EMODnet Physics – First Workshop, Tallinn 2011

Conclusions and actions from the Workshop held in Tallinn, Estonia, on 16 – 17 June 2011

The workshop was held by the EMODnet Physics project partners for representatives of the NOOS, BOOS and IBI-ROOS EuroGOOS Regions

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Contents

1 Introduction

The Workshop was opened by Hans Dahlin, director of EuroGOOS, with a short introduction. EuroGOOS is a partner in the EMODnet Physics project which is undertaken in cooperation with SeaDataNet and MyOcean. This project aims to develop a portal providing a harmonised overview and access to marine physical data, both archived and near-real-time, for Europe's maritime regions. The portal will be built upon the existing regional operational systems for marine physical data, the so-called ROOSs, and in synergy with SeaDataNet and MyOcean developments. The Workshop was organised by EuroGOOS to inform representatives of the NOOS, BOOS and IBI-ROOS regions about the EMODnet Physics project and to discuss how they can contribute to the further development and operation of the EMODnet Physics portal. Later on a comparable Workshop will be organised for the Mediterranean and Black Sea ROOSs.

The Workshop continued with presentations from project group members (Giuseppe Manzella – ENEA, Sylvie Pouliquen – IFREMER, Lesley Rickards – BODC, Antonio Novellino – ETT, and Dick Schaap – MARIS), giving detailed information on:

- EMODnet
- The EMODnet Physics project
- The planned architecture of the EMODnet Physics portal
- The adoption of the ROOSs / MyOcean near-real-time data exchange and access infrastructure
- The adoption of the SeaDataNet archived data access infrastructure
- The observation data to be included

These presentations led to discussions about the expected contributions from EuroGOOS–ROOS communities and resulting in agreed actions.

These minutes give a concise report of these items and the Workshop conclusions and actions. All presentations are available at the website that has been set up recently at www.emodnet-physics.eu, and that will host the portal in the near future (at present it contains a prototype).

2 Background on EMODnet

In December 2007 the European Parliament and Council adopted a common text for the **Marine Strategy Framework Directive** which aims to achieve environmentally healthy marine waters by 2020. This Directive includes an initiative for an overarching **European Marine Observation and Data Network (EMODnet)**. During the one-year consultation phase that followed the release of the EU Green Paper on a Future Maritime Policy for the European Union, stakeholders gave an overwhelmingly positive response. Facilitating access to high quality marine data will resolve difficulties and stimulate an expansion of value-added public and commercial services, lay the foundations for sound governance and reduce uncertainties on human impact on the planet, as well as of forecasts relating to the future state of the marine environment. Better and linked marine data will have an immediate impact on the planning of environmental policy and mitigation measures, and will also facilitate impact assessments and scientific work.

Accordingly in its Blue Book on an integrated maritime policy for the European Union, the Commission undertook to take steps in 2008 towards a European Marine Observation and Data Network (EMODnet) and in the accompanying Action Plan to prepare by 2009 an EU action plan to make progress in this area on the basis of a road map.

In 2010 the EU DG MARE launched the Commission's **Marine Knowledge 2020** communication proposing to unlock the potential of Europe's marine knowledge. It seeks primarily to enhance our understanding of Europe's seas and oceans, make using marine data easier and less costly and fostering competitiveness among marine data users. This communication underpins the position and importance of EMODnet for improving access to marine data and its relation with other EU initiatives such as INSPIRE, GMES, and WISE-Marine.

The **Global Monitoring for Environment and Security (GMES)** initiative aims to provide information services in the field of environment and security which are developed on the basis of sustainable observations systems from satellites and in-situ. Parameters made available through EMODnet will facilitate the GMES Marine Core Service which aims to deliver both short-term and seasonal forecasts, hindcasts, nowcasts, and time series and climate change scenario simulations of physical parameters describing open ocean state and dynamics and some primary ecosystem characteristics. The MyOcean project is demonstrating the GMES Marine Core Service until spring 2012, to be succeeded by MyOcean2 (2012–2014) and plans are underway for sustaining the activity thereafter possibly in a European Centre for Ocean Monitoring and Forecasting (ECOMF) through GMES.

EMODnet should respect INSPIRE standards for data discovery and access. EMODnet will provide data on scales defined by the regions and subregions of the Marine Strategy Framework Directive. EMODnet, as an open data system, is also considered as a significant observation and monitoring data conduit for the part of the **Water Information System for Europe (WISE)** that will be developed for dealing with marine information (WISE-Marine) and supporting the data and indicator needs for the initial assessments required by Member States in 2012 by the Marine Strategy Framework Directive. **WISE** and **WISE-Marine** are thematic branches of the envisaged **Shared Environmental Information System (SEIS)** based on INSPIRE principles. EMODnet data should be directly available for viewing through WISE-Marine.

The "proof of concept" of EMODnet is being tested through preparatory actions. Portals for a number of maritime basins are being set up for hydrographic, geological, biological, chemical and physical data as well as functional habitat maps. These portals will provide access to marine data of a standard format and known quality and identify gaps in coverage. The projects will identify the main challenges in moving from an ur-EMODnet to an operational EMODnet. Should these prototypes prove to be successful, then efforts will be made to extend their geographic range in order to cover all of the waters of EU Member States for one or more sets of parameters through Community instruments for territorial cooperation.

The EU has arranged funding for the coming 3 years (2012–2014) for further developing the EMODnet portals and undertaking supportive studies and activities, which together must result in a sustained and operational EMODnet from 2014 onwards. This should be supported by structured EU funding next to Member State funding.

Considering its embedding in the Marine Strategy Framework Directive it can be concluded that the EMODnet development will provide a great opportunity for data providers to promote the importance of their services for societal uses, to motivate extra monitoring and to establish sustained funding by Member States and EU. Therefore EuroGOOS decided to become involved in the EMODnet Physics project., and will deliver a shop window for its members to present their data provision to a large audience from users to policy and decision makers and to foster future developments. The relation with the Marine Strategy Framework Directive can also be used by data providers at their national level to defend their budgets against cost cutting operations. However it will also require EuroGOOS members to accept their responsibility for providing good services in order to qualify for a next level of negotiation and engagement with the EU and Member States for future sustained operation and expansion.

3 The EMODnet Physics portal project: summary of the tender

The overall objectives of the EMODnet Physics preparatory action are to provide access to archived and near real-time data on physical conditions in Europe's seas and oceans by means of a dedicated portal and to determine how well the data meet the needs of users from industry, public authorities and scientists. The latter implicates that it is also an objective to identify data gaps and arguments to motivate why these gaps should be filled in future monitoring. This project will contribute towards the definition of an operational European Marine Observation and Data Network (EMODnet).

This should be done by:

1. Providing through a portal
   a) Access to marine data from measurement stations and ferryboxes. Both near real-time and archived data of time series are to be made available.
   b) Metadata for these data sets using EMODnet/INSPIRE standards.
   c) Metadata maps and overviews for whole sea-basins showing the availability of data and monitoring intensity of that basin.
2. Monitoring and reporting on the effectiveness of the portal in meeting the needs of users in terms of ease of use, quality of information and fitness for purpose of the products delivered.
3. Analysing what lessons have been learned for a future operational EMODnet.
4. Keeping the portal operational afterwards.

