

EMSO RESEARCH INFRASTRUCTURE IN THE FRAMEWORK OF THE EUROPEAN MARINE RESEARCH

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Abstract

EMSO (European Multidisciplinary Seafloor and water-column Observatory) is an European-scale Research Infrastructure of fixed-point, deep-sea observatories. It is geographically distributed in key sites of European waters, and spans from polar to subtropical climatic zones and from the open ocean to closed basins thus offering a broad spectrum of study across diverse environments. EMSO provides scientists with near-real time and real-time, long-term time-series of relevant variables related to environmental processes and is a special tool to investigate interactions between the geosphere, hydrosphere and biosphere. EMSO, coordinated by a consortium of European Countries, is implementing services for the exploitation of its facilities (devices, sensor packages and data) by the scientists from various disciplinary marine communities.

Keywords: Deep sea processes, Mediterranean Sea

EMSO (European Multidisciplinary Seafloor and water-column Observatory) is a European-scale Research Infrastructure (RI) based on fixed-point, seafloor and water-column observatories with the basic scientific objective of near-real time and real-time, long-term monitoring of environmental processes related to the interaction between the geosphere, hydrosphere and biosphere. The RI is geographically distributed in key sites of European waters, and spans from polar to subtropical climatic zones and from the open ocean to closed basins thus offering a broad spectrum of study across diverse environments. EMSO open ocean observatory locations were identified according to the scientific priorities of the European marine Science community, through multiple EU coordination projects and infrastructure development projects. These key sites were selected because their ongoing key natural processes require continuous long-term monitoring to understand their dynamics at a continental scale. Tests sites are also integral parts of the observatory network and they are fundamental facilities for testing devices (software and hardware) to be incorporated in EMSO nodes. Figure 1 shows the location of the EMSO nodes presently targeted to establish permanent, fixed-point observatories. From the technological point of view, the most striking characteristic of observatory design is the ability to address interdisciplinary objectives simultaneously across scales. Data are collected from the ocean surface, through the water column, the benthos, and the sub-seafloor. Depending on the application, in situ infrastructures can either be attached to a cable, which provides power and enables data transfer, or they operate as independent benthic and moored instruments. Data, also in the latter case, can be transmitted through acoustic networks that are connected to a satellite-linked buoy. Cabled infrastructures provide important benefits such as real-time data transfer, when a processing of huge amount of data (as for bioacoustics) or a real-time integration with land-based networks (as for the seismology), as well as a rapid geo-hazard early warning system, is needed. EMSO ERIC (European Research Infrastructure Consortium) is the legal entity managing the infrastructure. The ERIC implements the organization to facilitate scientists from various disciplinary marine communities to access the infrastructure remotely, physically, virtually, and spreads the data produced encouraging the use and integration. The ERIC also promotes the enrichment of the infrastructure with new components and new monitoring nodes. Marine Science communities at national levels are progressively joining together to network, share and exploit their research infrastructures, efforts and skills in support of EMSO. It is particularly important to have this national-level coordination as the ERIC structure is according to national membership. Italian and French communities have already established joint research groups, namely EMSO Italia and EMSO France, gathering research institutions and universities under the leadership of INGV in Italy and Ifremer and CNRS in France. These research groups help to increase awareness of the EMSO opportunities and in broadening the scientific user base. EMSO is going to be one of the sub-sea segments of the COPERNICUS initiative and can significantly enhance the observational capabilities of European Member States. EMSO ERIC will also be an important component of the future EOOS (European Ocean Observing

System), a system of systems federating single initiatives (such as Euro-ARGO). EOOS will integrate Eulerian coastal and open ocean monitoring systems looking at sub-seafloor, seafloor, water-column, sea-air interface with Lagrangian systems and Earth Observation. EMSO is the European "voice" that can speak to worldwide counterpart programs, such as ONCNEPTUNE in Canada, NSF-OOI In US, JAMSTEC-DONET in Japan and IMOS in Australia. EMSO Team: P. Favali* (1,2), L. Beranzoli (1,2), M. Best(1), M. Cannat (3), N. Cagatay (4), J.-J. Dañobeitia(5), E. Delory (6), H. de Stigter(7), B. Ferré (8), M. Gillooly (9), F. Grant(9), P. O. J. Hall (10), V. Lykousis(11), J. Mienert(8), J. M.A. de Miranda(12), G. Oaie (13), V. Radulescu (14), J.-F. Rolin (15), H. Ruhl (16) and C. Waldmann (17) (1) EMSO Interim Office, (2) INGV, (3) IPGP, (4) ITU, (5)CSIC, (6) PLOCAN, (7) NIOZ ,(9) MI, (10) UGOT, (11) HCMR, (12) IPMA, (13) GeoEcomar, (15) Ifremer, (16) NERC, (17) MARUM.



Fig. 1. Geographical distribution of the EMSO nodes around the European Seas.

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