



# NATO STO CMRE NEWSLETTER

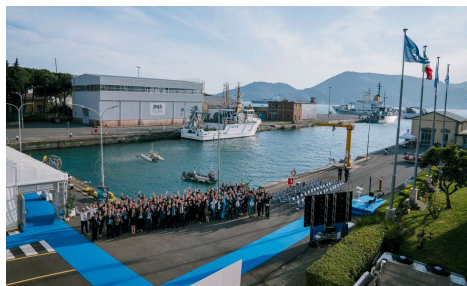
Stay updated with NATO Science & Technology Organization (STO) Centre for Maritime Research and Experimentation (CMRE) activities by following our Newsletters.

## HIGHLIGHTS

### NATO DEPUTY SECRETARY GENERAL AND PERMANENT REPRESENTATIVES OF NORTH ATLANTIC COUNCIL VISIT TO CMRE



On the 15th of April, the NATO Deputy Secretary General Mr. Mircea Geoană, visited CMRE together with Permanent Representatives to the North Atlantic Council. During this historic and memorable event, CMRE Director Dr. Eric Pouliquen shared his vision for the future along with our current cutting-edge capabilities as the place of choice for conducting Science & Technology for NATO and the Nations. Together with its researchers and engineers, Director presented CMRE forward-thinking approach to emerging and disruptive technologies, including Quantum Technologies, Critical Undersea Infrastructure protection, Autonomy and Robotics, AI and more, all with the background of two NATO Research Vessels, the NRV Alliance and CRV Leonardo. Alongside CMRE Director Dr. Pouliquen, the visitors were addressed by the Vice Admiral Dario Giacomini, on behalf of, His Excellency Ambassador Marco Peronaci, the NATO Chief Scientist Dr. Bryan Wells, and the Chief of Staff of the Italian Navy Admiral Enrico Credendino.



### NREP24 AND ACO24: CMRE SCIENTISTS AND ENGINEERS EMBARKED ON THEIR RESEARCH MISSION IN THE ARCTIC SEA



CMRE scientists and engineers embarked on NRV *Alliance* for their month long research missions in the Arctic sea: **Nordic Recognized Environmental Picture (NREP 24)** and **Arctic Climate Observatory (ACO 24)**.

**NREP 24** is funded by NATO Allied Command Transformation (ACT), and its objective is to investigate the changing, complex oceanographic and environmental conditions at these high latitudes and their impact on underwater sound properties. This multidisciplinary team from research, engineering, and IT is measuring environmental variables, running acoustic transmissions, and cross correlating data to form a common picture of the ocean features. **ACO 24**, funded by the NATO Science and Technology Organisation (STO) - Office of the Chief Scientist (OCS), collected data related to long-term environmental conditions in the area, including marine biology, water movements and the soundscape.



# JUNE

## CMRE AMONG 2,500 PARTICIPANTS AT CWIX

CMRE participated in the largest ever **Coalition Warrior Interoperability eXploration, eXperimentation, eXamination eXercise (CWIX)** at NATO's Joint Force Training Centre in Bydgoszcz, Poland. With over 2,500 participants and 490 capabilities being tested, CWIX24 is setting new records for interoperability and readiness. As part of this ground-breaking exercise, CMRE is collaborating with NATO Maritime Command to enhance the integration of unmanned platforms with national Command & Control (C2) systems. This critical work supports the development of STANAG 4817, paving the way for multi-domain command and control of these platforms. Establishing connections between STANAG 4817 and current NATO standards for Tactical Data Links (TDL) will provide the means to enlarge the operational picture, including unmanned systems and a multi-domain approach. With this objective in mind, CMRE planned and successfully executed multiple test cases at CWIX24, in cooperation with several NATO and National teams. The conducted testing activity explored the integration and interoperability of STANAG 4817 with different NATO and National systems in multiple Focus Areas: Maritime, Land, Air, TDL, GEOMETOC. CMRE, with the integration on STANAG 4817, was listed as one of the success stories at CWIX24.