The portal must be operational 24 hours a day, 7 days a week and should clearly be branded as an EMODnet portal following the EMODnet design style as also adopted by other EMODnet portals.

The EMODnet Physics project asks for the following types of measurements:

Measurements from fixed stations that should cover at least:

1. Wave height and period
2. Temperature of the water column
3. Wind speed and direction
4. Salinity of the water column
5. Horizontal velocity of the water column
6. Light attenuation
7. Sea level.

Measurements from ferryboxes that should cover at least:

1. Temperature of the water column
2. Salinity of the water column.

3.1 Relation with SEPRISE

SEPRISE (Sustained, Efficient Production of Required information Services) was a Specific Support Action undertaken by EuroGOOS and funded by the EC within the 6th Framework Programme to further operational oceanographic services, in line with the priorities of the members of EuroGOOS. The EU project finished in May 2007 but the portal was kept open by EuroGOOS. In total 45 European oceanographic and meteorological institutes provide(d) data to SEPRISE. Data are available in near real-time from fixed stations and buoys. In addition, model results have been obtained to provide forecasts for the same locations. Data were collected in any possible format and converted into one single format at a central location (SMHI). SEPRISE currently includes 385 stations producing 652 time series once every hour. Coriolis has collaborated with SEPRISE to create a complementary system including Argo floats, displaying information in Google Earth as well as providing an ftp site with freely available data. In 2008, EuroGOOS recommended the ROOSs to set up regional portals to facilitate observation sharing for operational oceanography needs. The main differences between SEPRISE and the current EMODnet physics portal is that the new portal must respect EMODnet (based on INSPIRE) standards for metadata and that the portal should deliver archived as well as near real-time data. Another difference is that it will be the responsibility of each of the EuroGOOS Regions and their data providers to arrange for all metadata and data sets to conform to agreed formats and will not require further conversion at the EMODnet Physics portal.

3.2 Project team

The EMODnet Physics tender has been submitted by and awarded to the **EuroGOOS Association** in

cooperation with the **MyOcean** and **SeaDataNet** consortia, represented by a partnership of EuroGOOS, ETT, ENEA, IFREMER, BODC and MARIS. EuroGOOS, SeaDataNet and MyOcean already have considerable overlaps in partners and cooperate in several ways. Many EuroGOOS members are also partners in SeaDataNet; and EuroGOOS and SeaDataNet have an agreement for maintaining and operating the European Directory of Ocean Observing Systems (EDIOS). MyOcean and SeaDataNet have signed an MoU with the aim of making available a comprehensive dataset of in-situ observations from both operational oceanography programmes and scientific surveys to serve both the Operational Oceanography and research communities as well as other users. Also MyOcean and SeaDataNet strive for common standards.

EuroGOOS, MyOcean and SeaDataNet develop and operate infrastructures for acquiring, archiving, and giving access to physical data from the global oceans and the regional and coastal waters of the European maritime regions. These infrastructures are populated by many providers of ocean and marine physical data sets in Europe and will provide the underlying basis for the EMODnet Physics portal.

The EMODnet project team partners represent these groups and their infrastructures and combine considerable expertise and experience of collecting, processing, and managing of ocean and marine physical data together with expertise in distributed data infrastructure development and operation including providing OGC services (WMS, WCS, and WFS) for viewing and distribution.

EuroGOOS (www.eurogoos.org) is an association of agencies to further the goals of GOOS and, in particular, the development of Operational Oceanography in the European Sea areas and adjacent oceans. EuroGOOS now has 34 Members in 18 European countries. Among its priorities are the improvement of the observing system for operational oceanography in Europe, its contribution to global systems and the further development of GOOS, in particular by taking the lead in advancing Coastal GOOS. Activities of EuroGOOS associates and Regional Members are organised at regional level. These Regional Ocean Observing Systems (ROOSs) are responsible for the collection of data to fulfil the aims of the regional service needs.

MyOcean (www.myocean.eu.org) is the implementation project of the GMES Marine Core Service, aiming at deploying the first concerted and integrated pan-European capacity for Ocean Monitoring and Forecasting. The MyOcean2 project that should start in 2012 will enhance and strengthen the services developed in MyOcean. Within these projects, the in-situ Thematic Assembly Centre (in-situ TAC) of MyOcean is a distributed service integrating data from different sources for operational oceanography needs. The MyOcean in-situ TAC is collecting and carrying out quality control in a homogeneous manner on data from outside MyOcean data providers to fit the needs of internal and external users. It provides access to integrated datasets of core parameters for initialization, forcing, assimilation and validation of ocean numerical models which are used for forecasting, analyses (nowcast) and re-analysis (hindcast) of ocean conditions. Since the primary objective of MyOcean is to forecast ocean state, the initial focus is on observations from automatic observatories at sea (e.g. floats, buoys, gliders, ferrybox, drifters, SOOP) which are transmitted in real-time to the shore. The second objective is to set up a system for re-analysis purposes that requires products integrated over the past 25 to 50 years. The MyOcean in-situ TAC, directly involved in the EMODnet Physics project, is providing the in-situ Pan European service for ocean monitoring based on the national and international providers. The in-situ TAC comprises a global in-situ centre and 6 regional in-situ centres. The in-situ TAC has been designed to fulfil the GMES Marine Core Service needs and the EuroGOOS regional systems (ROOS) needs. The focus of the MyOcean in-situ TAC is on parameters that are presently necessary for GMES Monitoring and Forecasting Centres namely temperature, salinity, sea level, current, chlorophyll / fluorescence, oxygen and nutrients. Additional parameters such as wind and waves are added by some ROOSs to these regional in-situ portals to fulfil additional downstream applications needs.

SeaDataNet (www.seadatanet.org) is a European Infrastructure project (DG-Research–FP6 (2006–2011) and continuing in FP7 (2011–2015)) which is developing and operating a Pan-European infrastructure for managing, indexing and providing access to ocean and marine environmental data sets and data products (e.g. physical, chemical, geological, and biological properties) and for safeguarding the long term archival and stewardship of these data sets. Data are derived from many different sensors installed on research vessels, satellites and in-situ platforms that are part of various ocean and marine observing systems and research programs. Data resources are quality

controlled and managed at distributed data centres that are interconnected by the SeaDataNet infrastructure and accessible for users through an integrated portal. The data centres are mostly National Oceanographic Data Centres (NODCs) which are part of major marine research institutes that are developing/operating national marine data networks, and international organizations such as IOC/IODE and ICES. The managed data sets come from various sources and time periods. This imposes strong requirements towards ensuring quality, elimination of duplicate data and overall coherence of the integrated data set. This is achieved in SeaDataNet by establishing and maintaining accurate metadata directories and data access services, as well as common standards for vocabularies, metadata formats, data formats, quality control methods and quality flags.

EuroGOOS, **MyOcean** and **SeaDataNet** together have developed a strategy of seeking active cooperation on national and international scales with marine monitoring centres, data archival organisations, other European and international data management initiatives and networks. This is done with the objective to achieve a wider coverage of data sources and an overall interoperability between data infrastructures in the marine and ocean domains. These objectives coincide perfectly with the aims of EMODnet with respect to pan-European marine data management and data access.

