CALDERA2012 CRUISE

GIRONA500 AUV EXPLORES THE SUBMERGED CALDERA OF THE VOLCANIC ISLAND OF SANTORINI.

The Caldera 2012 cruise took place between the 13 and the 23 of July within the caldera of Santorini (Greece) onboard R/V AEGAEO (HCMR, Greece). This project is funded through European Commission EUROFLEETS funding scheme (www.eurofleets.eu, grant n. 228344).

The main goals of the Caldera 2012 project are:

1. The validation of the AUV "GIRONA500" for routine scientific operations. This AUV is equipped with a multibeam sonar system for high resolution acoustic seafloor mapping as well as with cameras for seafloor imaging. Application of opto/acoustic imaging techniques to build photomosaics, micro-bathymetries and 3D topography reconstruction.

2. The characterization of hydrothermal activity within the caldera: optical maps of actively venting areas, water column in situ analyses with a marinized spectrometer, hydrothermal fluid sampling, and monitoring of temporal variations in hydrothermal activity.

The project consortium is formed by 4 institutions: l'Institut de Physique du Globe de Paris (PGP), the Hellenic Center of Marine Research (HCMR), Woods Hole Oceanographic Institution (WHOI) and the University of Girona (UdG).

MARINE VEHICLES & ROBOTS

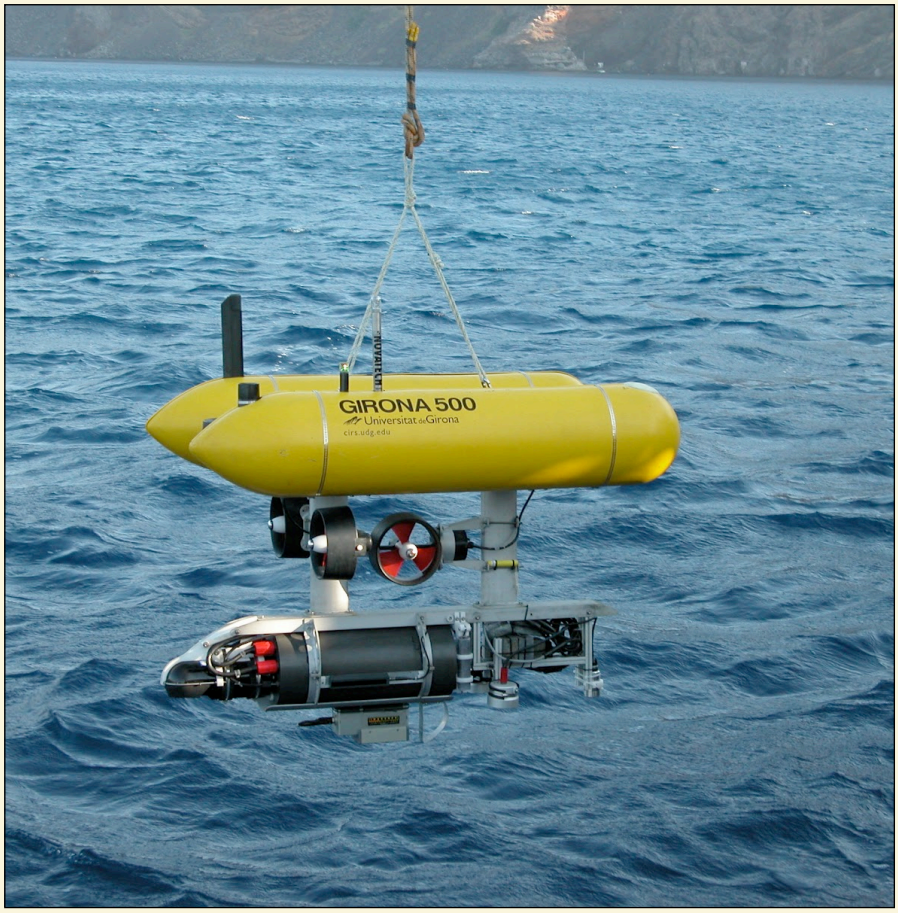
3 marine vehicles were used during the cruise: THETIS, a Human Operated Vehicle (HOV); MAXROVER, a remotely operated vehicle (ROV); and GIRONA500 an Autonomous Underwater Vehicle (AUV). THETIS and MAXROV are vehicles owned by the HCMR. GIRONA500 is an AUV designed and developped by the University of Girona.

