

M5 ON THE SETUP OF AN OPERATIONAL AUTONOMOUS UNDERWATER GLIDER FACILITY

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Abstract

We present the evolution, from its conception until today, of an established and internationally recognized Glider Facility. During 8 years of glider activity, new infrastructures and methodologies have been developed increasing glider missions, data, quality and availability. From 2005 to 2010, IMEDEA operated 4 Slocum G1 gliders following a research project approach. Since 2011, SOCIB, with in kind contribution from IMEDEA, is in charge of gliders' operation and maintenance, increasing the glider fleet with 4 new vehicles (2 Slocum G2 gliders and 2 iRobot Seagliders). SOCIB has established one permanent endurance line in the Balearic Islands and also provides open access glider time to third parties. We describe the progress of the Glider Facility, the results obtained and the objectives and actions foreseen in the near future.

Keywords –Autonomous Underwater Glider, Operational Oceanography, Western Mediterranean Sea, Meso and Submesoscale variability, Glider Observatories

Autonomous underwater gliders are meant to be a key technology for ocean observation in the near future. Observatories and universities from all over the world are gradually adopting these underwater robots to study specific processes that occur in the ocean, or to permanently monitor a specific area by keeping endurance lines. The Balearic Islands and the Spanish Government, through the research activities at IMEDEA and the monitoring observing system established at SOCIB, have strongly backed the implementation of such technology and the result is an internationally recognized operational Glider Facility based in Mallorca.

IMEDEA (CSIC-UIB) was an early adopter of glider technology and acquired its first Teledyne Webb Research (TWR) Slocum shallow glider in 2005 in the frame of the EU funded MERSEA project. Back then, glider technology was incipient in Europe and frequent troubleshooting occurred. This complex technology required specific engineering knowledge for operation and maintenance. In 2006,

the first scientific mission took place and, since then, the number of process oriented missions increased. Three new deep Slocum gliders were acquired and new data processing scripts were developed to process scientific data and track the gliders in Real Time [Ruiz et al]. Also, studies to increase the monitoring capacities of those platforms were done on optimal path planning techniques [Garau et al] and adaptive sampling methods [Alvarez et al].

In 2011, SOCIB was in charge of gliders operations and modified the working paradigm [Tintoré et al]. SOCIB focused on maintaining a semi-continuous endurance line that covers the Mallorca and Ibiza channels, with special emphasis on the Ibiza channel [Heslop et al]. The infrastructure and dedication to maintain such permanent activity was increased by two full-time engineers, a dedicated glider lab, and four new gliders (two deep TWR Slocum G2 gliders and two iRobot Seagliders). The results were promising during the first half of 2011 but several technical glider failures interrupted the monitoring for 7 months. In 2012, an intensive glider test program was established and carried out to ensure a correct behavior of the entire glider fleet, to minimize future interruptions of the endurance line monitoring. Several new improvements were also implemented: a 100 bar pressure chamber to test gliders' sealing, RUDICS communications, new vessels, new data management procedures, etc. In April 2012 the endurance line monitoring was reestablished with success.

This work presents a yearly evolution of the facility, from 2005 to mid-2013, with the main highlights regarding infrastructure, acquisitions, personnel, technology, repairs, methodologies and other important factors. The aim of the present text is to expose the lessons learnt in the process of establishing an operational Glider Facility.

A 3 year projection, from 2013 to 2016, is also presented regarding the main infrastructure and technological advances needed to reach SOCIB's target: one, or possibly two, endurance lines continuously monitored and the access of gliders to external users, as it has already been done in the frame of JERICO TNA project [JERICO TNA, first call].



Figure 1. Glider (Seaglider type) deployed during 2012