



## CMRE at the forefront of LIDAR optical applications

*The NATO Research Vessel Alliance visited Las Palmas de Gran Canaria for the first time and presented to the press the ALOMEx '15 (Atlantic Lidar Optical Measurements Experiment 2015) trial conducted from 31 October to 12 November 2015 in the Alboran Sea and in the Sahara Upwelling area*

LIDAR (Light Detection And Ranging) systems have the potential to estimate optical and physical ocean properties in the water column. The ALOMEx '15 (Atlantic Lidar Optical Measurements Experiment 2015), led by the NATO STO Centre for Maritime Research and Experimentation (CMRE) from 31 October to 12 November 2015, is one of the pre-eminent experiments to investigate the use of these technologies to retrieve optical parameters from the water. Moreover, CMRE scientists and partners, on board the NATO Research Vessel Alliance, observed with LIDAR and other methodologies the Alboran Sea and the Sahara Upwelling area, which is in particular very poorly characterised from an optical point of view. "Both areas are highly dynamic and thus very interesting from a scientific perspective", underlines Violeta Sanjuan Calzado, CMRE ALOMEx '15 Scientist in Charge. "We are also pleased that the ALOMEx '15 sea trial marks the first visit ever of NRV Alliance in Las Palmas de Gran Canaria", she adds.

LIDAR is a laser pulse, normally used in land and sea environmental surveys to measure distance, speed, rotation and chemical composition and concentration. During this sea trial the return pulse of the LIDAR signal was tested in order to generate a waveform that was subsequently processed to infer different products by using different algorithms, and then validated with *in-situ* measurements. These new LIDAR applications put CMRE and partners at the forefront in this field and open the ground to optical measures for target detection and recognition at sea, and better ocean characterisation for underwater robotic missions. Future LIDAR systems for underwater communications, bathymetry, mine detection and underwater imaging would benefit significantly from this research.

In addition to the CMRE team of scientists and engineers specialized in ocean-acoustics-optics, ALOMEx '15 has gathered several research institutes' experts and skills. The Harbour Branch Oceanography Institute (USA) brought on board NRV Alliance the LIDAR system, where the Naval Research Lab (USA) mounted a turbulence probe to understand the micro-perturbations in the optical field. The University of Padova (Italy) set up an underwater communications experiment to simultaneously assess acoustical and optical communications channels for optimal transmission. The Ligurian District for Maritime Technologies – DLTM (Italy) provided analysis of water samples to evaluate particle content in the water and their effect on the optical field. The University of Las Palmas de Gran Canaria provided a valuable dataset of satellite measurements for both sampling regions and for various physical parameters, including optics. Finally, the campaign also allowed the University of Cadiz (Spain) to validate their ocean forecast model for the Alboran Sea.

**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 countermeasure 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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