SeaDataCloud

OGC SWE in SeaDataNet & EMODnet

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Economy of data acquisition

- Marine data are collected by governments, research institutes, and private industry (in Europe already more than 1,000 organisations)

- Data for physics, geophysics, meteorology, chemistry, biology, geology, bathymetry

- Acquisition of oceanographic and marine data is expensive; annual costs in Europe estimated at 1.4 Billion Euro (1.0 = in-situ; 0.4 = satellites)

Professional data management is required with agreements on standardisation, quality control protocols, long term archiving, catalogues, and access
What is SeaDataNet?

A pan-European infrastructure set up and operated for managing marine and ocean data in cooperation with the NODCs and data focal points of 34 countries bordering the European seas.

<table>
<thead>
<tr>
<th>90s</th>
<th>Metadata directories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Medar/MedAtlas</td>
</tr>
<tr>
<td>2002-2005</td>
<td>Sea-Search (FP5)</td>
</tr>
<tr>
<td>2006-2011</td>
<td>SeaDataNet (FP6)</td>
</tr>
<tr>
<td>2011-2015</td>
<td>SeaDataNet II (FP7)</td>
</tr>
<tr>
<td>2016-2020</td>
<td>SeaDataCloud (H2020)</td>
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</tbody>
</table>
SeaDataNet portal

Giving access to
- Standards, tools both for data centres and other users
- Data and metadata
- Products

http://www.seadatatenet.org
SeaDataNet standards

• Set of common standards for the marine domain, adapting ISO and OGC standards and achieving INSPIRE compliance
  – **Adoption of ISO 19115 – 19139 standard for describing metadata** on data sets, research cruises, monitoring networks, and research projects => marine metadata profiles, schemas, schematron rules
  – **Controlled vocabularies** for the marine domain (>65,000 terms in 82 lists), with international governance and web services
  – **Standard data exchange formats**: ODV ASCII and NetCDF (CF) fully supported by controlled vocabularies

• Maintenance and dissemination of standard QA-QC procedures, together with IOC/IODE and ICES
SeaDataNet services and tools

• **Set of tools** to be used each data centre and freely available from the SeaDataNet portal: metadata editor, data conversion software, data analysis software (ODV), data interpolation software (DIVA)

• **Capacity building** by training workshops for uptake of standards and tools by the data centres in order to achieve standardisation

• **Pan-European services** for harmonised discovery, access, visualisation of data and data products

• **Common SeaDataNet Data Policy** and License

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CDI Data Discovery and Access service

SeaDataNet portal

European data sources
data centres $\leftarrow \approx 650$ originators

Search and Shop

Metadata + transaction data

Already 110 data centres connected and more underway

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CDI Data Discovery and Access service
SeaDataCloud

• Standards and information technology are always evolving, there is a move towards cloud storage and cloud computing, and the SeaDataNet infrastructure must stay up-to-date to maintain and further expand its services to its leads customers and major stakeholders

• SeaDataCloud project, started Nov 2016 with 4 year run and 10 Meuro funding

• A strategic and operational cooperation between the SeaDataNet consortium of marine and ocean data data centres and the EUDAT consortium of e-infrastructure service providers
Towards a Blue Cloud as blue print for the European Open Science Cloud (EOSC)

- Cloud platform with common services for data pre-processing, analyses, visualizations, publishing, DOIs...
- Applying common standards and interoperability solutions for providing harmonised data and metadata
- Providing harmonised discovery and access to data output from multiple sources, European and international
SeaDataNet cooperation

- Copernicus Marine Environmental Monitoring Services (CMEMS): providing long-term archives and standards
- Large ocean monitoring systems (EuroGOOS, AtlantOS, Euro-ARGO, JERICO-Next, ..): providing standards and validation + long-term archiving services
- Ocean Data Interoperability Platform (ODIP): exploring and demonstrating common standards and interoperability with leading data management infrastructures in USA and Australia
- GEOSS - EuroGEOSS: Maintaining the GEOSS portal with SeaDataNet in-situ data collections from large community of European data holders (> 100 data centres; >600 data originators)
- European Open Science Cloud (EOSC): shaping the pilot Blue Cloud
- European Marine Observation and Data Network (EMODnet) driven by Marine Knowledge 2020 and Blue Growth
SeaDataNet and EMODnet

- EU initiative for an overarching European Marine Observation and Data Network (EMODNet) driven by Marine Knowledge 2020 and Blue Growth

- SeaDataNet qualified as a leading infrastructure for the EMODnet data management component and is driving several thematic portals from the start in 2008

- ‘Bottom-up meets top-down’

- This synergy has resulted in many more data centres adopting SeaDataNet standards and connecting to the CDI Data Discovery and Access service while it gave a flying start to EMODnet
EMODnet thematic portals

