THE MINES WAR IN THE BLACK SEA: AN UNFINISHED CONFLICT

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Mine warfare has become an important aspect of the ongoing conflict between Russia and Ukraine in the Black Sea. The strategic use of naval mines represents a threat to both military and civilian ships, affecting naval and maritime security, as well as strategic stability in the Black Sea basin. The paper examines the types of mines used in this conflict, the number and locations of mines discovered in the Black Sea in the last two years, the entities involved in demining operations, and the types of vessels used in these efforts. It also addresses the future of mine warfare in the Black Sea – a region of significant geopolitical importance, serving as a strategic maritime gateway linking Eastern Europe, the Caucasus and the Middle East to the rest of the world. In recent years, the region has seen an increase in military tensions as the ongoing conflict between Russia and Ukraine has extended to the sea, transforming parts of the Black Sea into a dangerous area for navigation and shipping because of the use of mines.

Keywords: naval mine; Black Sea; security; Ukraine; Russia;

INTRODUCTION

The Black Sea has long been a region of significant geopolitical importance, serving as a strategic maritime gateway connecting Eastern Europe, the Caucasus, and the Middle East to the rest of the world. In recent years, the region has witnessed increasing military tensions, with the ongoing conflict between Russia and Ukraine playing a central role. One particularly concerning aspect of this conflict is the use of naval mines, turning parts of the Black Sea into a hazardous area for military and civilian shipping alike. This *"Mines War"* is emblematic of the evolving nature of naval warfare, where traditional methods blend with modern technology to create new forms of conflict at sea.

Naval mines have played a crucial role in the ongoing conflict between Russia and Ukraine in the Black Sea. As Ukraine has sought to defend its coastline and strategic maritime assets, it has deployed various types of mines to deter and disrupt Russian naval operations. However, the deployment of these mines has led to unintended consequences, with some mines drifting into the territorial waters of neighbouring countries like Romania, Bulgaria, and Turkey. This paper explores the types and characteristics of Ukrainian mines used in the conflict, the reasons these mines have drifted from Ukrainian waters to those of other Black Sea states, and the broader implications of this phenomenon.

Naval mines have been used for centuries as a cost-effective and efficient means of controlling sea lanes, denying enemy access, and inflicting damage on opposing fleets. The Black Sea, historically, has seen several instances of mine warfare, most notably during the Crimean War (1853-1856), the First World War, and the Second World War. However, the modern iteration of the Black Sea mines war is being driven by recent geopolitical changes, from 2022 onwards, namely the naval war between Russia and Ukraine.

THE USE OF MINES IN THE BLACK SEA CONFLICT

Naval mines in the current Black Sea conflict serve multiple strategic purposes. They are deployed by both Russian and Ukrainian forces to achieve several objectives:

❖ **Area Denial and Coastal Defence**: Mines have been used to create exclusion zones, preventing enemy ships from approaching sensitive coastal areas, ports,

and naval bases. For instance, Ukraine has reportedly deployed mines near its ports in Odessa and Mykolaiv to prevent a potential Russian amphibious assault. Similarly, Russia has used mines to protect its naval installations in Crimea and deter Western naval support for Ukraine.

❖ **Economic Disruption**: Mines pose a significant threat to commercial shipping, thereby impacting the economic stability of the region. The Black Sea is a crucial transit point for global trade, especially for energy exports and agricultural products such as wheat, which are vital for the economies of Ukraine and Russia. The presence of mines disrupts these commercial routes, causing significant economic repercussions.

❖ **Psychological Impact and Uncertainty**: Mines create a psychological effect on both military personnel and civilians. The unpredictability of mine locations makes navigation risky and heightens the sense of insecurity in the region. This uncertainty affects both military operations and commercial activities, amplifying the strategic value of mine warfare beyond its physical impact.

Mine Types and Deployment Methods

The types of mines used in the Black Sea vary from traditional contact mines to more sophisticated magnetic, acoustic, and pressure-activated mines. Traditional mines are relatively simple *(figure 1)* and cheap to produce, while modern mines are equipped with sensors and can be remotely controlled or activated, adding a layer of complexity to mine-clearing operations:

❖ **Contact Mines**: These mines are activated upon direct contact with a vessel. They are typically moored to the seabed and float below the water surface. Both Russia and Ukraine have used contact mines to block access to strategic coastal areas, often in shallow coastal waters or near port entrances to deny access to enemy vessels.

