

German Navy at REPMUS 2025: Successfully networked from sensor to situational awareness

Specialists Article REPMUS 2025



Sesimbra (Portugal). A US team from San Diego, California, launches an autonomous REMUS drone (Remote Environmental Monitoring Unit System) from a dinghy into the turquoise blue water. The Autonomous Underwater Vehicle (AUV) dives down and works its way forward in systematic paths, scanning the seabed with its sonar and collecting large amounts of data. After completing its mission, the drone resurfaces and is retrieved. The recorded measurement data is then read out by the team on the pier, saved on data carriers and handed over to the Commander Task Unit (CTU) Sesimbra. This is where the actual evaluation begins. Shortly afterwards, a high-resolution image appears on the screen in the situation centre: an MK36 bottom mine, deliberately placed on a busy route towards Setúbal. The exercise scenario has once again demonstrated how modern systems can revolutionise mine defence – and the important role Germany is currently playing in this field.

REPMUS/Dynamic Messenger 2025:

Objective and structure

Review: In September 2025, the REPMUS ("Robotic Experimentation and Prototyping with Maritime Unmanned Systems") exercise took place south of Lisbon off Sesimbra and Tróia in Portugal in combination with the NATO exercise "Dynamic Messenger". This was the 15th REPMUS exercise, which has established itself as one of the most important international testing platforms for unmanned systems – a significance that has grown considerably, especially since Russia's war of aggression against Ukraine, and shows how indispensable autonomous systems are today for naval forces and secure maritime transport routes.

During REPMUS 2025, thousands of participants from navies, NATO structures, industry, security agencies and research tested new technologies, concepts and operational procedures for almost four weeks. The aim is to improve interoperability, test the use of unmanned systems in multinational operations and quickly put innovations into practice.

The exercise was broadly divided into six core areas: Naval Mine Warfare (NMW), Underwater Warfare (UWW), Critical Undersea Infrastructure (CUI), Above Water Warfare (AWW), Force Protection (FP) and Rapid Environmental Assessment (REA).

German participation – leading role in mine defence

The German Navy made a significant contribution to the exercise with its 3rd Minesweeping Squadron. Commander Andreas Montag, a mine diver by training, former commander and designated head of the 3rd Minesweeping Squadron's "Unmanned Systems Task Force", assumed responsibility as CTU for the deployment of underwater, surface and aerial drones for mine countermeasures.

Montag directed the Mine Countermeasures (MCM) operation directly from the fishing port of Sesimbra. There, soldiers from the 3rd Minesweeping Squadron worked together with experts from NATO's Centre of Excellence for Mine Warfare (COE MW) in Belgium, NATO's Centre for Maritime Research and Experimentation (CMRE) in La Spezia and underwater data technology from north.io in Kiel in the so-called Data Fusion Cell.

In addition to high-ranking naval representatives, representatives of the German Federal Police Sea were also present as observers: a sign of how important REPMUS is for maritime security, especially in Germany, beyond the purely military context.

Rear Admiral Dirk Gärtner, Head of Planning and Design at the Naval Command in Rostock, visited the exercise from 18 to 23 September, including the situation centre in Sesimbra on 20 September. There he received a situation briefing (LVU), as it is called in Bundeswehr jargon. His conclusion: "The exercise impressively demonstrated how the German Navy, together with industry partners and allies, is digitally advancing its mine defence capabilities into the future. In my opinion, the networking of systems and the speed with which data can be processed and made available today are particularly significant advances."

The contribution of north.io as a digital enabler

With its "Ocean Data Platform," the Kiel-based company north.io provided the digital interface for the integration, processing and visualisation of the various sensor data. Whereas the processing of gigabytes or even terabytes of data used to take days or weeks, at REPMUS it was achieved in hours and, by the end of the exercise, even in minutes. This is a quantum leap from what was technologically possible just a short time ago. It clearly shows how revolutionary big data and AI approaches can increase efficiency in the underwater sector.

Commander Montag emphasised that the platform is the missing piece of the puzzle that has been needed to display the data collected by the teams and sensors quickly, in real time and in high resolution at staff level, thus making an extremely valuable contribution to command decisions – and doing so in virtually plug-and-play mode. This meant that, as the person responsible for the situation picture, he always had a quick, up-to-date, high-resolution and accurate picture of the seabed.

Jann Wendt, CEO of north.io, also summarised the cooperation: "We have proven how innovative and functional our technology from Germany and Schleswig-Holstein can be – and also how young, innovative companies in particular can make a very significant contribution to the further development of capabilities in the navy. The insights gained at REPMUS could be a real game changer."

