



ESONET LIDO Demonstration Mission: the East Sicily node

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Off East Sicily (at 2100 m depth, 25 km off the harbour of Catania) a prototype of a cabled deep-sea observatory (NEMO-SN1) was set up and has been operational in real-time since 2005 (the cabled deep-sea multi-parameter station SN1, equipped with geophysical and environmental sensors and the cabled NEMO-O₂DE, equipped with 4 broadband hydrophones). The Western Ionian Sea is one of the node sites for the upcoming European permanent underwater network (EMSO). Within the activities of the EC project ESONET-NoE some demonstration missions have been funded. The LIDO-DM (Listening to the Deep Ocean-Demonstration Mission) is one of these and is related to two sites, East Sicily and Iberian Margin (Gulf of Cadiz), the main aims being geo-hazards monitoring and warning (seismic, tsunami, and volcanic) and bio-acoustics. The LIDO-DM East Sicily installation represents a further major step within ESONET-NoE, resulting in a fully integrated system for multidisciplinary deep-sea science, capable to transmit and distribute data in real time to the scientific community and to the general public. LIDO-DM East Sicily hosts a large number of sensors aimed at monitoring and studying oceanographic and environmental parameters (by means of CTD, ADCP, 3-C single point current meter, turbidity meter), geophysical phenomena (low frequency hydrophones, accelerometer, gravity meter, vector and scalar magnetometers, seismometer, absolute and differential pressure gauges), ocean noise monitoring and identification and tracking of biological acoustic sources in deep sea. The latter will be performed using two tetrahedral arrays of 4 hydrophones, located at a relative distance of about 5 km, and at about 25 km from the shore. The whole system will be connected and powered from shore, by means of the electro-optical cable net installed at the East Sicily Site Infrastructure, and synchronised with GPS. Sensors data sampling is performed underwater and transmitted via optical fibre link, with optimal S/N ratio for all signals. This will also permit real-time data acquisition, analysis and distribution on-shore. Innovative electronics for the off-shore data acquisition and transmission systems has been designed, built and tested. A dedicated computing and networking infrastructure for data acquisition, storage and distribution through the internet has been also created. The deployment and connection of the deep sea structures will be performed using the dedicated ROV and Deep Sea Shuttle handling facilities (PEGASO, owned by INGV and INFN). LIDO-DM

constitutes the enhancement of the Western Ionian site in view of the EMSO Research Infrastructure.