3.3 The project

The EMODnet Physical portal must improve the overview and access to in-situ physical data sets for users, both in near real-time and delayed mode. This coincides with the priorities of EuroGOOS and fits perfectly with the aims of the MoU between SeaDataNet and MyOcean.

European marine institutes responsible for real-time data flows apply automatic quality control and distribute their data in real-time to national and international users as well as storing them in local archives. These data will be reviewed and subject to further quality control in delayed-mode to ensure the best quality data are available. In many countries these real-time data are also passed to the NODCs, which undertake extra quality control activities for validation, consistency analysis and preserve the validated data in long term archives for distribution to users in delayed mode. In the framework of EuroGOOS and, following the adopted plans of its DATA-MEQ (Data Management, Exchange & Quality) Working Group, the EuroGOOS regions (ROOSs) and its associated members have agreed to have an open and free distribution of their near real-time data, although authentication to access is required.

The cooperation of EuroGOOS, MyOcean and SeaDataNet for EMODnet Physics guarantees that the portal will be built upon the existing initiatives and systems of EuroGOOS, SeaDataNet and MyOcean to achieve a structural and operational infrastructure that can be easily expanded for a wider coverage of in-situ physical data providers. It also guarantees that their existing communities will be fully engaged in the development of the portal, the planning for sustained operation and the indication of possible gaps in coverage.

The EMODnet Physics portal will also encourage other physical data providers outside the present communities to come forward, to contribute and to become engaged in EuroGOOS, SeaDataNet and MyOcean. A comparable effect can already be seen in the other EMODnet preparatory actions.

3.4 Workplan

The EMODnet Physics project is divided over 5 Work Packages (WP):

WP 1 Project management

WP 2 Data Collection, Metadata Compilation and Quality Assessment/Quality Control

WP 3 Metadata aggregation, Data access and Data products

WP 4 Portal technical development and operation

WP 5 Analysis, evaluation and feedback

For the Workshop in Tallinn, WP2 is most important.

4 The proposed architecture for the EMODnet Physics portal

The institutes that are members of the EuroGOOS Association and partners in the MyOcean and SeaDataNet networks, manage a large set of physical monitoring stations and ferrybox routes. These generate a large volume of relevant physical data sets that should be brought to the EMODnet Physics portal *via* the underlying infrastructures of the ROOSs, the MyOcean in-situ TAC and the SeaDataNet NODCs. In addition, it is planned to identify and approach other potential data providers for contributing their data sets also to the EMODnet Physics portal.

The EMODnet Physics portal will therefore be developed and implemented as an overarching portal combining physical data sets and associated metadata from the underlying existing infrastructures from EuroGOOS, MyOcean and SeaDataNet.

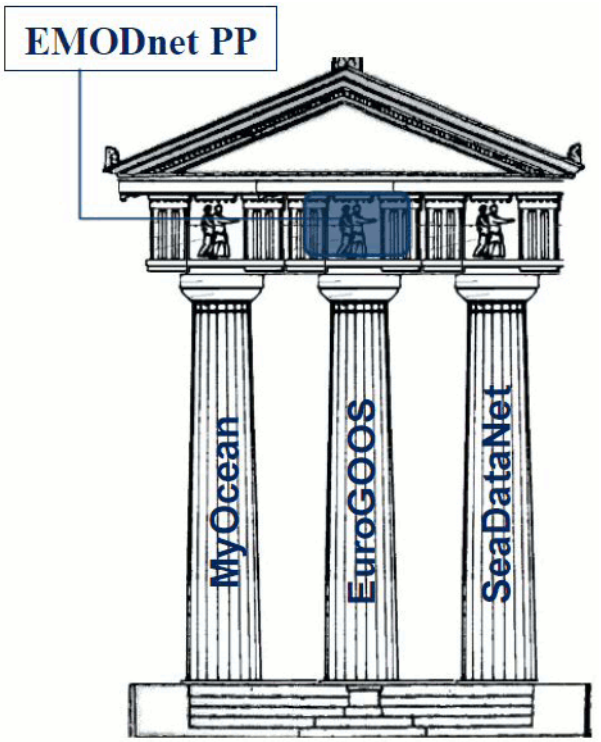

Figure 1 *The three EMODnet pillars*

These pillars comprise:

- The EuroGOOS regional operational observing systems (ROOSs), most of them collaborating with regional Conventions (HELCOM, OSPARCOM, MAP)
- The MyOcean in-situ TAC providing access to physical, chemical and biological near real time data acquired by continuous, automatic and permanent observation networks integrated in 6 regional portals and a global one operated by Coriolis
- SeaDataNet infrastructure, providing access to physical, chemical and biological data residing in a distributed system of data centres.

Note: The EMODnet Physics portal will limit itself to the near real-time and archived data sets of **fixed stations and ferrybox routes** for the specified physical parameters.

Real-time or near-real-time data, collected for operational needs, are collected by automatic observatories and transmitted in real-time to the shore, where these data sets are managed by the members of EuroGOOS ROOSs, transmitted in near-real-time to MyOcean in-situ TAC regional centres and integrated into the Global component of the in-situ TAC at IFREMER Coriolis. All these data sets will be made available to the EMODnet Physics portal from the EuroGOOS ROOSs regional infrastructures through the MyOcean Global in-situ TAC by means of FTP and the MyOcean metadata index.

Archived data from these fixed stations and ferryboxes will be made available to the EMODnet Physical portal through SeaDataNet.

The EMODnet Physics portal will therefore be developed and implemented as an overarching portal combining physical data sets and associated metadata from the underlying existing infrastructures from EuroGOOS, MyOcean and SeaDataNet.

4.1 Using EDIOS as a first entry

As a first entrance for searching, use will be made in the EMODnet Physics portal of the information from the European Directory of Ocean Observing Systems (EDIOS) directory. EDIOS provides an internet-based tool for searching information on observing systems operating repeatedly, regularly and routinely in European waters. The EDIOS directory contains metadata on European observing systems such as platforms, repeated ship-borne

measurements (e.g. ferryboxes), buoys, remote imagery, etc.

EDIOS is an initiative of the EuroGOOS Association. The directory was initially developed during the EU EDIOS project. Recently a major technical upgrade was completed by SeaDataNet, revising the EDIOS format, making optimal use of SeaDataNet common vocabularies and establishing both a new online user interface and a dedicated editing tool (MIKADO) for entering and updating EDIOS entries. The information in the original EDIOS directory is from 5 years ago and mostly out of date. **Therefore a major content update is required in cooperation between SeaDataNet NODCs and monitoring operators such as can be found in the EuroGOOS ROOSs.** The EDIOS format provides information about monitoring programmes / networks. For each related observation, station and track information is available about the operating institutes, instrument types, platform types, station types, sea areas, geographical locations, parameters, etc.

4.2 Proposed user dialogue in the EMODnet Physics portal

Figure 2 indicates how it is foreseen that users can discover and retrieve physical data sets in near-real-time and from archives via an EDIOS-based simple dialogue at the portal and then link through to near-real-time data sets via the MyOcean / EuroGOOS ROOSs system and through to archived data sets via the SeaDataNet system.

