechnologiczna i wojna w XXI wieku*, Wydawnictwo Uniwersytetu Jagiellońskiego 2014, pp. 11–12.

tion of Bielawski’s monograph, it should be unequivocally stated that there will be no security for an individual, national security, without security in outer space.

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