<table>
<thead>
<tr>
<th>Bathymetry</th>
<th>Geology</th>
<th>Seabed Habitats</th>
<th>Chemistry</th>
<th>Biology</th>
<th>Physics</th>
<th>Human activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum cell water depth</td>
<td>Seabed substrate</td>
<td>Data on modelled seabed habitats (depth, seabed substrate, broad scale biological zone, T, S, light, oxygen, energy due to waves &amp; current)</td>
<td>Pesticides &amp; Biocides</td>
<td>Biomass</td>
<td>Waves</td>
<td>Aggregate Extraction Dredging</td>
</tr>
<tr>
<td>Maximum cell water depth</td>
<td>Sediment accumulation rate</td>
<td>Broad-scale physical habitat map</td>
<td>Antifoulants</td>
<td>Abundance</td>
<td>Water temperature</td>
<td>Fisheries</td>
</tr>
<tr>
<td>Average cell water depth</td>
<td>Sea-floor geology</td>
<td>Detailed habitat maps from surveys</td>
<td>Pharmaceuticals</td>
<td>Gridded Abundance maps</td>
<td>Water salinity/conductivity/density</td>
<td>Hydrocarbon Extraction Main Ports</td>
</tr>
<tr>
<td>Standard deviation of cell water depth</td>
<td>Seabed lithology</td>
<td>Individual habitat modelling outputs</td>
<td>Heavy Metals</td>
<td>species groups:</td>
<td>Currents</td>
<td>Mariculture</td>
</tr>
<tr>
<td>Number of values used for interpolation of cell water depth</td>
<td>Stratigraphy</td>
<td>Geological events</td>
<td>Hydrocarbons</td>
<td>phytoplankton</td>
<td>Light attenuation/fluorescence</td>
<td>Ocean Energy Facilities</td>
</tr>
<tr>
<td>Horizontal coordinate reference system</td>
<td>Coastline migration</td>
<td>Aggregate resources</td>
<td>Radionuclides</td>
<td>zooplankton</td>
<td>Sea level</td>
<td>Pipelines and Cables</td>
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<tr>
<td>Depth reference system</td>
<td>Aggregate resources</td>
<td>Seabed lithology</td>
<td>Fertilizers</td>
<td>angiosperms</td>
<td>Atmospheric parameters</td>
<td>Protected Areas</td>
</tr>
<tr>
<td>Lowest Astronomical Tide</td>
<td>Geological events</td>
<td>Seabed lithology</td>
<td>Acidity</td>
<td>macro-algae</td>
<td>Wind</td>
<td>Waste Disposal</td>
</tr>
</tbody>
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EMODnet Bathymetry portal

Developing and providing a harmonised Digital Terrain Model (DTM) for the European sea regions

www.emodnet-bathymetry.eu
EMODnet Bathymetry example

> 7000 survey data sets used to generate and provide a harmonized and higher resolution digital terrain model for all European seas – comparison with GEBCO

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Pillars under EMODnet Physics

The European Global Ocean Observing System, association and its regional components (ROOSs)

Copernicus Marine Environment Monitoring System (CMEMS)

SeaDataNet, pan-European marine data management infrastructure and network of NODCs
Developing SWE standards

- SDC is contributing to the formulation of SWE profiles for selected platforms and instruments (SensorML and O&M)
- See: https://odip.github.io/MarineProfilesForSWE/
- SDC provides controlled vocabularies to be used for marking up SWE profiles:

  http://seadatanet.maris2.nl/v_bodc_vocab_v2/welcome.asp
Promoting SWE uptake

- SDC promotes adoption of SWE by operators of research vessels and observation platforms for:
  - streamlining the (near) real time data flows from platforms to data centres (Eurofleets, JERICO, FixO3, GROOM, .. Projects and EuroGOOS),
  - detailing relevant metadata of these systems and data flows
  - facilitating easy access by means of Sensor Observation Services (SOS);
SWE for research vessels - Eurofleets
SDC – Developing SWE Ingestion service for SWE-based observation data streams
SDC – Further developing ‘Helgoland’ viewer
EMODnet Ingestion – promoting SWE uptake

Welcome to the EMODnet Data Ingestion portal

The European Marine Observation and Data Network (EMODnet) consists of more than 160 organisations that together work on assembling, harmonising and making marine data, products and metadata more available to public and private users. This Data Ingestion portal facilitates additional data managers to ingest their marine datasets for further processing, publishing as open data and contributing to applications for society.

Submit your data files

The online Data Submission service facilitates you submit marine datasets by completing a form.

Ingest operational data

We are also interested in (Near) Real-Time ((N)RT) data streams from fixed and autonomous ocean observatories.

View submissions

View, search and download datasets that have been submitted by data providers using the Data Access service.

Home

READ MORE

EMODNET INGESTION

Submit

DATA INGESTION PORTAL

Wake up your data – set them free for Blue Society

EMODnet

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EMODnet Ingestion - Physics

• Identifying and encouraging more operators of operational platforms:
  – to join the European operational oceanography data exchange
  – to include their timeseries into SeaDataNet for validation, long-term stewardship and wider availability

• Enlarging awareness and stimulating uptake of SWE standards and services:
  – promotion and guidelines of SWE at EMODnet Ingestion portal
  – SOS demonstration service (Helgoland viewer) at EMODnet Physics portal