

Book review: Rafał Miętkiewicz, Autonomous Systems in Maritime Operations¹

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The development of modern construction materials, miniaturisation of electronic components, and access to sources with high energy density per unit of their mass have enabled the rapid development of unmanned platforms. These platforms include unmanned aerial vehicles, wheeled and tracked unmanned vehicles, as well as boats on and below the surface of the water. The features of unmanned systems that determine their use in various areas of human activity are: no operator on board, the ability to place any cargo on them, the ability to perform the mission

¹ R. Miętkiewicz, *Systemy autonomiczne w działaniach na morzu* (Eng. *Autonomous Systems in Maritime Operations*), Gdynia 2023, Polish Naval Academy of the Heroes of Westerplatte, 495 p. (the online English version is available at: https://www.academia.edu/104173920/AUTONOMOUS_SYSTEMS_IN_MARITIME_OPERATIONS - editor's note).

autonomously, automatically or under the manual control of the operator. The lower purchase price of such a system compared to an equivalent manned platform is also not insignificant.

The geopolitical situation in the Baltic Sea region and media reports about attacks on the Nord Stream infrastructure, which is an energy and fuel supply system and therefore a critical infrastructure, force special attention to be paid to this region, as it is of great importance for Poland's military and economic security.

In 2023, a comprehensive monograph of 495 pages was published by Commander, Rafał Miętkiewicz PhD, entitled *Autonomous Systems in Maritime Operations*. It is a unique publication because it is the first elaboration in Polish in which the role of modern maritime unmanned systems in maritime operations is described so extensively. So far, there has been a lack of a book on the publishing market referring to both the safety of the reservoir and the technology, including unmanned platforms, the use of which could increase the level of this safety.

The author of the monograph is an officer of the Polish Navy and a line officer with several years of experience on board naval mine warfare ships (he was among others the commander of ORP Śniardwy), as well as a scientist and academic lecturer, an assistant professor at the Naval Academy in Gdynia, as well as a member of the Polish National Security Association and the Polish Nautological Society, an expert of the Ignacy Łukasiewicz Institute for Energy Policy in Rzeszów, and in 2023, he was an external expert of the Interministerial Task Force on solutions for the destruction, immobilisation and taking control of an unmanned floating vehicle in the context of the security of critical infrastructure facilities located off the Baltic coast or outside the borders of the Republic of Poland (established at the Interministerial Team for Terrorist Threats).

His reviewed monograph is divided into five chapters, each of which ends with a summary.

The first chapter, entitled *Autonomous systems in the marine domain*, contains extensive characteristics of unmanned platforms. In it, the author divided these platforms according to their functional features, illustrating it with diagrams and tables, thanks to which it is easier to systematise knowledge. As these systems can perform missions at different levels of autonomy, different ways of dividing autonomy levels have been described, including the levels indicated by Lloyd's Register, International Maritime Organisation, Roadmap FY2011-2036 and Multinational

Capability Development Campaign. The following pages contain extremely interesting descriptions not only of autonomous surface and underwater systems, but also of flying systems, both civilian and military, with the author not limiting himself to systems already known and in use. Colourful illustrations enriching these characteristics are an added value. The chapter identifies technologies that have the potential for widespread use in the long term. The author included autonomous biomimetic systems and swarms, shoals or flocks of autonomous maritime platforms. Given that swarms, shoals or flocks of unmanned platforms are a technology whose research and development began relatively recently, analysing how they can be used to protect seaports and bases, as well as to attack enemy surface and submarine vessels, is of particular interest. According to available data, many countries around the world are working intensively on building autonomous unmanned systems.