GIRONA500 AUV DIVES IN SANTORINI

GIRONA500 AUV

The GIRONA 500 is a reconfigurable autonomous underwater vehicle (AUV) designed for a maximum operating depth of up to 500 m. The vehicle is composed of an aluminum frame which supports three torpedo-shaped hulls of 0.3 m in diameter and 1.5 m in length as well as other elements like the thrusters. This design offers a good hydrodynamic performance and a large space for housing the equipments while maintaining a compact size which allows operating the vehicle from small boats. The overall dimensions of the vehicle are 1 m in height, 1 m in width, 1.5 m in length and a weight of less than 200 Kg. The two upper hulls, which contain the flotation foam and the electronics housing, are positively buoyant, while the lower one contains the more heavy elements such as the batteries and the payload. This particular arrangement of the components separates the centre of gravity from the centre of buoyancy by about 11 cm, which is significantly more than found in a typical torpedo shape design. This provides the vehicle with passive stability in pitch and roll, making it suitable for tasks that will benefit from a steady platform such as interventions or imaging surveys.

The most remarkable characteristic of the GIRONA 500 is its capacity to reconfigure for different tasks. In its standard configuration, the vehicle is equipped with typical navigation sensors (DVL, AHRS, pressure gauge and USBL) and basic survey equipment (profiler sonar, side scan sonar, video camera and sound velocity sensor). In addition to these sensors, almost half the volume of the lower hull is reserved for payload equipment that can be configured according to the requirements of a particular mission. During the CALDERA-2012 project, the payload area hosted the WHOI mass spectrometer.



AUV Missions.

During the cruise the GIRONA500 AUV targeted two sites of scientific interest: the northern basin hydrothermal vent site and the lava tongue descending from there up to the bottom of the caldera. The undertaken missions included a multi-beam survey of the lava tongue, at 15 m. altitude, descending from 280 m. up to 350 m depth in the northern part of the crater. It also performed a joint multi-beam and monocular survey, at 4 m. altitude, while acquiring chemical data using the WHOI mass spectrometer.

The work took place on board the Greek AEGAEO oceanographic ship of the Hellenic Center of Marine Resarch which is also equipped with a ROV (MAXROVER) and a HOV (THETIS).

UDG TEAM

UdG Team

- From left to Rigth: David Ribas, Lluís magí, Narcis Palomeras, Natalia Hurtos, Ricard Campos, Pere Ridao, Nuno Gracias, Aggelos Mallios anbd Rafael Garcia.

UdG Contribution

The UdG team contributed to the project providing the AUV, as well as high resolution optical and acoustic mapping capabilities. During the following weeks, the data gathered with the underwater robots will be used to set-up high acurate 2D photomosaics, 2.5D micro-bathymetries and 3D reconstructions of selected sites of geological interest, to assist the geological studies.