Users will be able to query a subset of the EDIOS directory by a map of stations and ferrybox routes for different physical parameter groups. This will also include information about the EuroGOOS regions. Additional EDIOS information can be browsed for selected stations and routes, such as more details about their monitoring programme/network and more details about each station and its observation facilities.

4.3 Near Real-Time data exchange and access

The fixed station and ferrybox route information records will contain direct links to view and browse near real-time time series of selected parameters in charts and tables, that are derived from the EuroGOOS ROOSs / MyOcean in-situ TAC system, and to submit requests for downloading near real-time data sets from the in-situ TAC system. The charts and tables are freely available for a specific sliding time window (to be determined); the downloading of data sets requires a MyOcean user registration in order to monitor and keep track of the number and origin of users and number of downloads for justification of the underlying infrastructures. The actual downloading will take place from the Global in-situ TAC.

The MyOcean architecture developed has been extended by the ROOSs to integrate and distribute other observations necessary for ROOS applications. Also the real-time QC procedures for T&S, Current and Sea Level have been endorsed by EuroGOOS (Annual meeting 2010) as a recommendation for all partners in all regions. The near-real-time QC procedure for Biological parameters (Chlorophyll-*a*/Fluorescence, Oxygen, Nutrients) is implemented in MyOcean. They should be extended to additional platforms and variables by the ROOSs.

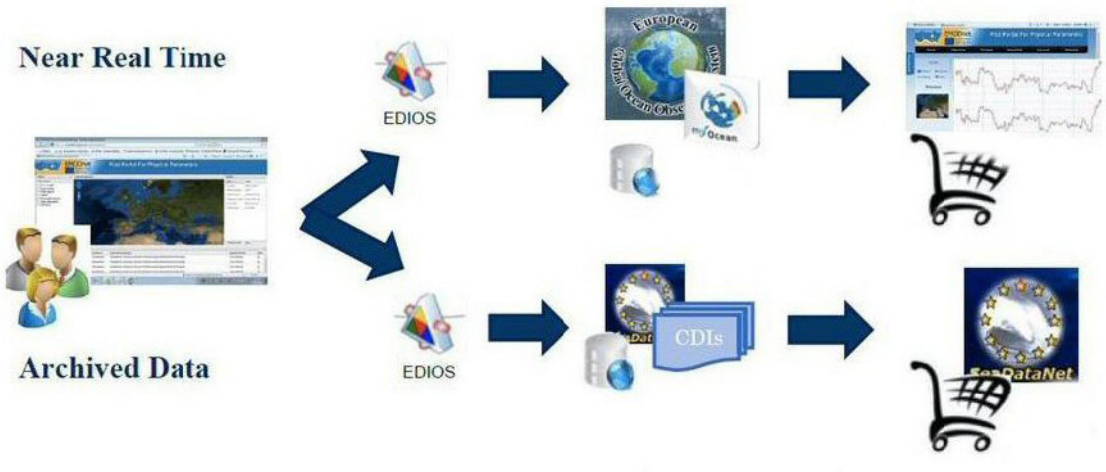

Figure 2 *Proposed dialogue for users of the EMODnet Physics portal*

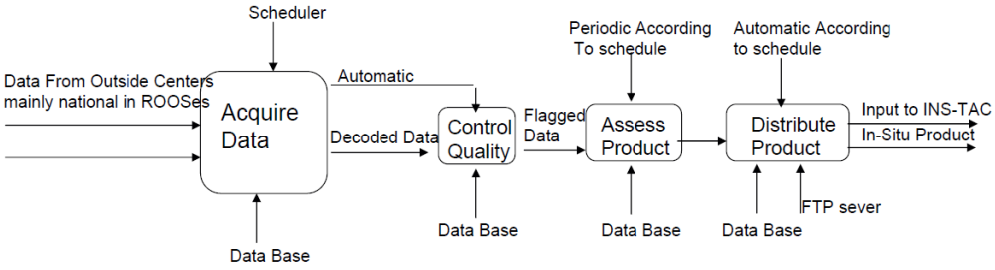

Figure 3 *Implemented functions at the EuroGOOS Regions / MyOcean regional and Global component of the in-situ TAC*

New Data Providers can be included in the ROOS organisation through contact between the Data Provider and the ROOS portal manager. Most of the time the new Data Provider only has to put their data on an FTP server, in their own format, and provide access details to the ROOS manager. Conversion to the common NetCDF format is taken on board by the MyOcean in-situ TAC partners as well as data integration in the portal.

For EuroGOOS partners' own purposes, MyOcean purposes and the EMODnet Physics portal purposes it is encouraged that the EuroGOOS Regional partners will sustain the in-situ TAC distributed system in cooperation with MyOcean and extend it with more stations and more types of data and bring in more data providers that become partners in the ROOSs. This is illustrated in Figure 4.

Further information about the MyOcean/ EuroGOOS ROOSs data exchange can be found at www.coriolis.eu.org/Data-Services-Products/MyOcean-In-Situ-TAC.

4.4 Archived data sets discovery and access

The fixed station and ferrybox track information records will also contain direct links to retrieve and browse metadata records from the SeaDataNet Common Data Index (CDI) data discovery and access service for quality controlled and long term time series of selected parameters. The **CDI** is a fine-grained index to individual data measurements and based upon the ISO 19115 standard. The CDI Service provides users with a highly detailed insight and unified access to the large volumes of marine and oceanographic data sets, archived at distributed data centres. The CDI includes a field for data access restrictions ranging from unrestricted to restricted with a number of values in between. An intelligent middle tier connection is configured between the SeaDataNet portal and the local data management systems at each of the data centres (at present circa 70 data centres). A shopping basket allows users to submit a shopping request for multiple data providers in one go and to

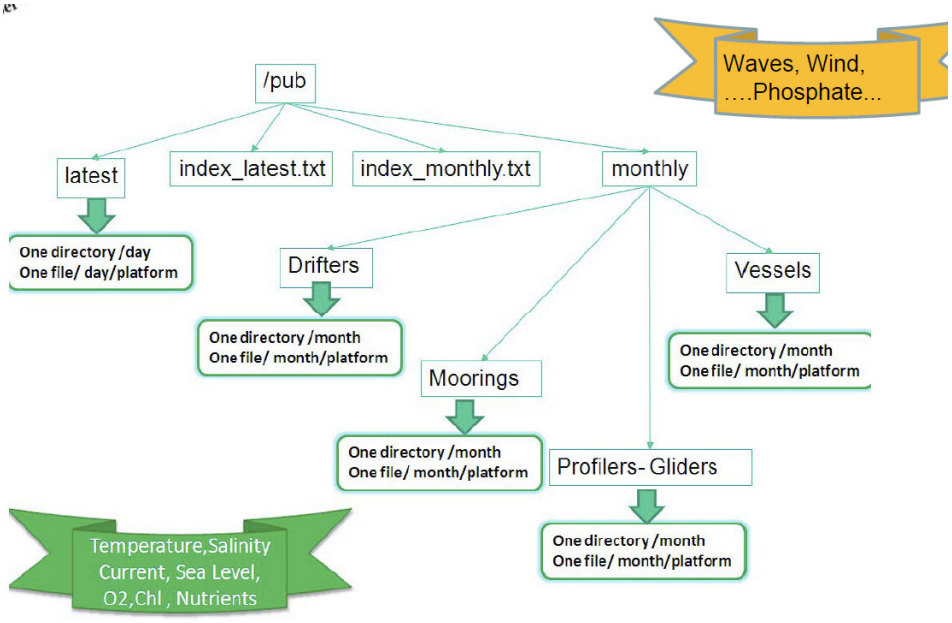

Figure 4 *The MyOcean in-situ TAC system organisation and range of exchanged parameters for MyOcean (Green) and added for EuroGOOS (Brown)*

follow its processing by each of the providers via an online transaction register. This also facilitates downloading of data sets in common formats for agreed requests.

