

MERSEA, a precursor to GMES Marine Core Service

Description

Objectives:

the overall objective of the MERSEA (Marine Environment and Security for the European Area) project is to develop an integrated service to intermediate users and policy makers in support of safe and efficient off-shore activities, environmental management, security and sustainable use of marine resources. The service relies on an integrated European operational system of global monitoring and forecasting of the ocean and a coordinated network of regional systems for European waters. The project is a precursor of the GMES European Marine Core Service (MCS) that will deliver a set of basic, generic information products based upon common-denominator physical and bio-geochemical state variables.

Although the services are developed primarily to fulfil the reporting, monitoring and forecasting requirements of European agencies and stakeholders, they do have a global scope. The provision of services is based on access to ocean products and information, such as long running data sets to define the mean, fluctuations, and past trends in the state of the marine environment; to record its evolution and the success or otherwise of policy responses and, with predictions of future change, to establish baselines for effective environmental management.

Methods:

the basic method is to merge and assimilate diverse data from space-borne sensors and in situ measurement networks into high-resolution ocean models in order to monitor the ocean physics, bio-geo-chemistry and ecosystems and to provide forecasts on prediction time scales ranging from days to months. The system relies on a network of Monitoring and Forecasting Centres, Thematic Data Assembly Centres, and the associated information management infrastructure. The present pre-operational system comprises global and regional (Arctic, North-Atlantic and European shelves, Baltic, and Mediterranean) Centres, and Data Assembly Centres for satellite altimetry, ocean colour, sea-ice, sea-surface temperature, and forcing fields; and in situ data. Atmospheric analyses and forecasts are provided by the ECMWF (European Centre for Medium Range Weather Forecasting) and NWS (National Weather Services).

Data and results:

the system is critically dependant on the availability of Earth Observation data from satellites, whose continuity is absolutely indispensable. Likewise, *in situ* networks, such as the Argo array and other moored and ship borne data, and coastal systems, must be maintained to provide input into the monitoring and forecasting systems. The MERSEA system validates combines and merges all available data to elaborate higher level fields. It produces regular and systematic reference information on the state of the ocean, of known quality and accuracy for the global and regional European Seas. The information delivered presently covers physical ocean state variables; the number of environmental variables produced will increase over the period 2008-2013. The products include observational and model data, real time mapping and forecasting. Ocean bulletins, indicators, synthesis, and statistics are elaborated. Baseline data are obtained from long-term retrospective analysis.

Impact:

as outlined below, the MCS developed by MERSEA provides information relevant to most of the GEO societal benefit areas. It delivers the common denominator data for all users in the marine sector, in other words the information for existing and new downstream services. The applications domains range from Climate to Marine Environment, Seasonal and Weather forecasting, Coastal and local monitoring, Offshore operations, Maritime transport and safety, Fisheries, Research, General Public.



The targeted users are European agencies and policy authorities, national agencies (e.g. NWS, coast-guards), local authorities, private adding-value companies, research laboratories...

Added value

The added value is the transformation of data into information, ocean products, and services.

The MCS mission is to provide with a European added-value:

- Operational Production of Ocean Core Data;
- Dissemination of Products;
- Assessment and expertise;
- Tools development and maintenance
- Training and research coordination.

The services are critically dependant on GEO data and need GEO support in the continuing availability of such. In turn, the MCS enhances the data from the GEO components, by offering real-time and long term 3D description of the oceans from top to bottom. New advanced products (indicators) synthesising the information available provided by the integrated systems (modelisation+assimilation) of the MCS. Forecasts are also a unique contribution of the MCS.

Relevance to GEO

Relevance to SBA can be highlighted by several examples:

- Reducing loss of life and property from natural and human-induced disasters:
 - forecasting for maritime operations, upper-ocean information for hurricane prediction, coastal management.
- Understanding environmental factors affecting human health and well-being:
 - coastal water quality monitoring, harmful algal blooms.
- Improving management of energy resources:
 - support to offshore operations
- Understanding, assessing, predicting, mitigating, and adapting to climate variability and change:
 - the role of the ocean in all climate issues is paramount and obvious (heat, sea-ice, carbon cycle).
- Improving water resource management through better understanding of the water cycle:
 - role of the ocean in the global water cycle, evaporation-precipitation.
- Improving weather information, forecasting and warning:
 - extended weather forecasts need high quality ocean information.
- Improving the management and protection of terrestrial:
 - coastal and marine ecosystems.
- Understanding, monitoring and conserving biodiversity:
 - for the ocean realm.

Transverse areas:

MERSEA is developing all components of the MCS in line with the transverse areas concepts, in particular architecture, interoperability and data management standards.

Participants

- France, Germany, EC, Denmark, Cyprus, Germany, Greece, Italy, Norway, United Kingdom and several other European countries, with close coordination with international partners.
- Associated GEO organizations include: ECMWF, EEA, ESA, EUMETSAT, GOOS, IOC, POGO, WMO, WCRP.

Current Status and Next Steps

The four-year MERSEA project will end in mid-2008, at which time it will deliver a prototype, pre-operational system as a contribution to the GMES MCS. Next steps will transition to full operational standards and sustained operations. Gaps (potential):

- Continuity of space observations and in situ networks are crucial for the future.