Commander Nadia Rijo from NATO's Maritime Geometoc Centre of Excellence (COE) in Lisbon, whose group carried out the Rapid Environmental Assessment (REA) during the exercise, also commented: "The Ocean Data Platform technology far exceeded our expectations. The system delivered more than we had requested, especially in terms of the rapid processing and visualisation of large amounts of environmental data. We immediately recognised the added value this platform offers for future NATO operations. We hope that north.io will participate again next year - particularly because it provides a central ocean data management system that has noticeably improved our interoperability."

"Not only is a central ocean data management system necessary, but the agnostic connection to a combat management system (CMS) was also established for the first time during the exercise by north.io," adds Commander Guy Phlipppo, Director of Maritime Unmanned Systems Integration and Industry Engagement at NATO in Brussels.

Route Survey and Q Routes: Significance not only for the Baltic States

Particularly impressive was the proof that the entire data chain from sensor to situation picture was functioning. This is of immediate importance for the German Navy, especially for so-called "Q routes" in the North Sea and Baltic Sea, i.e. prepared, regularly surveyed NATO supply routes that are intended to enable secure resupply in the event of a crisis or defence situation. Securing these Q routes has always been one of the core tasks of NATO mine countermeasures and is also firmly anchored in German operational planning for national and alliance defence (OPLAN Germany).

Securing these routes is of central importance, particularly for the northern federal states of Germany and the Baltic states. In the event of tension or defence, their supply depends on the sea lanes being free of mines and other hazards. The proximity to Setúbal made this particularly clear during the exercise: the Portuguese port also has significant maritime infrastructure, including shipyards that are important for regional and international supply.

Conclusion: REPMUS 2025 demonstrated how industry and the navy can work hand in hand. With the "GREYSHARK™", an AUV from German manufacturers "EUROATLAS" and "EvoLogics", for example, a powerful underwater vehicle is now available which, in combination with the "Ocean Data Platform" from north.io, can regularly travel Q routes in future and detect mines at an early stage using "change detection". The GREYSHARK is particularly notable for its long operating time: according to Eugen Ciemnyjewski, managing director of EUROATLAS, it can operate autonomously and covertly for up to 16 weeks at four knots, covering distances of over 8,000 nautical miles. By way of comparison, this corresponds to the sea route from Paris to New York City and back on a single "tank of fuel".

The company "EvoLogics", which already produces drones for Ukraine, also contributed its small unmanned Quadroin AUVs, which can be used flexibly and autonomously in swarms with the "GREYSHARK" for special tasks and expand the range of sensor carriers. In future, these can also be transported directly to their destination by air using drones from INFINTEQ – a corresponding aircraft also took part in the manoeuvre.

At REPMUS, Rheinmetall also presented the so-called Harbor Protection Container, whose situation picture for port protection is also supported by the Ocean Data Platform from Kiel. All operational data for sea and air surveillance can be consolidated there. These interlocking solutions can be integrated into the protection of critical maritime infrastructure and illustrate how strongly the data platform can be embedded as the backbone of an overall system.

A particular advance, explicitly highlighted by Commander Guy Phlipppo (NATO), was that the Ocean Data Platform was connected to SYSTEMATIC's SitaWare command and control software for the first time at REPMUS. SitaWare is an internationally used command and control (C2) software that creates a common operational picture and supports command levels. It is also used by the German Navy. The connection enabled underwater data from drones and sensors to be integrated directly into the German CTU's operational command picture – a decisive step towards fully networked, multinational mine countermeasures.

Outlook: From sensor to situation picture – and Germany's role

Germany's participation in REPMUS 2025 has impressively demonstrated that the entire mine countermeasures chain can now be digitally mapped. At the same time, it became clear that German industry partners with highly innovative technologies can make a decisive contribution to maritime security in the NATO context. From sensors to data platforms to situational awareness, this creates a new level of quality that is equally important for securing supply routes, ports and critical infrastructure in the North Sea, Baltic Sea and Atlantic Ocean.

This development is more than just technical progress; it is a geopolitical signal. As Professor Herfried Münkler emphasises in his latest book, *Macht im Umbruch* (Power in Transition): "In the fields of economics and technology in particular, it will be important for Germans to once again become the driving force behind Europe, and that is primarily a task for national politics."

At REPMUS 2025, Germany impressively demonstrated that, with its maritime forces and industrial partners, it can make a substantial contribution to this future – and that there is an opportunity to (once again) become the driving force behind Europe in terms of security policy through technological innovation.

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Photo by Markus Beer/EUROATLAS