

Book Review

Radosław Bielawski (2022) *Potęgometryczny wymiar militaryzacji kosmosu*. Warsaw: Military University of Technology,
256 pp., ISBN 978-83-7938-348-1

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Published: 1 August 2022

Citation: Radomska, A. (2022) 'Radosław Bielawski (2022) *Potęgometryczny wymiar militaryzacji kosmosu*. Warsaw: Military University of Technology, 256 pp., ISBN 978-83-7938-348-1', *Security and Defence Quarterly*, 40(4), pp. 91–94.
doi: [10.35467/sdq/151841](https://doi.org/10.35467/sdq/151841)

The militarisation and weaponisation of space is an issue gaining importance in the scientific debate along with the increased activity of state and non-state actors in extraterrestrial space. The militarisation process is identified with launching artificial space objects from the Earth's surface and then placing them in orbits around the Earth. These are usually dual-use technologies that can be exploited in both military and non-military sectors. Their public availability has a stabilising effect on international relations. On the other hand, weaponisation is a sequence of activities focused on the deployment of weapon elements on Earth that can strike space infrastructure or space directly. The offensive nature of weaponisation can lead to deterioration of international relations. In 2019, order to adapt to the current security challenges, space was recognised by the North Atlantic Treaty Organisation's member states as the fifth domain of military action alongside dimensions such as land territories, sea territories, air space and cyber space.

Taking into account the above, the book *Potęgometryczny wymiar militaryzacji kosmosu* perfectly fits into the interdisciplinary approach of security sciences, combining an up-to-date review of English and Polish literature and practical methods for estimating potentiometric indicators relating to militarisation and weaponisation aspects of the space domain. The book under review fits into a relatively new area of security – space security – and is a complete study of the issues involved. Three criteria will be assessed: the structure

of publication adopted by the author, the content it contains, and its relevance to contemporary scientific practice in the field of security sciences. It consists of three main parts. The first addresses issues related to the identification of weapons directed against space assets and the resulting new sources of military threats originating from space. The second relates to militarisation and weaponisation of space by world powers. The third takes into account the practical dimension of the estimation of potentiometric indicators in the conditions of space weaponisation. These thematic blocks are contained in four separate chapters. The publication features a conclusion and an extensive appendix that contains details of attacks made against technical components of space systems in the period 1977–2019.

In the first chapter, the author develops a conceptual and meaningful framework that includes the most important definitions related to space and the artificial objects in it. The terms included therein make it easier to properly understand the content presented later on.

The second chapter includes the author's efforts to identify the weapons used against space infrastructure and contemporary types of space-based military threats. Space weapons are defined and distinguished into kinetic, non-kinetic, electronic and cyber weapons, as in contemporary literature in English. Following this basic classification, the author provides examples that are adequate for the adopted division, which means that knowledge about the possibility of their application in the process of weaponisation of outer space can be systematised. Faced with attempts to classify military threats in space, the author uses an analytical approach. On the basis of events that occurred between 1977 and 2019, a useful categorisation of threats and their sources are determined, taking into account the types of weapons used during attacks on space assets. The bar graphs showing the percentages offer added value. The most significant section in this part of the publication includes the formulated methods for reducing the effects caused by space-based military threats.

The third chapter of the evaluated publication is one of the leading substantive parts. It is also the most extensive, as it consists of six subchapters, each of five or six points. The author uses case studies of selected countries such as the United States, the Russian Federation, the People's Republic of China, Iran, the Democratic People's Republic of Korea, and India to determine the developmental directions of militarisation and weaponisation of space by the most active state actors. The same independent variables were adopted for each of them regarding the necessary capabilities to undertake an arms race in space. The following are distinguished: political aspects, kinetic, non-kinetic and electronic, and cyber weapons capabilities. The approach used makes it possible to distinguish the determinants of efforts to militarise and weaponise the space domain, as well as to review current information on them such as the current state of space weapon development and the formation of political conditions conducive to the weaponisation of space. By defining the independent variables, it is also possible to concretise a unified pattern of conduct in the effort to dominate a given astrostrategic region of space through the military capabilities possessed or acquired in the future.

The fourth chapter addresses methods for estimating potentiometric indicators in the context of militarisation and weaponisation of the space domain. It constitutes the second leading substantive part, which consists of six subchapters. The author refers to the possibility of practical application of the issues related to powermetric and poweronomic. Due to the fact that no useful way of quantifying power-generating indicators in the space domain has emerged so far, the author puts forward his own proposal in this area, which may both set a new direction for the development of poweronomic and powermetric as well as provide a basis for formulating future assumptions on the military capabilities of states in space by means of numerical data. The author approaches the powermetric issues in

two dimensions; first, he presents selected multivariate models (Hafeznia, Sułek, Orłowski, Power of States Index), and then refers to contemporary powermetric reports and rankings, which include The Military Balance, Global FirePower, RAND Corporation, the Global Militarization Index, the Global Cybersecurity Index, among others. This has translated into a structuring of knowledge in this area and a review of key powermetric summaries.

In the literature in English, the issue of the arms race in the space domain is much more frequently discussed, with a distinction being made between the militarisation process and the subsequent weaponisation of space. The publication *Dual-use conundrum: Towards the weaponization of outer space?* (Pražák, 2021) can be offered as an example. Counterspace operations to protect space assets during the creation of military capabilities in space by state actors are an increasingly common subject of scholarly consideration. Detailed reflections in this area are contained in a manuscript entitled *Counterspace Operations and Nascent Space Powers* (Shabbir and Sarosh, 2018). Researchers also evaluate the effectiveness of using space-based weapons during military operations, which can be found in a book entitled *Assessing the military utility of space-based weapons* (Spacy, 2003). The radical and dynamic changes occurring in space, which is becoming a contemporary military battlefield, should be viewed as a complex ecosystem of interchangeable relationships, as noted in a publication entitled *What Is New Space? The Changing Ecosystem of Global Space Activity* (Paikowsky, 2017). Among the publications addressing the legal status, organisational aspects and possibilities of conducting military activities in the space domain, it is worth mentioning the paper *Organisational, military and legal aspects of space security* (Bielawski and Polkowska, 2020). In turn, the consideration of human activity in space from the perspective of shaping international relations can be read in the manuscript *Theory of spacepower – a brief introduction* (Czajkowski, 2017).

The paper *Potęgowymetryczny wymiar militaryzacji kosmosu* not only has a coherently presented substantive content, but also stands out for its high scientific value. This is indicated by its ability to formulate synthetic conclusions for each chapter, the footnotes, in which the author provides an explanation or expands certain terms and classifications, and numerous sources of English and Polish literature. An alphabetical list of the most important acronyms is also an asset. The book is addressed to a wide range of readers including space enthusiasts, students and researchers specialising in space security.

It can be concluded that the publication constitutes an important contribution to the development of security science, in this case space security. Moreover, the reviewed book is a precursor study in Polish scientific literature focused on contemporary issues of militarisation and weaponisation of outer space and methods for estimating their powermetric indices. Numerous lists presented in the form of tables, through which the author has unified and compared data, as well as the diagrams and graphs based on his own work, unquestionably add value to the work. The coherent and orderly structure also deserves appreciation. The selection of independent variables formulated for the purpose of determining the potential of militarisation and weaponisation of outer space by the world powers and the criterion adopted for the selection of these powers may be questionable. Taking into account the above, it is assessed that the reviewed book, despite a few insignificant shortcomings which do not affect the presented substantive content, is a valuable contribution to the scientific output concerning issues of contemporary space security.

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