Description: Contact mines are designed to detonate upon direct physical contact with a vessel. They can be moored or free-floating, and are typically placed in areas where enemy ships are likely to pass, such as near ports, harbours, and coastal waters.

Characteristics: Ukrainian contact mines are relatively straightforward in design and are often equipped with chemical or mechanical detonators that trigger the explosive payload upon impact. These mines are less sophisticated than influence mines but are effective in creating blockades or denying access to strategic areas.

Examples: Ukraine has reportedly used several types of contact mines, including Soviet-era models like the KB-1 and KB-2, which have charges of up to 250 kilograms of TNT. These mines are designed to destroy ships by detonating their explosive charge on contact.

❖ **Anchored mines**: These mines are detonated by the influence of the magnetic, acoustic or hydrostatic field of a ship or submarine. They are programmed to detonate only under certain conditions for certain types of ships and submarines.

Description: Anchored mines float at a predetermined depth below the surface. They are designed to detonate upon contact with a vessel or when triggered by specific influences, such as magnetic or acoustic ships signatures.

Characteristics: Ukrainian moored mines are relatively simple in design and include both older Soviet-era mines and newly manufactured types. They are typically equipped with a buoyant mine case connected by a cable to an anchor on the seabed. The mooring cable determines the mine's depth, which can be adjusted to target specific types of vessels (e.g., surface ships or submarines).

Examples: The MYaM and YAM types, both of Soviet origin, are examples of moored mines used by Ukraine. These mines have a charge weight of 200-300 kilograms of TNT and are fitted with contact horns or magnetic triggers that activate upon detecting a nearby ship's magnetic field.

Drifting Mines: mines float freely in the water and can move with currents, making them unpredictable and challenging to locate and neutralize. Several reports suggest that drifting mines have been used by both sides, either intentionally or unintentionally, posing a significant hazard to shipping lanes and coastal infrastructure.

Description: Drifting mines are free-floating mines that move with the currents. Unlike moored mines, they are not anchored to the seabed, making them more unpredictable in their movement.

Characteristics: Ukrainian drifting mines are designed to float at or just below the surface and are equipped with contact detonators. They pose a significant threat to ships due to their mobility, which makes them difficult to detect and neutralize. Drifting mines are typically smaller than moored mines but still carry a substantial explosive charge.

Examples: Some of the drifting mines used by Ukraine are believed to be modified versions of older Soviet-era mines, such as the RM-1. These mines may have been adapted for deployment in shallower waters or near coastal areas to prevent enemy landings or naval incursions.

❖ **Improvised Mines**: Due to the resource constraints faced by Ukraine, there have been reports of improvised explosive devices being deployed as makeshift mines. These can range from modified naval mines to civilian vessels laden with explosives, deployed in a way that allows them to drift into enemy waters.

Deployment methods vary from traditional minelayers, such as ships and submarines, to aerial delivery by aircraft and helicopters. Additionally, modern conflict sees the integration of unmanned vehicles (both aerial and underwater) to deploy or clear mines, showcasing the technological evolution in this area of warfare.

Figure 1: Ukraine's naval mine floating on the Black Sea
(https://odessa-journal.com/turkey-romania-and-bulgaria-have-started-a-joint-operation-for-demining-the-black-sea)

Reasons for the Drift of Ukrainian Mines into Neighbouring Waters

Several factors have contributed to the drift of Ukrainian mines from their original deployment areas to the territorial waters of Romania, Bulgaria, and Turkey:

❖ **Unanchored or Damaged Mines**:

Explanation: Some of the mines deployed by Ukraine were not properly anchored or were damaged during deployment, causing them to break free and drift with the currents. Strong currents and storm conditions in the Black Sea can dislodge moored mines, transforming them into drifting mines.

Impact: Unanchored or drifting mines pose a hazard not only to enemy vessels but also to neutral ships and coastal infrastructure in the wider Black Sea region. This unintended drift has led to discoveries of Ukrainian-origin mines in Turkish, Romanian, and Bulgarian waters.

