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CMRE uncovers seabed secrets with underwater robots

The NATO Research Vessel Alliance is conducting the Multinational AutoNomy Experiment (MANEX '14) along the Ligurian coast, in order to demonstrate the advantages of mapping the seabed using autonomous vehicles.

From 22 September to 13 October 2014, multiple autonomous underwater vehicles (AUVs) equipped with modern sensors relevant to NATO minehunting missions are being employed at sea during the Multinational AutoNomy Experiment (MANEX '14) along the Italian coast, between Framura and Bonassola, in the Ligurian sea. Onboard the NATO Research Vessel Alliance, operated by the NATO Centre for Maritime Research and Experimentation (CMRE), part of the NATO Science and Technology Organization, scientists and engineers from eight institutions and ten Nations are exercising state-of-the-art high resolution underwater acoustic imaging systems and autonomous vehicle behaviours. The purpose of the trial is to collect data that will allow NATO researchers to advance the state-of-the-art in the area of seabed mapping using autonomous vehicles, mainly for mine countermeasures applications. The use of robots removes the need for Navy personnel to operate in a potentially dangerous area like a minefield, and ensures their safety. Improved capabilities in seabed mapping can also lead to positive advancements in other fields such as support for environmental and archeological surveys.

CMRE has a world-leading expertise in autonomous mine countermeasures and seabed mapping. For many years, in fact, the Centre has been working to transform the way mine countermeasures are conducted, from a post-Cold War approach, that focuses on post-operations clearance using surface ships, to a quickly deployable, autonomous system-of-systems that is scalable, cost effective, and minimizes risk to personnel. This includes developing techniques for handling the large data rates associated with modern high-resolution sonar, and developing AUV systems that can make adjustments to pre-planned routes based on data that are gathered in situ.

During MANEX '14, CMRE capabilities, AUVs and sensors will be challenged in a very complex environment where the sea bottom characteristics vary over the range of flat sand, seabed ripples, and heavy clutter. In particular, so-called Automatic Target Recognition (ATR) algorithms, computer programs used to find and identify underwater objects in sonar imagery, will be 'stressed' in such a high clutter and complex environment with the objective of maximising detection rates whilst minimising false alarms. The data collected will greatly help to enhance the quality of the scientific research conducted by the Alliance in this field. Overall, the multinational aspect of the MANEX '14 trial will also allow NATO and Nations to gain experience in how autonomous systems can be used in joint mine countermeasures missions. The MANEX '14 sea trial is funded by the Allied Command Transformation (ACT).

About CMRE. The STO-CMRE (Science and Technology Organization – Centre for Maritime Research and Experimentation) is located in La Spezia, Italy. Formerly the NATO Undersea Research Centre (NURC), the Centre focuses on research, innovation and technology in areas such as defence of maritime forces and installations against terrorism and piracy, secure networks, development of the common operational picture, the maritime component of expeditionary operations, mine countermeasures systems, non-lethal protection for ports and harbours, anti-submarine warfare, modelling and simulation, and marine mammal risk mitigation. CMRE operates two ships, NATO Research Vessel *Alliance*, a 93-meter 3,180-ton open-ocean research vessel, and Coastal Research Vessel *Leonardo*, a smaller ship designed for coastal operations. In addition to its laboratories the Centre is equipped with a fleet of autonomous underwater and surface vehicles and a world-class inventory of seagoing sensors.

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