## NATO STO STRATEGY SUB-GROUP MEETING HOSTED AT CMRE



As the in-house laboratory for conducting Science & Technology for NATO and the Nations, we were honored to host the STO Strategy Sub-Group Meeting in June, bringing together a wealth of expertise to shape NATO's future S&T direction. The SSG discussed recent developments in STO such as the drafting of an ambitious NATO S&T Strategy and focused on CMRE's priorities and Programme of Work.

## CMRE ESTABLISHES THE FIRST NATO QUANTUM LABORATORY!

CMRE has established the first NATO Quantum Lab dedicated to conducting edge research activities at the intersection between Quantum Science and Technology and Maritime / Underwater Applications.

The Quantum Lab is conducting a range of projects in the areas of Quantum computing, sensing, navigation and communications. It aims at hosting scientists and visiting researchers from academia, industry and research institutions from across NATO. The objective of CMRE with the Quantum Lab is to create a focal point for research, development and experimentation of Quantum science and Technology within the Alliance. Recently, the CMRE Quantum team performed the first sea trials on the topic of Quantum Navigation, working in collaboration with TNO (NL) and University of Pisa (IT) to acquire magnetic maps with quantum sensors to validate the feasibility of using such information to navigate in the absence of GPS (which happens underwater).



## CMRE UPCOMING ACTIVITIES & EVENTS

**Women & Girls in Science Winners Visit to CMRE**  
30 August  
CMRE, La Spezia (IT)

**UComms Conference**  
3 - 5 September  
Sestri Levante (IT)

**REPMUS EXERCISE**  
September Portugal

**NATO M&S GROUP MEETING**  
October  
La Spezia (IT)

**INNOVATION CONTINUUM 24:**  
23 - 30 October  
CMRE, La Spezia (IT)

**WARM '24 - COBRA '24**  
Sea trials  
October,  
Taranto (IT)

**ANMW FESTIVAL SEPIA**  
November  
CMRE, La Spezia (IT)

**Bold Machina NATO Forces exercise**  
November  
CMRE, La Spezia (IT)

**COLD '24**  
Sea trial  
November,  
Elba Island (IT)



MAY

## INTEROPFEST 2024: ONE STEP TOWARDS MARITIME STANDARDIZATION

The **InteropFest 2024** was held from **20 to 24 May** at **CMRE, La Spezia (IT)** and constitute an important milestone in maritime standardization. InteropFest gathered participants from Germany, Italy, Spain, Portugal, Norway and the NATO MGEOMETOC COE. Through lecture series and hackathon, CMRE presented to the industrial and academic community its latest developments in standardized command and control and data sharing. The lectures were interleaved with hackathon activities, where experts from the community were able to implement and test the latest developments in the Collaborative Autonomy Tasking Layer (CATL). CATL is a data model and family of messaging protocols, designed in the SCI-343 Research Task Group (RTG), and intended to exemplify a standardisation approach suitable for connecting federating networks of unmanned assets. Both the RTG and the InteropFest represent important communities of experts and users who contribute their collective effort to the future of interoperable command and control.



APRIL

## MAG 2024 TRIAL AT-SEA

A sea trial named MAG 2024, was carried out during April offshore La Spezia. Two quantum magnetometers were deployed in a continuously monitored environment. The latter was achieved by locating a series of moored environmental sensors in the proximity of the magnetic sensor. In particular, a moored WireWalker continuously monitored the temperature and salinity in the vicinity of the magnetometer. The moored instrument was complemented with bottom-deployed ADCP current meters to monitor sea currents at different depths, a Waverider measured surface waves and, a Meteo buoy recorded the wind (which drives near-surface currents). A third quantum magnetometer was installed at an isolated location on land to refer the local variations of the Earth's magnetic field.

## COUNTERING DRIFTING MINES



Recent geopolitical events have risen the international community and NATO's attention on naval mining and the use of drifting mines. They pose critical threats to any maritime and amphibious operations, including civilian shipping. In 2024, CMRE started to investigate the issue posed by drifting mines and activity objective is to perform research and development of signal processing and autonomy algorithms that may provide capability of drifting mine detection, classification and tracking with airborne systems using electro-optical sensors. The expected outputs for 2024 are the development of autonomous perception and tracking algorithms for drifting mines, the performance assessment of EO and IR sensors and the first at-sea trials for testing and validation.