❖ **Environmental Factors**:

Explanation: The Black Sea has a specific system of currents, in its entirety, from Kerci to the Bosphorus, through which it connects with the Azov and the Mediterranean Seas. Seasonal weather conditions, including storms and high winds, can exacerbate these currents, causing mines to drift over significant distances.

Impact*:* Environmental conditions such as the Black Sea's north-to-south currents can carry floating mines away from Ukrainian waters into the waters of neighbouring states. The unpredictability of weather patterns and the dynamic nature of the Black Sea's hydrology make it challenging to contain drifting mines to a specific area.

❖ **Deliberate Use of Drifting Mines**:

Explanation: Ukraine has mainly planted anchored and contact mines to protect its maritime waters and Black Sea ports. It is probable that drifting mines are intentionally deployed to discourage Russian military ships or to disrupt maritime transportation routes in disputed areas for civilian purposes.

Impact: The use of drifting mines as a tactical measure could have unintended consequences, with some mines drifting beyond their intended area of operation due to unforeseen changes in wind and current patterns.

❖ **Lack of Effective Mine Management and Disposal**:

Explanation: The conflict's intensity and the urgency of defending coastal areas may have led to a lack of rigorous mine management and disposal practices. Inadequate marking, monitoring, and maintenance of deployed mines increase the likelihood of mines breaking loose and drifting.

Impact: Mines that are not effectively managed or tracked can easily drift into neutral waters, posing risks to maritime navigation and causing international incidents.

Mines Found in the Black Sea in the Last Two Years

As a result of the naval missions, more than 100 sea mines have been discovered and neutralized in the Black Sea in the last two years. The exact number is difficult to determine due to the secrecy surrounding military operations, but various reports and official statements provide some insight:

- Turkey: As of mid-2023, Turkish authorities reported the discovery of over 30 drifting mines in their territorial waters and international waters near the Bosphorus Strait. These mines were believed to have originated from the conflict zones in the Black Sea and were neutralized by the Turkish Navy's mine-hunting teams.

- Romania and Bulgaria: The Romanian and Bulgarian navies have also reported finding mines drifting into their waters. Romania, for instance, detected and neutralized at least ten mines off its coast in the 2023-2024 period. Bulgaria reported the discovery of four mines in its territorial waters in the same period. These mines have been attributed to the conflict between Russia and Ukraine, carried by currents from areas closer to the warzone.
- Ukraine: Ukraine has been actively engaged in mine-clearing operations along its coast, particularly near key ports like Odessa. Ukrainian sources have reported neutralizing dozens of mines since 2022, mainly moored and contact mines deployed to protect own waters from Russian incursions.

Entities Involved in Mine-Clearing Operations

Several countries and organizations are actively involved in mine-clearing operations in the Black Sea:

- Turkey: Turkey, a NATO member with a significant naval presence in the region, has taken an active role in clearing mines, particularly around the Bosphorus Strait. The Turkish Navy operates several mine-hunting ships and has specialized teams trained in explosive ordnance disposal (EOD).
- Romania and Bulgaria: As NATO members, Romania and Bulgaria have coordinated their mine-clearing efforts in the Black Sea with the broader NATO strategy. Both countries have deployed mine-hunting ships and EOD units to detect and neutralize mines drifting into their waters.
- Ukraine: The Ukrainian Navy, supported by international partners, has been involved in extensive mine-clearing operations, particularly around its ports and coastal areas. The Ukrainian Navy uses mine countermeasure vessels (MCMVs) and remotely operated underwater vehicles (ROVs) to locate and neutralize mines.
- NATO and International Organizations: NATO has expressed concerns over the presence of naval mines in the Black Sea and has conducted joint exercises with its member states to enhance mine-countermeasure capabilities. Additionally, organizations like the International Maritime Organization (IMO) monitor and coordinate responses to ensure safe maritime navigation in the region.

