SeaDataNet - Pan-European infrastructure for marine and ocean data management: Unified access to distributed data sets (www.seadatanet.org)

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SeaDataNet is a leading infrastructure in Europe for marine & ocean data management. It 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 via research cruises and other observational activities, in situ and remote sensing. The basis of SeaDataNet is interconnecting 40 National Oceanographic Data Centres and Marine Data Centers from 35 countries around European seas into a distributed network of data resources with common standards for metadata, vocabularies, data transport formats, quality control methods and flags, and access. Thereby most of the NODC's operate and/or are developing national networks to other institutes in their countries to ensure national coverage and long-term stewardship of available data sets.

The majority of data managed by SeaDataNet partners concerns physical oceanography, marine chemistry, hydrography, and a substantial volume of marine biology and geology and geophysics. These are partly owned by the partner institutes themselves and for a major part also owned by other organizations from their countries.

The SeaDataNet infrastructure is implemented with support of the EU via the EU FP6 SeaDataNet project to provide the Pan-European data management system adapted both to the fragmented observation system and the users need for an integrated access to data, meta-data, products and services. The SeaDataNet project has a duration of 5 years and started in 2006, but builds upon earlier data management infrastructure projects, undertaken over a period of 20 years by an expanding network of oceanographic data centres from the countries around all European seas. Its predecessor project Sea-Search had a strict focus on metadata. SeaDataNet maintains significant interest in the further development of the metadata infrastructure, extending its services with the provision of easy data access and generic data products.

Version 1 of its infrastructure upgrade was launched in April 2008 and is now well underway to include all 40 data centres at V1 level. It comprises the network of 40 interconnected data centres (NODCs) and a central SeaDataNet portal. V1 provides users a unified and transparent overview of the metadata and controlled access to the large collections of data sets, that are managed at these data centres.

The SeaDataNet V1 infrastructure comprises the following middleware services:
• Discovery services = Metadata directories and User interfaces
• Vocabulary services = Common vocabularies and Governance
• Security services = Authentication, Authorization & Accounting
• Delivery services = Requesting and Downloading of data sets
• Viewing services = Mapping of metadata
• Monitoring services = Statistics on system usage and performance and Registration of data requests and transactions
• Maintenance services = Entry and updating of metadata by data centres

Also good progress is being made with extending the SeaDataNet infrastructure with V2 services:
• Viewing services = Quick views and Visualisation of data and data products
• Product services = Generic and standard products

• Exchange services = transformation of SeaDataNet portal CDI output to INSPIRE compliance

As a basis for the V1 services, common standards have been defined for metadata and data formats, common vocabularies, quality flags, and quality control methods, based on international standards, such as ISO 19115, OGC, NetCDF (CF), ODV, best practices from IOC and ICES, and following INSPIRE developments.

An important objective of the SeaDataNet V1 infrastructure is to provide transparent access to the distributed data sets via a unique user interface and download service.

In the SeaDataNet V1 architecture the Common Data Index (CDI) V1 metadata service provides the link between discovery and delivery of data sets. The CDI user interface enables users to have a detailed insight of the availability and geographical distribution of marine data, archived at the connected data centres. It provides sufficient information to allow the user to assess the data relevance. Moreover the CDI user interface provides the means for downloading data sets in common formats via a transaction mechanism.

The SeaDataNet portal provides registered users access to these distributed data sets via the CDI V1 Directory and a shopping basket mechanism. This allows registered users to locate data of interest and submit their data requests. The requests are forwarded automatically from the portal to the relevant SeaDataNet data centres. This process is controlled via the Request Status Manager (RSM) Web Service at the portal and a Download Manager (DM) java software module, implemented at each of the data centres. The RSM also enables registered users to check regularly the status of their requests and download data sets, after access has been granted. Data centres can follow all transactions for their data sets online and can handle requests which require their consent. The actual delivery of data sets is done between the user and the selected data centre.

Very good progress is being made with connecting all SeaDataNet data centres and their data sets to the CDI V1 system. At present the CDI V1 system provides users functionality to discover and download more than 500.000 data sets, a number which is steadily increasing.

The SeaDataNet architecture provides a coherent system of the various V1 services and inclusion of the V2 services. For the implementation, a range of technical components have been defined and developed. These make use of recent web technologies, and also comprise Java components, to provide multi-platform support and syntactic interoperability. To facilitate sharing of resources and interoperability, SeaDataNet has adopted the technology of SOAP Web services for various communication tasks.

The SeaDataNet architecture has been designed as a multi-disciplinary system from the beginning. It is able to support a wide variety of data types and to serve several sector communities. SeaDataNet is willing to share its technologies and expertise, to spread and expand its approach, and to build bridges to other well established infrastructures in the marine domain.

Therefore SeaDataNet has developed a strategy of seeking active cooperation on a national scale with other data holding organisations via its NODC networks and on an international scale with 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.

Recent examples are e.g. the EU FP7 projects Geo-Seas for geology and geophysical data sets, Upgrade-BlackSeaScene for a Black Sea data management infrastructure, CaspInfo for a Caspian Sea data management infrastructure, the EU EMODNET pilot projects, for hydrographic, chemical, and biological data sets. All projects are adopting the SeaDataNet standards and extending its services. Also active cooperation takes place with EuroGOOS and MyOcean in the domain of real-time and delayed mode metocean monitoring data.

SeaDataNet Partners:
IFREMER (France), MARIS (Netherlands), HCMR/HNODC (Greece), ULg (Belgium), OGS (Italy), NERC/BODC (UK), BSH/DOD (Germany), SMHI (Sweden), IEO (Spain), RIHMI/WDC (Russia), IOC

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