## JANUARY - MARCH

### HIGH LATITUDE RESEARCH WORKSHOP

Exploring the Barents Sea's and overall Arctic region's importance amid climate change and shifting geopolitics, participants of the CMRE **High Latitude Research Workshop** delved into 'Atlantification' and its impact on ocean dynamics and SONAR capabilities. The Workshop was held **from 7 to 8 March** at **CMRE, La Spezia (IT)**.



## CMRE SUPPORT TO DIANA CHALLENGE

During February, CMRE had the pleasure to host and support ELWAVE during the first DIANA start-up testing, with the demonstration of an emerging sensing technology as part of the first batch of DIANA challenges. ELWAVE operated their innovative bio-inspired CEDAR/OCTOPULSE electrical sensing system within the framework of the CMRE's UXO (Unexploded Ordnance) Testbed facility, sponsored by the USA DoD Environmental Security Technology Certification Program (ESTCP), to promote the demonstration of innovative and disruptive technologies for the detection and classification of UXOs in view of their final remediation from contaminated underwater sites. During the demo week ELWAVE operated successfully their OCTOPULSE sensor at sea in the CMRE water basin, installed on board a Remote Operated Vehicle (ROV) deployed from NATO Coastal Research Vessel "Leonardo", on a purposely deployed field of UXO and clutter targets, in controlled environmental conditions.



## EDUCATIONAL ACTIVITIES

### CMRE SUPPORTING YOUNG TALENTS AND FOSTERING LOCAL COMMUNITY ENGAGEMENT

The first all-Italian edition of the **SeaPerch Challenge** was a huge success! Sponsored by CMRE and supported by the Italian Navy, this event is part of the **Giona Project** that promotes maritime research and STEM education. The Challenge was held on **15 and 16 May in La Spezia (IT)** and it offered high school students from Liguria and Tuscany to showcase their Underwater Robots' skills.

### INVITED LECTURES TO UNIVERSITY STUDENTS AND NAVAL ACADEMY CADETS

In the period of February to May, CMRE scientists and engineers gave invited lectures and trainings to students enrolled in the University of Pisa *Underwater Electro-Acoustics and Applications* Master's program, and cadets of the ITA Naval Academy.

### DR FERRI RECEIVED 2023 IEEE OES AWARD

During the OCEANS 2024 conference, Dr Gabriele Ferri has received the prestigious 2023 IEEE Oceanic Engineering Society (OES) Distinguished Technical Achievement Award for his work on marine robotic networks.

Dr. Ferri's pioneering role in cooperative autonomy solutions for marine heterogeneous robotic networks, deployed in complex underwater environments, has rightfully earned him this esteemed accolade.



## INNOVATION CONTINUUM 2024 SPOTLIGHT

The **INNOVATION CONTINUUM 2024 (IC'24)** is a new strategic initiative by ACT to drive tangible outcomes through the experimentation and demonstration of cutting-edge S&T solutions. This series of events presents a unique opportunity for NATO enterprise bodies and the nations to collaborate with ACT, thereby advancing Warfare Development through joint efforts. IC'24 will bring together military professionals, industry leaders, academia representatives, and subject matter experts in EDT. Information Technology experts will play a crucial role in addressing NATO's complex interoperability challenges, injecting fresh perspectives and energy into demonstrations, experimentations and workshops.

### IC 2024: SPARK

The first **IC'24** event was held from 27 - 29 February in La Spezia (IT) and focused on outlining the 2024 innovation experimentation and demonstration goals. The discussions centred on Multi-Domain Operations and Digital Transformation, resulting in agreed-upon hypotheses, proposals, and an initial list of operational scenarios and innovative solutions for further exploration.



### IC 2024: IGNITE

The second **IC'24** event from 14 to 17 May in Pensacola (US), **IGNITE** brought together industry leaders, academia, the winning teams of the TIDE Hackathon 2024, NATO Bodies and Nations in a collaborative effort to refine scenarios and select innovative solutions for the final event at CMRE end of October 2024.

### UPCOMING IC'24 EVENTS

Third IC'24 event: 2 - 5 September, The Hague (NL)

Final IC'24 event: 23 - 30 October at CMRE, La Spezia (IT)