Types of Ships Involved in Mine Discovery and Destruction

Various types of ships and naval assets are used in mine-clearing operations in the Black Sea:

- Mine Countermeasure Vessels (MCMVs): These specialized ships are equipped with sonar systems and underwater vehicles to detect, classify, and neutralize mines. The Turkish, Romanian, Bulgarian, and Ukrainian navies have deployed MCMVs in their respective waters to combat the mine threat *(figure 2).*

Figure 2: Mine destroyed by a Romanian War Ship
(https://www.info-sud-est.ro/fotoreport-how-mines-are-destroyed-in-the-black-sea-demonstration-by-romanian-military-divers-five-mines-planted-during-the-war-in-ukraine-were-destroyed-in-romanian-waters/)

- Minehunters: Minehunters are smaller, agile vessels specifically designed to locate mines using sonar and remotely operated vehicles (ROVs). They can safely neutralize mines using explosive charges or mechanical sweeping equipment. The Turkish Navy, in particular, has several minehunters actively patrolling the Black Sea.
- Patrol Boats: Patrol boats equipped with mine detection and clearance capabilities are also used in coastal areas. The Ukrainian Navy has deployed patrol boats around critical ports to ensure safe passage for commercial and military vessels.

- Remotely Operated Vehicles (ROVs): ROVs are unmanned underwater vehicles used to identify and neutralize mines. They can be launched from a variety of ships, including MCMVs, minehunters, and patrol boats. ROVs are also used by all parties involved in mine clearance actions in the Black Sea.

IMPACT ON REGIONAL SECURITY AND INTERNATIONAL TRADE

The use of sea mines the Black Sea, a quite small and closed sea, has significant implications for regional security and international trade. The Black Sea serves as a vital corridor for energy supplies, agricultural and various other commodities exports. Disruption of this maritime traffic impacts not only the littoral states but also global markets. For instance, the blockading of Ukrainian ports has led to shortages and price hikes in global grain markets, given Ukraine's role as a major exporter of wheat and other agricultural products. From a security perspective, the presence of mines creates a contested maritime environment where the risk of miscalculation is high. Neutral shipping, including humanitarian aid missions, faces threats from these hidden weapons. Additionally, the use of mines could potentially draw in NATO, given the Alliance's commitment to maintaining freedom of navigation in international waters and protecting its members' economic interests.

Implications of Mines Drifting to Neighbouring Waters

The drift of Ukrainian mines into the territorial waters of Romania, Bulgaria, and Turkey has several implications:

❖ **Regional Security Risks**:

Explanation: Drifting mines pose a direct threat to regional security and maritime safety. They can damage or destroy vessels, including civilian ships, fishing boats, and commercial cargo ships. This threat necessitates increased vigilance and mine-clearing efforts by the affected countries.

Impact: The presence of drifting mines has prompted Romania, Bulgaria, and Turkey to enhance their mine-clearing capabilities, deploying minehunters, patrol boats, and underwater drones to detect and neutralize these threats. These countries have also strengthened their naval cooperation to address the risks posed by drifting mines.

❖ **Diplomatic Tensions**:

Explanation: The unintended drift of Ukrainian mines into neighbouring waters can lead to diplomatic tensions between Ukraine and affected countries.

These incidents may be perceived as violations of territorial sovereignty or as acts of negligence that endanger civilian shipping.

Impact: Diplomatic efforts have been necessary to address these concerns, with Ukraine assuring its neighbours of its commitment to preventing further drift and cooperating in mine-clearing operations. However, the ongoing conflict complicates these efforts, as mines continue to pose a hazard in contested waters.

❖ **Impact on International Shipping and Trade**:

Explanation: The drift of mines into international and territorial waters poses a significant risk to global shipping routes, particularly in the Black Sea, a critical artery for international trade. The presence of mines can lead to the rerouting of ships, increased shipping insurance costs, and disruptions in maritime commerce.

Impact: These disruptions have economic consequences for countries dependent on maritime trade, including Ukraine, Russia, and their neighbours. The international community has called for measures to ensure the safety of shipping lanes and reduce the threat posed by drifting mines.

CHALLENGES IN MINE CLEARANCE

Mine clearance in the Black Sea presents several challenges:

❖ **Technological Complexity**: Modern mines, especially influence mines, require sophisticated technology for detection and neutralization. This technology may not always be readily available or may be limited in capacity, especially for Ukraine.