The second chapter, entitled *The Baltic Sea as a basin for the use of maritime autonomous systems* is actually a small encyclopaedia of knowledge on the possibilities of using autonomous unmanned systems in the area concerned. The reader will find here information on Polish maritime areas, their division and size of area, supplemented by a clear map. In the next part of the chapter, the author describes the conditions affecting the operation of autonomous unmanned platforms in maritime conditions. He included: the number and location of Polish seaports together with the volume of cargo handled in them, infrastructure projects for the transfer of raw materials or the exploitation of natural resources through their extraction from the seabed, the construction of offshore wind farms together with the infrastructure for the transmission of electricity to shore, and the location of conventional ammunition and chemical weapons lying on the seabed. An important part is the characterisation of the environmental conditions of the Baltic Sea, including, inter alia, weather conditions affecting carrying out of unmanned platform missions. The chapter further includes an analysis of the impact of environmental factors on the operation of unmanned surface, air and underwater platforms.

The next chapter *Contemporary security threats in the maritime domain* is an in-depth analysis of threats occurring now, as well as those that may arise in the future. The author described in detail the impact of the aggressive policy of the Russian Federation, among others, on the security of Poland. He devoted a lot of space to the conflict in Ukraine

and how it affects the security architecture of Poland and the region in which Poland is geographically located. The analysis of threats in the area of maritime security is worth emphasising. The author has extensively discussed the various sources of these threats. He also analysed selected incidents that occurred in the Baltic Sea region. The chapter is enriched with situational maps, tables, photographs and diagrams.

The penultimate chapter *The tasks of the Polish Navy in the light of challenges and threats to security* is devoted to considerations concerning the tasks of the Polish Navy in the context of threats to the Polish state defined and described in the previous parts of the book. The current geopolitical situation of Poland, in a way, forces one to ask questions about the state of the Navy and its potential to defend the interests of the Republic. The author has attempted to answer these questions.

Until the start of the full-scale war in Ukraine, the navies of various countries made limited use of unmanned maritime platforms. Following its outbreak, autonomous naval platforms have increasingly been used to attack both enemy naval units and elements of their port and transport infrastructure. There have also been reports of multiple platforms being used simultaneously in a way that makes it possible to speak about a swarm, shoal or flock attack. For maritime professionals, this is an opportunity to draw lessons for national naval forces. Those responsible for Baltic Sea security should also keep a close eye on the developments in Ukraine. Based on its war experience, taking into account Poland's membership of NATO and considering Polish interests in the Baltic Sea area and technological developments, the concept of using autonomous unmanned maritime platforms should be proposed.

The final, fifth chapter, entitled *The concept of using maritime autonomous systems*, is devoted to this topic. According to the author of this review, this is the most important chapter. The concept proposed therein for the use of maritime autonomous systems in combating terrorist acts in the Polish economic zone should become the subject of in-depth analyses by the commanders of the Polish Armed Forces and counter-terrorist services and formations responsible for the security of the Polish state. However, in view of the dynamics of developments related to military operations in Ukraine, it should be assumed that the content of this chapter is only the beginning of considerations that will need to be made as more information on the use of autonomous unmanned systems in maritime operations emerges. Such considerations require an in-depth analysis

of the content included in the first four chapters of this monograph. In this sense, it constitutes a collection of information necessary for the management of maritime safety of the Republic of Poland, a kind of foundation on which the safety policy can be built.

The knowledge contained in the publication *Autonomous Systems in Maritime Operations* is so extensive that a single reading of this book is not sufficient. An in-depth understanding of the issues described requires returning to selected passages. A great advantage is the fact that the publication includes not only the author's observations and conclusions, but also numerous references to other sources, both Polish and foreign, which allows the reader to verify the content and expand the knowledge base on the basis of other authors' works. Another advantage is the way in which the content is communicated - the book is written in a professional but readable language, while charts, tables, diagrams and photographs make it easier for the recipient to systematise the information. It can be read both by professionals involved in unmanned systems in maritime operations and by people who are just beginning their adventure with autonomous unmanned systems.

On the Polish and foreign publishing market, this is the best publication on the use of autonomous systems in maritime operations, with a particular focus on the Baltic Sea. Of course, one can read about the issues raised in the works of other authors, but in no publication have they been put together. When translated into English, Rafał Miętkiewicz's book can be successfully used to promote the Polish *raison d'état* within NATO working groups in the area of using autonomous systems to ensure the security of the Baltic Sea and the critical infrastructure located there.

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