GIRONA500 becomes Operational

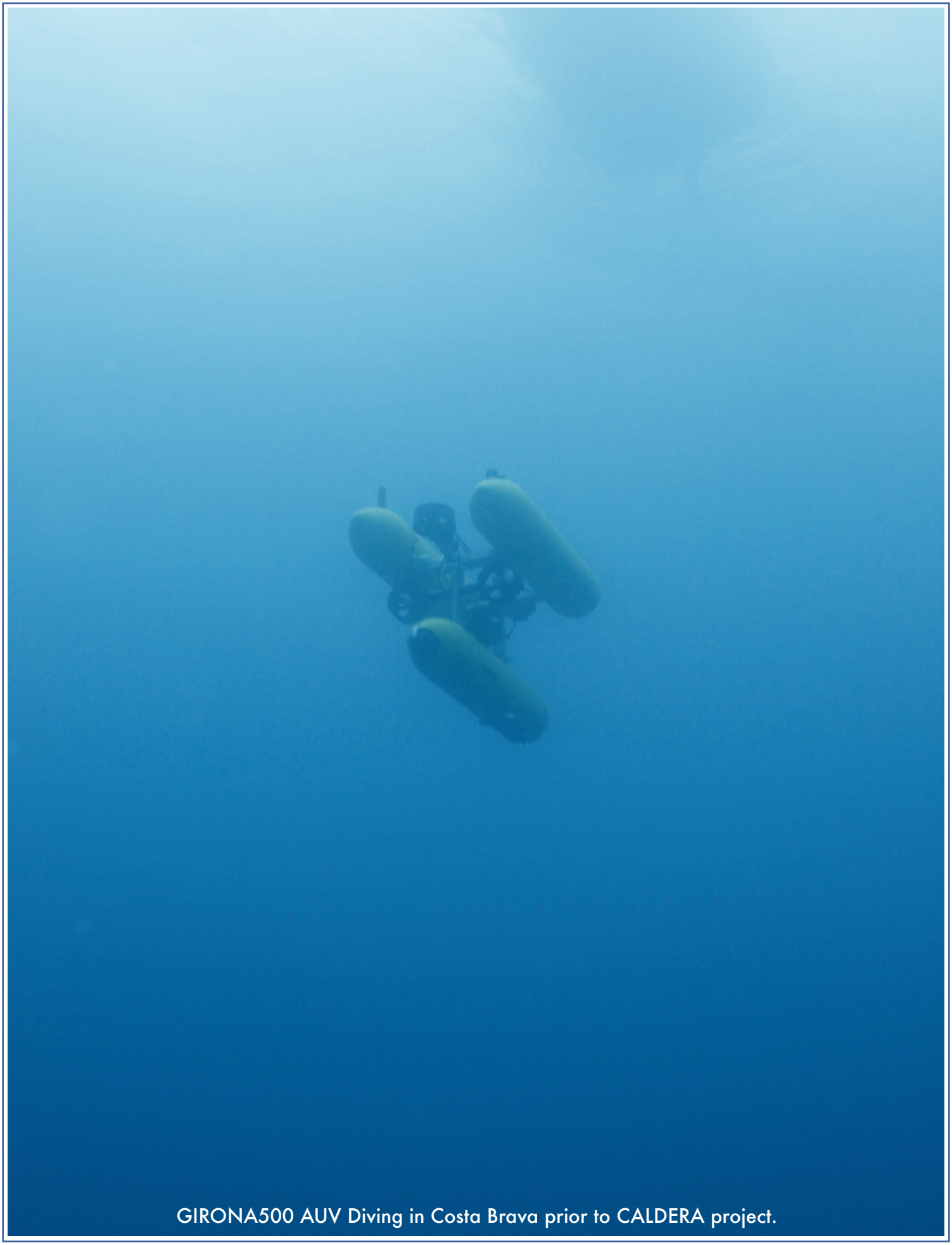
One of the main goals of the UdG team consisted in testing and validating the recently developed AUV, as an operative vehicle for rutinary scientific operations. The cruise results confirm our robot as an operational AUV which has been able to repetitively dive bellow the 300 m. depth reaching the deepest area of the caldera at 380 m.

About GIRONA500 AUV

The robot was built by the University of Girona in the context of the "RAUVI: Reconfigurable Autonomous Underwater Vehicle for Intervention Missions" Spanish research project under the grant DPI2008-06548-C03-03. Currently it is being used in the TRIDENT, PANDORA and MORPH European projects.

More Information

CALDERA2012 Eurofleets abstract: http://www.eurofleets.eu/np4/226.html
CALDERA2012 project web page: http://www.ipgp.fr/pages/040407.php?langue=2
GIRONA500 AUV : http://cirs.udg.edu
UdG Team : http://vicorob.udg.edu



GIRONA500 AUV Diving in Costa Brava prior to CALDERA project.