❖ **Environmental Conditions**: The Black Sea's depth, varying seabed conditions, and water currents complicate mine detection and clearance operations. Mines can drift over time, making their original deployment location irrelevant.

❖ **Political and Military Risks**: Mine clearance operations can be politically sensitive and carry military risks. Clearance operations may be viewed as hostile acts, and there is always a risk of accidental detonation, which could escalate military tensions further.

The International Response

The international community, particularly NATO and other Black Sea littoral states such as Turkey, Romania, and Bulgaria, has been closely monitoring the situation. These countries have been working to enhance their mine countermeasure capabilities and have engaged in diplomatic efforts to ensure freedom of navigation in the Black Sea. The United Nations and other international bodies have called for adherence to the rules of international law, particularly the United Nations

Convention on the Law of the Sea (UNCLOS), which governs the use of mines in international waters.

However, geopolitical divisions have complicated a unified response. While NATO and the European Union have supported Ukraine, Russia continues to assert its right to deploy mines within its claimed territorial waters. The lack of a clear international mandate for mine clearance in disputed waters adds to the complexity of addressing the issue.

FUTURE OF MINES WARFARE IN THE BLACK SEA

The future of mine warfare in the Black Sea is likely to be shaped by several factors *(figure 3)*:

❖ **Technological Advancements**: The development of more sophisticated mines and mine-clearing technologies will play a crucial role. Advanced mines with stealth capabilities and multi-sensor triggering mechanisms could be used to enhance naval blockades or deny access to key areas. Conversely, improvements in mine detection and neutralization technologies, such as autonomous underwater vehicles (AUVs) and AI-driven sonar systems, will enhance the ability to counter these threats.

❖ **Regional Cooperation and NATO Involvement**: Continued cooperation among Black Sea states, along with NATO's presence in the region, will be critical in mitigating the mine threat. Joint exercises and shared intelligence can enhance collective security and response times to drifting or newly deployed mines.

❖ **Legal and Diplomatic Measures**: Efforts to establish international norms and legal frameworks to prohibit the indiscriminate use of mines, particularly drifting mines, could reduce the threat over time. Diplomatic efforts to end hostilities in the Black Sea region would also decrease the likelihood of continued mine warfare.

❖ **Environmental and Economic Implications**: The extensive use of mines in the Black Sea poses environmental risks, including damage to marine life and habitats. Furthermore, the presence of mines can disrupt shipping routes, leading to economic losses for countries dependent on maritime trade. Future strategies must consider these implications to ensure sustainable and safe navigation in the region.

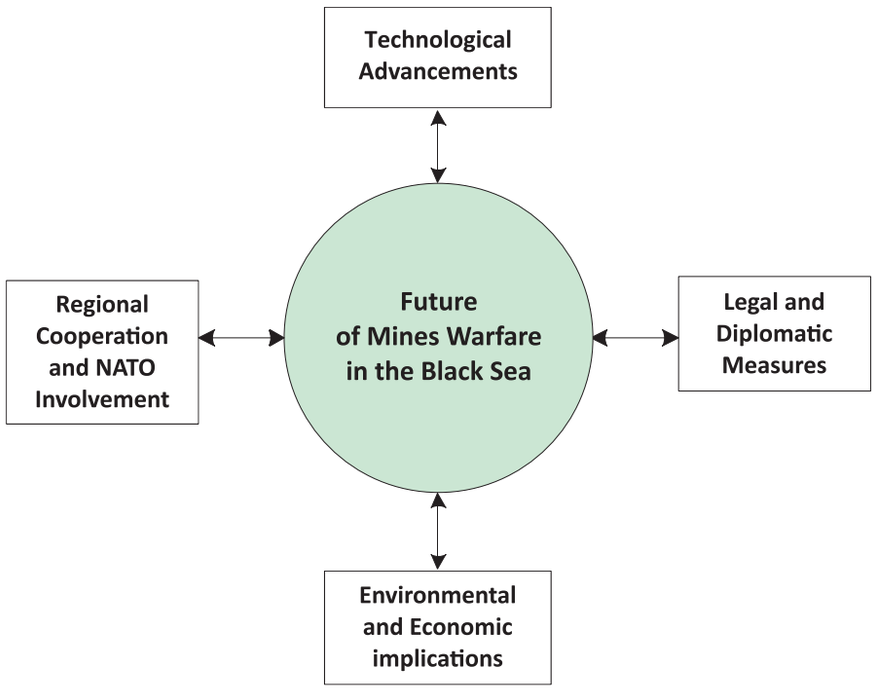

Figure 3: Factors of the future of mines warfare in the Black Sea (author's design)

