

Euro-Argo ERIC – EMODnet

Memorandum of Understanding

The present Memorandum of Understanding aims to strengthen the relationships between EMODnet, represented by Seascope Belgium administering the EMODnet Secretariat, ETT coordinating EMODnet Physics and OGS coordinating EMODnet Chemistry and Euro-Argo ERIC to further develop their collaboration on *in situ* ocean observations in Europe.

Rationale

Euro-Argo ERIC provides *in situ* ocean observations to a wide range of users with an interest in the ocean's state and evolution, both from a physical and a biogeochemical point of view. The European Argo programme coordinated by Euro-Argo ERIC contributes 25% of the Argo international programme.

The European Marine Observation and Data Network (EMODnet) is a network of organisations supported in the framework of the EU's Integrated Maritime Policy delivering the EU marine data service EMODnet. These organisations work together to observe the ocean, process the data generated according to international standards and make that information freely available as interoperable data layers and data products. Argo represents a major observing system for EMODnet especially for the Physics and Chemistry lots.

Euro-Argo ERIC

The international Argo programme is an essential component of the global ocean observing system required to monitor and forecast the oceans and the evolution of our climate. Argo is the first-ever global, *in situ* ocean observing network in the history of oceanography, providing an essential complement to satellite systems. About 4000 floats are now globally measuring ocean properties between the surface and 2000m depth, delivering key data used to produce standardised products. Argo provides thousands of daily measurements of ocean physics and is progressively becoming the main source of *in situ* biogeochemical (BGC) observations in the open seas, while extending towards the abyss.

The Euro-Argo ERIC (European Research Infrastructure Consortium) organises and federates 13 European countries aiming at maintaining 25% of the global Argo network. Euro-Argo partners also operate one of the two Argo Global Data Assembly Centres and several regional Argo data centres.

Setting up a long-term observation of the deep oceans is vital to understand how much, and how fast, the earth will warm due to increased greenhouse gas concentrations. Long-term observation of ocean biogeochemistry helps to understand the evolution of the marine ecosystems and the impact of climate change. The new "Global, Full-Depth and Multidisciplinary" Argo design (Roemmich et al., 2019, *Front. Mar. Sci.* 6:439. doi: 10.3389/fmars.2019.00439) is now being implemented in Europe, with two main objectives: 1/ to sustain the existing global array and 2/ to extend its capabilities to deeper depths and to biogeochemistry through the Deep Argo and BGC Argo missions. In addition, Euro-Argo is also enhancing Argo monitoring in polar regions and European marginal seas including shallower areas to complement other observing systems.

EMODnet

The European Marine Observation and Data Network (EMODnet) is a long-term EU marine data initiative funded by the European Maritime, Fisheries and Aquaculture Fund (previously: European Maritime and Fisheries Fund). The EMODnet service is the focal point for *in situ* integrated marine environmental and human activities data and data products that are used by thousands of users who need high quality, harmonised and standardised data and information as input to operations at sea and to support the green transition, as observations and information on the health of the ocean and on human impact for regional sea-basin assessments and European policies.

EMODnet connects a network of over 120 organisations who work together to process ocean observations and marine data collected by a myriad of actors according to international standards and make that information freely available as interoperable data layers and data products. This 'collect once and use many times' philosophy benefits all marine data users, including policy makers, scientists, private industry and the public.

EMODnet provides easy and free access to marine data, metadata and data products and services spanning seven broad disciplinary themes: bathymetry, geology, physics, chemistry, biology, seabed habitats and human activities. Each theme is dealt with by a partnership of organisations that possesses the expertise necessary to standardise the presentation of data and create data products. To demonstrate the power of opening up Europe's wealth of marine observations and data, EMODnet experts also turn marine data into maps, digital terrain models, time series & statistics, dynamic plots, and provides map viewers and other applications ready to support researchers, industries and policy makers to tackle grand societal challenges.

EMODnet is also one of the core data infrastructures and ocean services which, together with the Copernicus Marine Service and Copernicus Data and Information access service (DIAS), form the backbone of a future European Digital Twin Ocean, a key contribution to the EU marine data space and regional best practices for the global ocean data ecosystem

Relations between Euro-Argo ERIC and EMODnet

Observations are a fundamental pillar of the EMODnet value-added chain that goes from observation to information and users. The Argo array of profiling floats is an essential *in situ* observing system covering all the oceans with an enhanced coverage in the European Marginal seas implemented by the Euro-Argo ERIC Members. It represents the main source of temperature and salinity measurements at depth and is the backbone of the *in situ* observing system in most of the European seas. With regards to implementation of the new phase of Argo with its extension to the deep and the biogeochemical missions and towards high latitudes and shallower areas, it has been shown that Argo measurements were key in improving the EMODnet physical and biogeochemical products with a global ocean coverage, but also in shallow seas like the Baltic Sea or in European Marginal seas with depths greater than 2000m like the Mediterranean Sea. Moreover, the Argo biogeochemical parameters, provided freely in near real time and delayed mode, are complementary to the monitoring systems operated in European seas and will support the enhancement of EMODnet products in the near future, in particular in support of the Marine Strategy Framework Directive and for carbon monitoring.

EMODnet and Euro-Argo ERIC collaboration items

Seascope Belgium – administering the EMODnet Secretariat on behalf of the European Commission directorate General for Maritime Affairs and Fisheries - and Euro-Argo ERIC recognize a common

interest in *in situ* data for different applications and users, and identify several areas of development and operational activities that will benefit from further cooperation between them. This Memorandum of Understanding formulates an initial number of areas and activities of cooperation, while this list can be updated over time in mutual agreement:

With this MoU, Euro-Argo ERIC and EMODnet representative organisations Seascope Belgium (EMODnet Secretariat) in close collaboration with ETT (EMODnet Physics) and OGS (EMODnet Chemistry) agree to

- Exchange and coordinate activities to maximize and ease the use and sharing of existing and new types of Argo data with corresponding metadata by EMODnet;
- Regularly review the quality and availability of Euro-Argo products and agree on recommendations as to their improvement;
- Report on achievements and future needs in terms of observations (spatial and temporal coverage) in order to enhance the range and quality of products offered by EMODnet;
- Develop joint advocacy activities towards funding agencies for promoting the need for a sustained and consolidated European contribution to the full-depth, multidisciplinary and global Argo array.

Progress on these collaborative activities will be monitored through regular meetings between key representatives of both entities. Initially, the meetings will be organized yearly - with notice of at least one month before each meeting - with the possibility to increase the frequency based on requirements from both sides. They will also provide opportunities for possibly updating this initial MoU.

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