

4DEMON

4 decades of Belgian marine monitoring: uplifting historical data to today's needs

DURATION
1/10/2013 - 31/12/2017

BUDGET
999.071 €

PROJECT DESCRIPTION

During the last four decades the Belgian scientific community has, built up considerable expertise in marine sciences. Numerous scientific expeditions at sea have resulted in a vast quantity of scientific data related to different topics and important publications about the marine environment of the Belgian Continental Shelf (BCS). Many valuable, historic data however still remain inaccessible to the larger scientific community, being available only on paper in various institutions. In addition, most data need to be thoroughly quality-controlled and intercalibrated to be able to compare with recent data.

Historical data are essential for understanding long-term changes in the quality of the marine environment. The 4DEMON project aims to centralise, integrate and valorise data compiled during expeditions in the BCS over the last four decades. The project will focus on the compilation of long-term data sets on contamination, eutrophication and ocean acidification.

The 4DEMON project brings together a multidisciplinary consortium of five Belgian partners with a long-standing expertise in marine science, holding a large amount of historic information on the BCS. This will be used to complete and interpret existing data sets. In addition, modern data, like continuous underway data (e.g. salinity, temperature, pH, nutrients and chlorophyll) and remote sensing chlorophyll a and turbidity, will supplement the data sets and will help the data intercalibration and interpretation as they have a much higher spatial and temporal resolution. Data managers will coordinate and support the data management process from data inventory and rescue to data archival with appropriate tools. Data will be integrated in central databases and disseminated through a data portal.

For contaminants (MSFD Descriptor 8, 2008/56/EC), the focus is put on organic pollutants and heavy metals analysed in marine sediments and biota. Since contaminant levels are a complex outcome of different factors such as influx, spatial and temporal variations and chemical or biodegradation, the collection and interpretation of historical data is crucial for a thorough knowledge on pollution and its dynamics.

Dissolved nutrient concentrations and ratios, phytoplankton biomass and species composition, and turbidity are key indicators to monitor the status of eutrophication in coastal waters (MSFD Descriptor 5, 2008/56/EC). These indicators are influenced by natural and anthropogenic processes acting at different temporal and spatial scales. To assess the relative impact of these processes, robust long-term data series are essential.

The accumulation of anthropogenic CO₂ in surface waters of the ocean has altered carbonate chemistry in surface waters since pre-industrial times. Ocean acidification can alter the rates and fates of primary production and calcification of numerous marine organisms and communities. Such changes can change the ocean's carbon sequestration capacity, biodiversity and ecosystem services and goods. The detection of the underlying complex interactions require long time series of quality checked variables related to carbonate chemistry such as pH.



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In the first phase an extensive data inventory will be created and relevant historic data and metadata will be searched for in archives and digitized when needed. The "Projet Mer/Projekt Zee" (PMPZ), 1970-1976, is considered as the starting point for data integration within 4DEMON since it is the start of systematic measurement campaigns for most environmental parameters. Nevertheless, some older data sets on e.g. plankton diversity will not be excluded. In the second phase of the project, all data will be subjected to a series of quality controls. The identified changes in sampling strategies and methodologies and missing elements in metadata will need to be overcome by the determination of conversion factors, normalization and error estimates. Literature consultation, analyses of additional samples to obtain specific intercomparison and normalisation information, and a thorough analysis of existing in-situ data and high-resolution results will be used to guide intercalibration.

Integrated statistical analyses of the newly combined and intercalibrated multiparameter data sets will offer a unique opportunity to assess not only long-term trends in the selected environmental parameters, but also potential interactive effects between them. The trends observed in the compiled data sets will also be compared with long-term data sets of the same parameters from adjoining areas.

The main project deliverables - detailed inventories, data products and revised and robust, quality-controlled data sets - will be publicly disseminated via a data portal on the project website. Moreover, the data will be linked to international data management structures such as ICES, EMODNET, SeaDataNet, OBIS and GBIF. Secure archival and final dissemination is considered as highly important in the project. In addition, the multidisciplinary approach of the project will enable a maximal outcome of the incorporation of these historic scientific expedition results. Finally, valorisation of the results is crucial: our data sets will not only be of great value to the national and international scientific community, but will be essential for policy makers and managers to evaluate and guide integrated coastal zone management.

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LINKS

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