Further information about the SeaDataNet CDI format and getting connected can be found on the SeaDataNet website in the Standards & Software section: www.seadatanet.org

4.5 User Registration

All metadata are in the pubic domain and freely available to any user. Also the browsing of near-real-time time series as charts and tables will be freely available without any constraints. However for data access by downloading, both MyOcean and SeaDataNet require a one-time user registration. The registration includes users having to agree with the MyOcean and/or SeaDataNet data policy and licence conditions for use of data sets and derived data products. Also it enables tracking usage of the infrastructures and facilitates the processing for SeaDataNet of multiple requests to multiple data centres. **As part of the EMODnet Physics project, and the MoU between SeaDataNet and MyOcean, the possibility of achieving a Single-Sign-On will be explored for the basic data services of both systems, implicating a possible legal tuning of data policies and technical tuning of the login systems.**

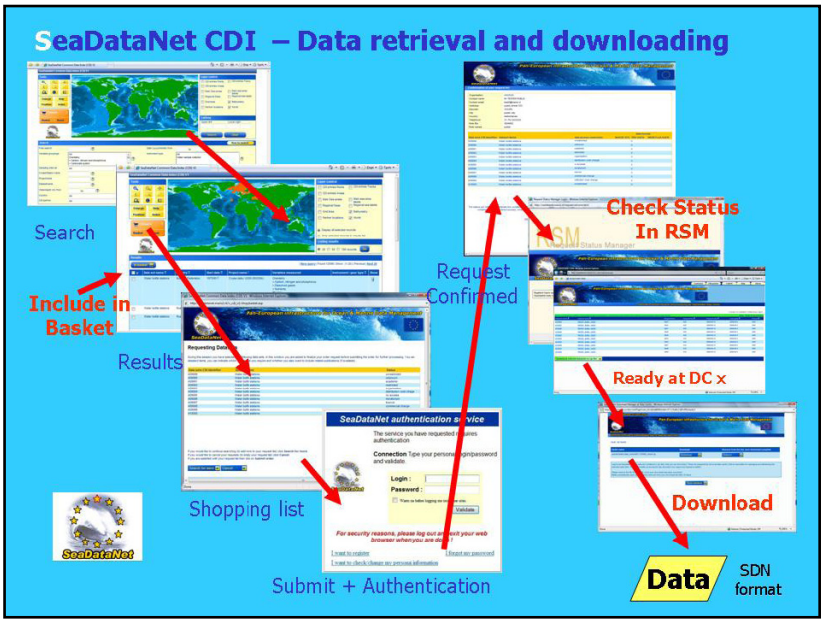

Figure 5 *SeaDataNet CDI data discovery and access service−transaction process*

5 WP2: Data Collection, Metadata Compilation and QA/QC

As can be derived from the proposed architecture and user dialogue it will be essential for a well functioning EMODnet Physics portal that:

- As many fixed stations and ferrybox routes as possible will be included for at least the specified EMODnet Physics parameters
- The following conditions are met for each included fixed station and ferrybox track:
  - The station / track is described in the new EDIOS directory and with a complete indication of observed parameters
  - The near-real-time data for each parameter of each EDIOS station / track is included in the appropriate EuroGOOS ROOS system and as such transferred at regular intervals to the MyOcean in-situ TAC in NetCDF (CF) format and including MyOcean metadata index records (as specified in the EuroGOOS / MyOcean guidelines)
  - The long term time series for each parameter of each EDIOS station / track are built up as archives with additional QA/QC activities and as such included in the SeaDataNet CDI metadata service whereby the archive data sets are stored in a data centre that is operationally connected to the SeaDataNet infrastructure. The data sets can be stored as files following the SeaDataNet ODV ASCII format or stored in a database with a script for ODV output. **Monitoring agencies can decide to transfer their data sets to existing SeaDataNet NODC data centres for QA/QC, long term stewardship and access OR to become connected themselves following the SeaDataNet data centre guidelines**.

The objectives of WP2 are therefore as follows:

- To identify data sources that will contribute
- To arrange for identified data sources to become available via the underlying EuroGOOS ROOSs / MyOcean in-situ TAC, and SeaDataNet infrastructures with common metadata and data formats
- To validate the coverage and to complete the EDIOS directory
- To establish and give guidance on common data and metadata models for complimentary data suppliers.

The geographical coverage includes all the maritime regions with the following expected input providers:

1. The Western Mediterranean Sea (MOON and SeaDataNet)
2. The Adriatic Sea (MOON and SeaDataNet)
3. The Ionian Sea and the Central Mediterranean Sea (MOON and SeaDataNet)
4. The Aegean-Levantine Sea (MOON and SeaDataNet)
5. The Greater North Sea, including the Kattegat, and the English Channel (NOOS (North West Shelf) and SeaDataNet)
6. The Celtic Seas (IBI-ROOS and SeaDataNet)
7. The Bay of Biscay and the Iberian Coast (IBI-ROOS and SeaDataNet)
8. In the Atlantic Ocean, the Macronesian biogeographic region, being the waters surrounding the Azores, Madeira and the Canary Islands (Coriolis and SeaDataNet), and Cape Verde (E subtropical Atlantic)
9. The North Atlantic (including the Porcupine Abyssal Plain, the Central Irminger Basin, and the Norwegian Sea).

As part of the EMODnet Physics proposal submission, the following projects/regional organisations/institutions have agreed to collaborate by means of an official letter of intent:

1. Coriolis, France (through IFREMER)
2. Instituto Espanol de Oceanografia (IEO), Spain
3. Meteo Galicia, Spain
4. NERC – National Oceanography Centre, UK
5. NERC – British Oceanographic Data Centre (BODC), UK
6. IBI-ROOS
7. MOON / MedGOOS (through HCMR)
8. Istituto Nazionale – Osservatorio Geofisico Sperimentale (OGS), Italy

9. Danish Maritime Safety Administration (DaMSA), Denmark
10. Nansen Environmental and Remote Sensing Center (NERSC), Norway
11. Marine Institute, Ireland
12. Danish Meteorological Institute (DMI), Denmark
13. Hellenic Center for Marine Research (HCMR), Greece
14. Met Office, UK
15. SYKE Finnish Environment Institute, Finland
16. University of Cambridge, UK
17. Swedish Meteorological and Hydrographic Institute (SMHI), Sweden
18. Marine Institute Gdansk, Poland
19. Permanent Service from Mean Sea Level (PSMSL), International (based in UK)
20. Institute Français de Recherche pour l'Exploitation de la Mer (IFREMER), France
21. Agenzia Nazionale per le Nuove Tecnologie, l'Energia e lo Sviluppo Economico Sostenibile ENEA, Italy
22. Marine Hydrophysical Institute of National Academy of Sciences, Ukraine
23. Federal Maritime and Hydrographic Agency BSH, Germany
24. Rijkswaterstaat, The Netherlands
25. SeaDataNet, EC project (through IFREMER and MARIS)
26. MyOcean, EC project (through Mercator Ocean)
27. EMODnet Chemical Parameters (by OGS)
28. EuroSITES, European Ocean Observatory Network
29. Oceanography Center, University of Cyprus
30. Institute of Oceanology PAS, Poland

Also as part of the EMODnet Physics proposal submission the stations and ferrybox routes in Annex 2 should at least be included in the EMODnet Physics portal if they are still operating.

