

# Chapter 7

## SeaDataNet: Towards a Pan-European Infrastructure for Marine and Ocean Data Management

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### ABSTRACT

*SeaDataNet is actively operating and further developing a Pan-European infrastructure for managing, indexing and providing access to ocean and marine data sets and data products, acquired from research cruises and other observational activities in European marine waters and global oceans. It is undertaken by the National Oceanographic Data Centres (NODCs), and marine information services of major research institutes, from 35 coastal states bordering the European seas. Its data centres have the essential capabilities and facilities for data quality control, long term stewardship, retrieval and distribution. Development and provision of standards, services and tools for marine and ocean data management has proven instrumental for wider uptake. This is further encouraged by cooperation and synergy with EU marine research projects, and by adoption of the SeaDataNet infrastructure in the EMODnet (European Marine Observation and Data Network) development. EMODnet is an initiative in the framework of the EU Marine Directive.*

### INTRODUCTION

The initial steps towards developing a pan-European infrastructure for marine data management were undertaken with support of the European Commission through the EU SEA-SEARCH project which ran from 2002 to 2005. This was followed in 2006 by the SeaDataNet project (2006 – 2011) and the subsequent SeaDataNet II project (2011 – 2015). Through these projects a consortium of European oceanographic data centres have been actively developing the SeaDataNet pan-European infrastructure for managing, indexing and providing access to ocean and marine data sets and data products that have been acquired from research cruises and other observational activities in European seas and global oceans. The SeaDataNet consortium consists of National Oceanographic Data Centres (NODCs), and the marine information services of major research institutes, from 35 coastal states bordering the European

DOI: 10.4018/978-1-5225-0700-0.ch007

seas, and also includes expert modelling centres, IT experts, and the international Intergovernmental Oceanographic Commission (IOC) of UNESCO, International Council for the Exploration of the Sea (ICES) and EU Joint Research Centre (EU-JRC) in its network. The data centres involved in SeaDataNet are highly skilled having been actively engaged in data management for many decades; they also have the essential capabilities and facilities for quality control, long-term stewardship, retrieval and distribution of marine data.

Preparations are now underway with the European Commission for another phase of the project that will address new challenges such as big data, new types of instrumentation and data, new IT standards, and cloud infrastructures. The objective of this chapter is to give an overview of the current approach and architecture of the SeaDataNet infrastructure including its component services, how it has expanded over time to a network of more than 100 connected data centres, and its role as a key element of the technologies behind a number of the European Marine Observation and Data Network (EMODnet) portals.

## BACKGROUND

Oceanographic data is highly diverse and includes a wide range of measurements and variables that have been generated by a broad, multidisciplinary spectrum of projects and programs. It has been collected by hundreds of research institutes, governmental organizations and private companies using various heterogeneous observing sensors which are installed on a variety of platforms such as research vessels, submarines, aircraft, moorings, satellites, buoys etc. to measure a range of physical, chemical, biological, geological and geophysical parameters. As well as the data captured directly from observing the marine environment, secondary data about the marine domain results from the analysis of water and sediment samples collected in the oceans.

The nature of the marine environment means that data acquisition is undertaken at very considerable cost and the resulting observations are often unique and irreplaceable. This data is also fundamental to all aspects of marine research, assessment and planning, and to make best use of it necessitates a robust operational infrastructure, based on European and internationally agreed standards covering data quality, and long-term stewardship as well as technical and semantic aspects of interoperability.

A number of directives and communications from the European Commission including the Marine Strategy Framework Directive (MSFD, 2008) highlight the need for a coordinated approach to marine monitoring in European waters to support sustainable exploitation while maintaining the good environmental status (GES) of the seas. The MSFD has also given rise to the European Marine Observation and Data Network (EMODnet) that aims to integrate national and regional marine data infrastructures to allow stakeholders to access data and data products for the European seas. The EU communication “Marine Knowledge 2020” (European Commission 2010) further emphasizes the need for a systematic approach to support the development of integrated European marine data management.

The SeaDataNet data infrastructure has become a core element of this coordinated approach to marine data management in Europe. It has been developed through a series of projects with many of the SeaDataNet data services and directories having been created within the framework of its precursors, the EU-funded SEA-SEARCH project that was established in response to the lack of awareness of available marine data and information, and the EU-funded SeaDataNet project that was undertaken to overcome the fragmented delivery of data and information. The main objective of the latter project was to provide those stakeholders seeking to make use of marine data with a centralized overview and

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