



New developments in Seafloor observatory technologies: the SED Module developed in the MONSOON project

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In the main frame of the wide range of scientific and technological activities developed by EMSO (European Multidisciplinary Seafloor and water-column Observatory, www.emso-eu.org) Research Infrastructure. The MONSOON project (MONitoraggio SOttOmariNo for environmental and energetic purposes) is a FESR (i.e. European funds for social development) funded project by "Regione Siciliana" (industrial call). The final target of the project is to build up a prototype of a seafloor observatory named SED (Submarine Energy Device), for which specific technological developments in terms of power consumption reduction, new data logger and new sensors have been planned. The SED observatory is planned to operate down to a water depth of 2000m in an extreme marine environment, with the presence of hydrothermal vents.

SED is designed to operate as "stand-alone" or near-real-time observatory when connected to a buoy. The final version of the prototype it is planned to be released in June-July 2015 after tests completion. All the components of the observatory have been planned and laboratory-tested by the INGV and CNR public Research Institutions, while the executive plan and the manufacturing has been carried out by the industrial partnership (Eurobuilding SpA, Hitec2000 srl and Innova SpA). All the partners are going to take care of the tests in a real environment.

The selected test site is located in the Aeolian islands where the shallow hydrothermal system off the coasts of the Panarea island provided an easy-to access extreme submarine environment with temperatures up to 140°C, pH less than 3 and electrical conductivity double of the normal sea-water. In this hostile environment we tested all the materials planned to be used to manufacture the different parts of the observatory, as well as all the sensors including those off-the-shelf and those planned within the MONSOON project: probes for acoustic signals, dissolved CO₂ data, optical fibre-based temperature and pressure

The probes are connected by submarine cables and connectors to a vessel hosting the electronics made new low-power cards for data collection, electrical power management, sensor driving and control, network communication and data storage. The power is provided by high capacity Lithium-polymer batteries. The tests have been carried out using a permanent INGV infrastructure made of a buoy cabled to a seafloor station operating at a depth of 23 metres two miles to the East of the Panarea island. This infrastructure allowed to perform the communication tests and to check the status of all the probes by near-real time communication.

The technologies developed within the MONSOON project support the EMSO scientific infrastructure, allow to perform continuous monitoring in marine hydrothermal systems and exploit the know-how on the scientific and industrial international market.