The present Workshop provided the opportunity to discuss and validate with representatives of NOOS, BOOS and IBI-ROOS the present coverage of stations and ferrybox routes and to agree on steps to complete their presence in the EuroGOOS ROOSs / MyOcean, and SeaDataNet infrastructures.

IFREMER (Sylvie Pouliquen) has made a first analysis of the planned table (see Annex 2) and the present data exchange as available in the in-situ TAC. It can be seen that a growing number of EuroGOOS ROOS data providers are contributing or are planning to contribute to the FTP system, even if they are not participants in MyOcean. However by checking the latest index file at the Global in-situ TAC it can be concluded that a certain number of stations and relevant parameters beyond the MyOcean scope, such as waves, are not yet available in the exchange. These might already be exchanged within the EuroGOOS Regions but have not yet become available for the MyOcean Global component of the in-situ TAC.

This analysis was followed by an overall discussion on the EMODnet project, the requested cooperation, metadata and data provision, and the best way forward.

Thereafter ETT (Antonio Novellino) gives a short demonstration of the EMODnet Physics portal which for now includes a prototype of the user dialogue which is limited so far to a subset of UK tidal stations. The portal and prototype can be found at www.emodnet-physics.eu. At present this is still a prototype.

6 Conclusions

All participants agree that they want to contribute as requested and will cooperate with the project team to achieve the goals set for the EMODnet Physics pilot project. They asked the project team to provide a good background document to inform and convince their management.

For the near-real-time data exchange it is agreed that it would be efficient if the project team first made a detailed analysis of missing stations and parameters and then approach the ROOS coordinators and related data providers with specific requests. The extension of the data exchange will then be undertaken as part of the EuroGOOS agreement. It will also require that the near-real-time quality control procedures are extended for the new parameters such as waves.

The participants agreed on the proposed EMODnet Physics data policy which will include the following elements:

- All metadata is freely available for any user
- Near-real-time data sets are freely available for graphics and tables with a sliding window of 2 months
- Downloading of near-real-time data sets takes place through the MyOcean catalogue and requires a one-time user registration and id-password per request. The near-real-time data sets are available without extra conditions.
- Downloading of long term archived data sets takes place through the SeaDataNet CDI service and requires a one-time user registration and id-password per request. The downloading of archived data sets is determined by the data access restriction, as set by the data provider in the CDI metadata, and possibly the registered role of the user.

The EDIOS directory has to be completed for all data providers for their stations. So far the new EDIOS only has entries for the UK (see seadatanet.maris2.nl/v_edios/search.asp). The updating should be done through cooperation between the SeaDataNet NODC and EuroGOOS data providers. It will require a lot of metadata gathering and entries. However the Workshop participants pointed out that the ROOS indexes and NetCDF files already contain a lot of metadata that at first should be extracted by the project team to partly pre-fill the EDIOS entries. The part-completed entries should then be forwarded to the specific ROOS coordinators or data providers for completion. It is hoped that this approach will save considerable effort and create better conditions for the data providers to cooperate.

The long term archives for each station and type of data should become available in the SeaDataNet CDI system. It was agreed that the project team should first analyse the existing situation for identified stations, use this analysis to make an inventory of missing CDI entries and archives, and then approach ROOS contacts or data providers to improve the situation.

The present access and exchange will focus on near-real-time (1 day to a week delay) and historic data sets. Real-time (minutes to hour delay) exchange is much more complex and will have a greater technical impact for data providers. However this can be the scope of a later phase of EMODnet Physics, also considering the present discussions on a European Ocean Observing System.

7 Actions

Action: The EMODnet Physics Project team will prepare a summary of the Tallinn Workshop presentations, conclusions and actions. This document will also give the requested background about EMODnet and the EMODnet Physics project so that data providers can use it to inform their management.

Action: The EMODnet Physics Project team will analyse the present coverage of stations and data types in the Global component of the in-situ TAC and will approach ROOS coordinators for extending the near-real-time data exchange.

Action: ROOS coordinators will encourage, both for EuroGOOS partners own purposes, MyOcean purposes and the EMODnet Physics portal purposes, that the EuroGOOS Regional partners will sustain the in-situ TAC distributed system in cooperation with MyOcean and extend it with more stations and more types of data and bringing in more data providers that become partners in the ROOSs. The EMODnet Physics Project team will give the necessary guidance, where required.

Action: The EMODnet Physics Project team will analyse the present availability of long term archived data sets in the SeaDataNet CDI and data access system and will approach ROOS coordinators for extending the archives in cooperation with the SeaDataNet NODCs. Thereby data providers can decide to transfer data sets to their NODC or to become connected themselves to the SeaDataNet infrastructure. In many cases there is already ongoing cooperation between data providers and NODCs. The EMODnet Physics Project team and NODCs will give the necessary guidance, where required.

Action: The EMODnet Physics Project team will use the present MyOcean metadata_index and NetCDF files to extract metadata that can be used for pre-filling the EDIOS series and platform forms. The ROOS coordinators and data providers will then be approached to complete the EDIOS entries in cooperation with the NODCs.

Action: The EMODnet Physics Project team will evaluate the present MyOcean metadata_index and see whether some improvements can be made for harmonising it with SeaDataNet Common Vocabularies and EDMO. This analysis will also consider introducing a controlled vocabulary for station ids (in tuning with WMO, etc.) because that will make it possible to link EDIOS, CDI and near-real-time index entries automatically.

Action: The EMODnet Physics Project team will also contact the ferrybox coordinators to determine how to include the ferrybox routes and data sets in an efficient way. It seems appropriate to include the ferrybox tracks as schematised lines in the EDIOS metadata. The actual positions of the observations, both near-real-time and archived, will be available through the NetCDF files for near-real-time and the CDI metadata for archived data sets.

Action: As part of the EMODnet Physics project and the MoU between SeaDataNet and MyOcean the possibility of achieving a Single-Sign-On will be explored for the basic data services of both systems, implicating a possible legal tuning of data policies and technical tuning of the login systems.

Action: The EMODnet Physics Project team will build feedback options into the portal so that users and data providers can give feedback. The Project team will regularly inform the data providers about progress, feedback received and usage of the portal.

Action: The EMODnet Physics Project team will post the presentations and summary of the Tallinn Workshop on the EMODnet Physics website in the public domain for wide availability. See www.emodnet-physics.eu.