CONCLUSIONS

The *"Mines War"* in the Black Sea is a microcosm of the broader conflict between Russia and Ukraine, highlighting the evolving nature of naval warfare and the strategic use of mines in modern conflicts. The deployment of mines serves multiple purposes, from denying access and disrupting economic activities to creating psychological uncertainty. The conflict underscores the need for enhanced mine countermeasure capabilities, better international cooperation, and adherence to international maritime law to prevent further escalation and ensure safe navigation in this strategically vital region.

The *"Mines War"* in the Black Sea is a major component of the conflict between Russia and Ukraine. The use of various types of mines, together with the complexity of mine operations, presents important threats to regional security and safety of shipping. The future of war with mines in the Black Sea will depend on technological advancements, regional cooperation, and diplomatic efforts to address the root causes of the conflict. The use of naval mines by Ukraine in the conflict with Russia

has had unintended consequences, with some mines drifting into the waters of neighbouring countries such as Romania, Bulgaria, and Turkey. Various factors, including environmental conditions, inadequate mine management, and the deliberate use of drifting mines, have contributed to this phenomenon. The drift of mines poses significant security, diplomatic, and economic risks, prompting affected countries to enhance their mine-clearing capabilities and engage in diplomatic dialogue with Ukraine. As the conflict continues, the threat of drifting mines remains a great challenge to the security of the Black Sea basin.

BIBLIOGRAPHICAL REFERENCES:

1. Bulgarian Naval Forces (2023). *Mine Clearance and Maritime Safety Efforts in the Black Sea*.
2. Delanoë, I. (2024). *Russia's Black Sea Fleet in the "Special Military Operation" in Ukraine*, https://www.fpri.org/article/2024/02/russias-black-sea-fleet-in-the-special-military-operation-in-ukraine/, retrieved on 17 August 2024.
3. Greenpeace (2024). *Black Sea: Shadow of the Mines OMV to Build Gas Platforms and Pipelines Amidst Black Sea War Zone*, https://www.greenpeace.org/static/planet4-romania-stateless/2024/06/7b5c64be-en_mines_risk_analysis_black_sea.pdf., retrieved on 12 May 2024.
4. International Maritime Organization (IMO), (2023), *Safety of Navigation in the Black Sea: Current Threats*.
5. Jane's Defence Weekly (2023). *Naval Mines in the Russia-Ukraine Conflict: Types, Deployment, and Drift Pattern*.
6. NATO Maritime Command Reports on Mine Warfare in the Black Sea.
7. *The Drifting Menace*, https://www.rand.org/pubs/commentary/2022/11/the-drifting-menace.html, retrieved on 13 July 2024.
8. Turkish Ministry of Defense, (2023), *Naval Mine Clearance Operations in the Bosphorus Strait*.
9. Ukrainian Navy Official Reports (2022-2023). *Mine Deployment and Management Strategies in the Black Sea*.
10. Yaylali, C.D. (2024), *Three NATO allies activate Black Sea task force,* https://www.defensenews.com/author/cem-devrim-yaylali/, retrieved on 29 June 2024.
11. https://odessa-journal.com/turkey-romania-and-bulgaria-have-started-a-joint-operation-for-demining-the-black-sea, retrieved on 29 June 2024.
12. https://www.fpri.org/article/2024/02/russias-black-sea-fleet-in-the-special-military-operation-in-ukraine/, retrieved on 12 May 2024.

13. https://www.info-sud-est.ro/fotoreport-how-mines-are-destroyed-in-the-black-sea-demonstration-by-romanian-military-divers-five-mines-planted-during-the-war-in-ukraine-were-destroyed-in-romanian-waters/, retrieved on 13 July 2024.