Action: The EMODnet Physics Project team will continue the development and fine-tuning of the user dialogue at the EMODnet portal for discovering and browsing physics stations, related near-real-time data and related CDI and archived data. This includes fine-tuning the present prototype and extending the data coverage following the actions above. The prototype at present has a focus on UK tidal stations.

Action: The EMODnet Physics Project team will organise comparable Workshops with the ROOSs for the Mediterranean and Black Sea. These will take place in the second half of 2011.

Annex 1: Participants to the EMODnet Physics Workshop in June 2011

EMODnet Physical Portal Pilot Project Team

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David Hydes, NOC, United Kingdom

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Urmas Lips, MSI, Estonia

Kieran Lyons, MI, Ireland

Julien Mader, AZTI, Spain

Dave Mills, CEFAS, United Kingdom

Esmael Musema Hasen, IMR, Norway

Riitta Olsonen, SYKE, Finland

Wilhelm Petersen, HZG, Germany

Agnieszka Prominska, IOPAN, Poland

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Annex 2: Table of fixed stations and ferry-boxes

Name of Measuring station or Ferry-route	Owner of data	Sea-basin	Parameter covered	Real Time (yes or no)	Archived measurements (approx. number of years)
14 sea level stations	SMHI, SE	Baltic Sea	Sea Level	Yes	Over 100 years
2 buoy stations	DAMSA, DK; SMHI, SE	Baltic Sea	Horizontal velocity (currents)	Yes	
4 wave buoys	SYKE, FI	Baltic Sea	Wave height and period	Yes	From 2009
10 sea level stations	SYKE, FI	Baltic Sea	Sea level	Yes	From 2009
30 sea level stations	DMI, DK	Baltic Sea	Sea level	Yes	
4 MARNET stations	BSH, DE	Baltic Sea	Temperature, Salinity, Wind speed and direction	Yes	Over 15 years
Ferrybox: Gothenburg-Kemi-Oulu-Lübeck-Gothenburg	SMHI, SE; SYKE FI	Baltic Sea and Kattegat	Temperature, salinity	Yes	From 2009
15 tide gauge stations	NERC, UK	North Sea	Sea level	Yes	Most over 20 years; some over 50 years
Oyster Ground Deployment Smart Buoy	CEFAS, UK	North Sea	Temperature, salinity, Light attenu-ation	Yes	From 2006
West Gabbard NMMP Site Smart Buoy	CEFAS, UK	North Sea	Temperature, salinity, Light attenu-ation	Yes	From 2008
5 MAWS network	Met Office, UK	North Sea	Wind speed and direction, wave height and period, temperature	Yes	From 1986
Fixed stations from the National Measuring Network from the Netherlands in the North Sea and along the Netherlands (18),	Rijkswaterstaat NL	North Sea	Wave height and period	Yes	Over 30 years
Fixed stations from the National Measuring Network from the Netherlands in the North Sea and along the Netherlands (24),	Rijkswaterstaat NL	North Sea	Sea level	Yes	Over 30 years
Fixed stations from the National Measuring Network from the Netherlands in the North Sea and along the Netherlands (ca 12),	Rijkswaterstaat NL	North Sea	Wind speed and direction	Yes	Over 30 years
Fixed stations from the National Measuring Network from the Netherlands in the North Sea and along the Netherlands (14),	Rijkswaterstaat NL	North Sea	Water Temperature	Yes	Over 30 years
Fixed stations from the National Measuring Network from the Netherlands in the North Sea and along the Netherlands (ca 2),	Rijkswaterstaat NL	North Sea	Horizontal velocity (currents)	Yes	Over 30 years
Fixed stations from the National Measuring Network from the Netherlands in the North Sea and along the Netherlands (ca 5)	Rijkswaterstaat NL	North Sea	Salinity	Yes	Over 30 years
4 MARNET fixed stations	BSH, DE	North Sea	Temperature, Salinity, Wind speed and direction	Yes	From 1991

Name of Measuring station or Ferry-route	Owner of data	Sea-basin	Parameter covered	Real Time (yes or no)	Archived measurements (approx. number of years)
L4	PML, UK	Celtic Seas	Temperature, Salinity, Wind speed and direction, turbidity (light attenuation) *Additionally: Dissolved oxygen, fluorescence, nitrate, CDOM, air pressure, humidity, PAR*	Yes	From 1988 (also earlier measurements of temperature and salinity)
E1	PML, UK	Celtic Seas	Temperature, Salinity, Wind speed and direction, turbidity (light attenuation) *Additionally: Dissolved oxygen, fluorescence, nitrate, CDOM, air pressure, humidity, PAR*	Yes	From 2002, (also temperature and salinity 1902-1987, with some gaps)
ISO Mooring A	NERC, UK	Celtic Seas	Temperature, salinity, wave height and period, light attenuation, horizontal velocity (currents)	Yes	From 2001
ISO Mooring B	NERC, UK	Celtic Seas	Temperature, salinity, horizontal velocity (currents)	Yes	From 2002
20 tide gauge stations	NERC, UK	Celtic Seas	Sea level	Yes	Most over 20 years; some over 50 years
15 MAWS network	Met Office, UK	Celtic Seas	Wind speed and direction, wave height and period, temperature	Yes	From 1986
Liverpool Bay NMMP Site Smart Buoy	CEFAS, UK	Celtic Seas	Light attenuation	Yes	From 2002
7 Irish Marine Weather Buoy Network	Marine Institute, IE	Celtic Sea	Wind speed and direction, wave height and period, wave direction, temperature, salinity *Additionally: Air temperature, humidity, air pressure*	Yes	From 2001
5 Sea level stations	Marine Institute, IE	Celtic Sea	Sea level	Yes	From 1940
Ferry route Liverpool to Dublin (or Belfast)	NERC, UK	Celtic Seas	Temperature, salinity, Light attenuation	Yes	From 2004
17 Meteo stations in Galicia	METEO-GALICIA, SP	Bay of Biscay and Iberian Coast	Air temperature, wind speed and direction	Yes	From 2005
4 Meteo-oceanographic stations	METEO-GALICIA, SP	Bay of Biscay and Iberian Coast	Wind speed and direction, water temperature, salinity *Additionally: Air temperature, humidity, air pressure*	Yes	From 2007
5 tide gauges	IEO, SP	Bay of Biscay and Iberian Coast	Sea level	Yes	Over 20 years
2 Sea level stations	Puertos del Estado, SP	Bay of Biscay and Iberian Coast	Sea level	Yes	From 1992
2 MAWS network	Met Office, UK	Bay of Biscay and Iberian Coast	Wind speed and direction, wave height and period, temperature	Yes	From 1986
2 Sea level Ssations	IH, PT	Bay of Biscay and Iberian Coast	Sea level	Yes	From 1986
7 Automatic buoys	Puertos del Estado, SP	Bay of Biscay and Iberian Coast,	Wave height and period, wind speed and direction	Yes	From 1992
4 MAREL automatic buoys	Ifremer + partners, FR	Celtic Seas/ Bay of Biscay and Iberian Coast	Temperature and depending of the location Salinity, Turbidity (light attenuation) *Additionally: O_2, Chlorophyll*	Yes	From 2009
Ferry route Roscoff Plymouth	Ifremer/CNRS, FR	Celtic Seas / Bay of Biscay and Iberian Coast	Temperature, Salinity, Turbidity (light attenuation) *Additionally: O_2, pH, fluorescence*	Yes	From 2011

Name of Measuring station or Ferry-route	Owner of data	Sea-basin	Parameter covered	Real Time (yes or no)	Archived measurements (approx. number of years)
Ferry route Roscoff Cork Santander	Ifremer/CNRS, FR	Celtic Seas / Bay of Biscay and Iberian Coast	Temperature, Salinity Turbidity (light attenuation) *Additionally: O_2, pH, fluorescence*	Yes	From 2011
1 Sea level station	IH, PT	Atlantic Ocean, Macronesian bio-geographic region	Sea level	Yes	From 1978
2 tide gauges	IEO, SP	Atlantic Ocean, Macronesian bio-geographic region	Sea level	Yes	Over 20 years
2 Automatic buoys	Puertos del Estado, SP	Atlantic Ocean, Macronesian bio-geographic region	Wave height and period, wind speed and direction, horizontal velocity (currents), temperature, salinity	Yes	From 1992
ESTOC (EuroSITES)		Atlantic Ocean, Macronesian bio-geographic region	Temperature, salinity, *Additionally: Chl-a, Nitrate, PAR, Dissolved CO_2, POC. Sea pressure, dissolved O_2*	Yes	From 2002
TENATSO (EuroSITES)		Atlantic Ocean, Macronesian bio-geographic region	Temperature, salinity, *Additionally: Chl-a, Nitrate, PAR, Dissolved CO_2, POC. Sea pressure, dissolved O_2*	Yes	From 2008
PAP (EuroSITES)	NOC, UK	Atlantic	Temperature, salinity, wave height and period, horizontal velocity (currents), turbidity (light attenu-ation). *Additionally: Chl-a, Nitrate, PAR, Dissolved CO_2, POC. Sea pressure, dissolved O_2*	Yes	From 2002
1 MAREL automatic buoy	Ifremer, FR	Western Mediterranean	Temperature, Salinity, Turbidity (light attenuation) *Additionally: O_2, Chlorophyll*	Yes	From 2009
1 coastal meteo station	ENEA, IT	Western Mediterranean	Wind speed and direction *Additionally: pressure, humidity, air temperature*	Yes	From 2007
7 sea level stations	IEO, SP	Western Mediterranean	Sea level	Yes	From 1943
2 deep sea buoy DYFAMED and W1-M3A (EuroSITES)	CNRS, FR; CNR, IT	Western Mediterranean	Temperature, salinity, wave height. Horizontal velocity (currents), turbidity (light attenuation) *Additionally: Chl-a, Nitrate, PAR, Dissolved CO_2, POC. Sea pressure, dissolved O_2*	Yes	From 1995
7 sea level stations	IEO, SP	Western Mediterranean	Sea level	Yes	From 1943
7 buoy network POSEIDON	HCMR, GR	Aegean Levantine basin	Wind speed and direction, sea temperature, horizontal velocity (currents), wave height and period *Additionally: wave direction, air pressure, air temperature*	Yes	From 2005
1 deep sea buoy E1-M3A (EuroSITES)	HCMR, GR	Aegean Levantine basin	Temperature, salinity, wave height. Horizontal velocity (currents), turbidity (light attenuation) *Additionally: Chl-a, Nitrate, PAR, Dissolved CO_2, POC. Sea pressure, dissolved O_2*	Yes	From 2007
1 sea level station (Alexandria)	NIOF, Egypt; NOC, UK	Aegean Levantine basin	Sea level	Yes	From 2009
1 coastal station	OGS, IT	Adriatic Sea	Temperature, salinity, horizontal velocity (current).	Yes	From 2000

Name of Measuring station or Ferry-route	Owner of data	Sea-basin	Parameter covered	Real Time (yes or no)	Archived measurements (approx. number of years)
1 deep sea buoy E2-M3A (EuroSITES)	OGS, IT	Adriatic Sea	Temperature, salinity, wave height and period. Horizontal velocity (currents), turbidity (light attenuation) *Additionally: Chl-a, Nitrate, PAR, Dissolved CO_2, POC. Sea pressure, dissolved O_2*	Yes	From 2004
1 sea level site (Trieste)	IST, IT	Adriatic Sea	Sea level	Yes	From 1905
1 deep sea buoy Pylos (EuroSITES)	HCMR, GR	Ionian Sea and Central Mediterranean	Temperature, salinity, wave height and period, horizontal velocity (currents), turbidity (light attenuation) *Additionally: Chl-a, Nitrate, PAR, Dissolved CO_2, POC. Sea pressure, dissolved O_2*	Yes	From 2010
1 deep weather ship Station M (EuroSITES)	UIB, NO	Greenland Sea/Arctic Sea	Temperature, salinity, wave height and period, horizontal velocity (currents), turbidity (light attenuation) *Additionally: Chl-a, Nitrate, PAR, Dissolved CO_2, POC. Sea pressure, dissolved O_2*	Yes	From 1948
1deep sea buoy, CIS (EuroSITES)	IFM, DK; NOC, UK	North Atlantic (Greenland)	Temperature, salinity, wave height and period, horizontal velocity (currents), turbidity (light attenuation) *Additionally: Chl-a, Nitrate, PAR, Dissolved CO_2, POC. Sea pressure, dissolved O_2*	Yes	From 2002
6 Synoptic Coastal Stations	IOBAS, BG	Black Sea	Wind speed and direction *Additionally: Air pressure, Air temperature, Atmospheric humidity, Cloud cover height and extent, Cloud type, Precipitation and evaporation, Snow and ice mass, thickness and extent*	Yes	From 1950
10 series Bulgarian Black Sea Monitoring Program	IOBAS, BG	Black Sea	Horizontal velocity of the water column (currents), Salinity of the water column, Sea level, Temperature of the water column, Wave height estimates	Yes	From 1995
19 sea level series	IOBAS, BG	Black Sea	Sea Level	Yes	From 1910
1 station Monitoring of the South Bulgarian Black Sea coastal zone	IOBAS, BG	Black Sea	Salinity of the water column, Temperature variation in the water column, Wave height estimates, Wind speed and direction *Additionally: Secchi disk depth, Variable fluorescence parameters, Wave direction*	No	From 1984
2 series Marine water quality monitoring on the State Hydrometeorological Service network of Ukraine	SHMSU	Black Sea	Salinity of the water column, Temperature of the water column *Additionally: Secchi disk depth, Silicate concentration parameters in the water column*	No	From 1991
In-situ vessel Observations (about 30000 observations)	Coriolis, FR; MFS-VOS, IT	All seas and oceans	Surface temperature, salinity, nutrients	Yes (in some cases with one month delay)	From 1999
In-situ SWS NRT observations	Coriolis, FR	Celtic Sea, Bay of Biscay, Iberian coast	Temperature, Salinity, wind, waves, currents,	Yes	From 2010
MOON Coastal buoys, sea level (2 stations)	MOON	Mediterranean Sea	Wave Height and period, Sea level Currents, Surface meteo, Nutrients	Yes	10 years
Ships of Opportunity (12000 stations)	ENEA, IT	Mediterranean Sea	Temperature	Yes	1999