SeaDataCloud

EMODnet
European Marine Observation and Data Network

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?

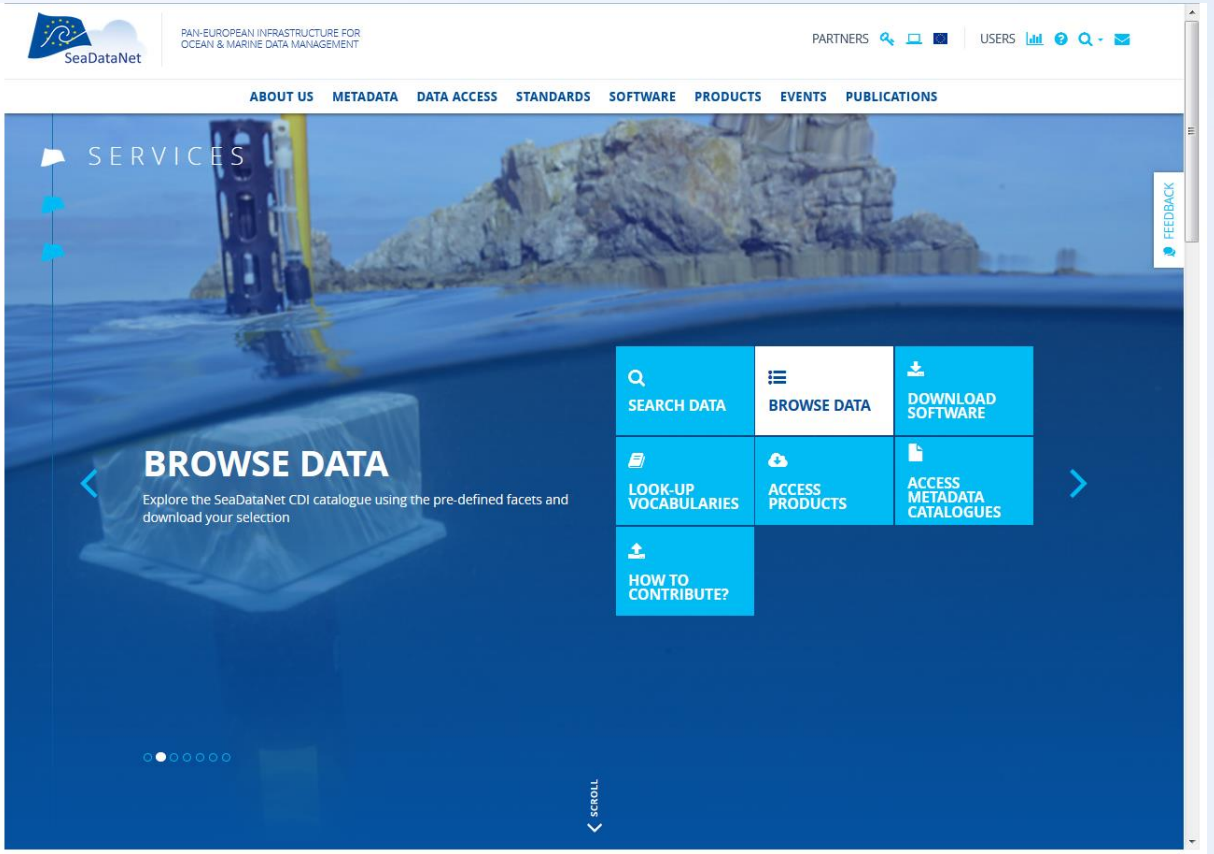
A pan-European infrastructure set up and operated for managing marine and ocean data in cooperation with the NODCs and data focal points of 34 countries bordering the European seas

90s	Metadata directories Medar/MedAtlas
2002-2005	Sea-Search (FP5)
2006-2011	SeaDataNet (FP6)
2011-2015	SeaDataNet II (FP7)
2016-2020	SeaDataCloud (H2020)

SeaDataNet portal

Giving access to

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



http://www.seadatanet.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

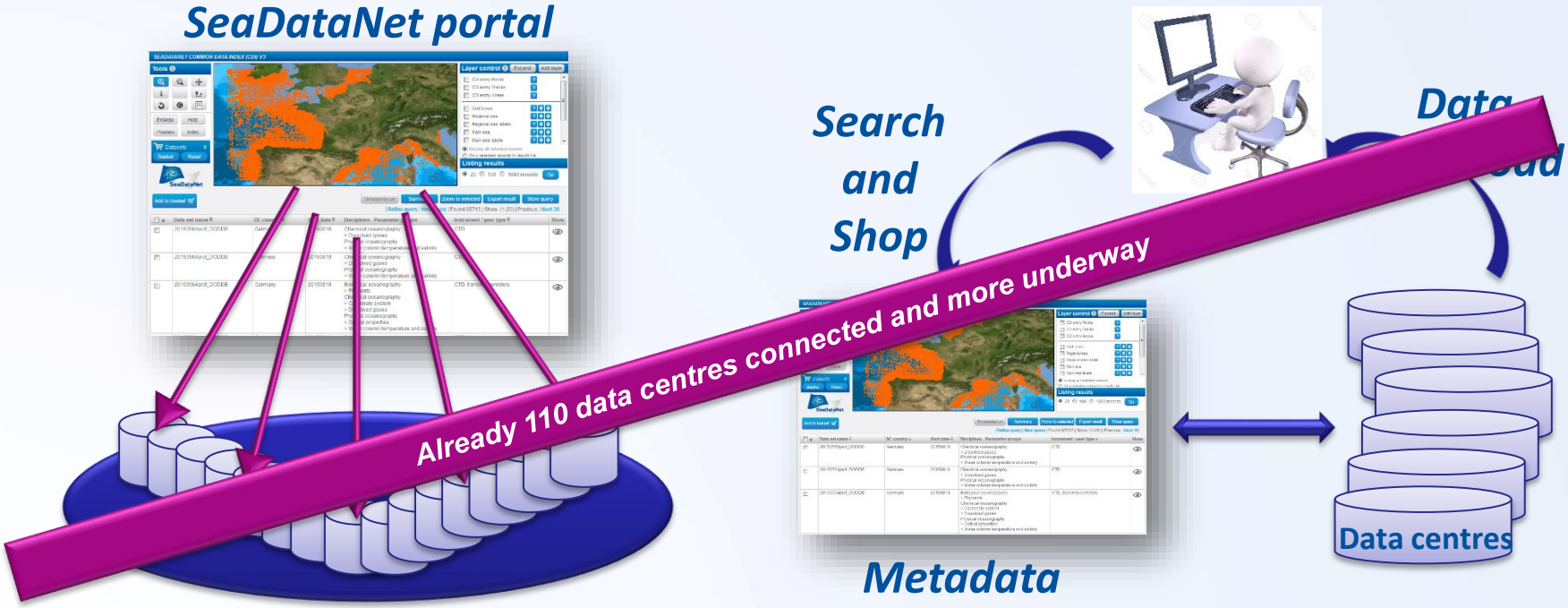
SeaDataNet services and tools

- **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

CDI Data Discovery and Access service



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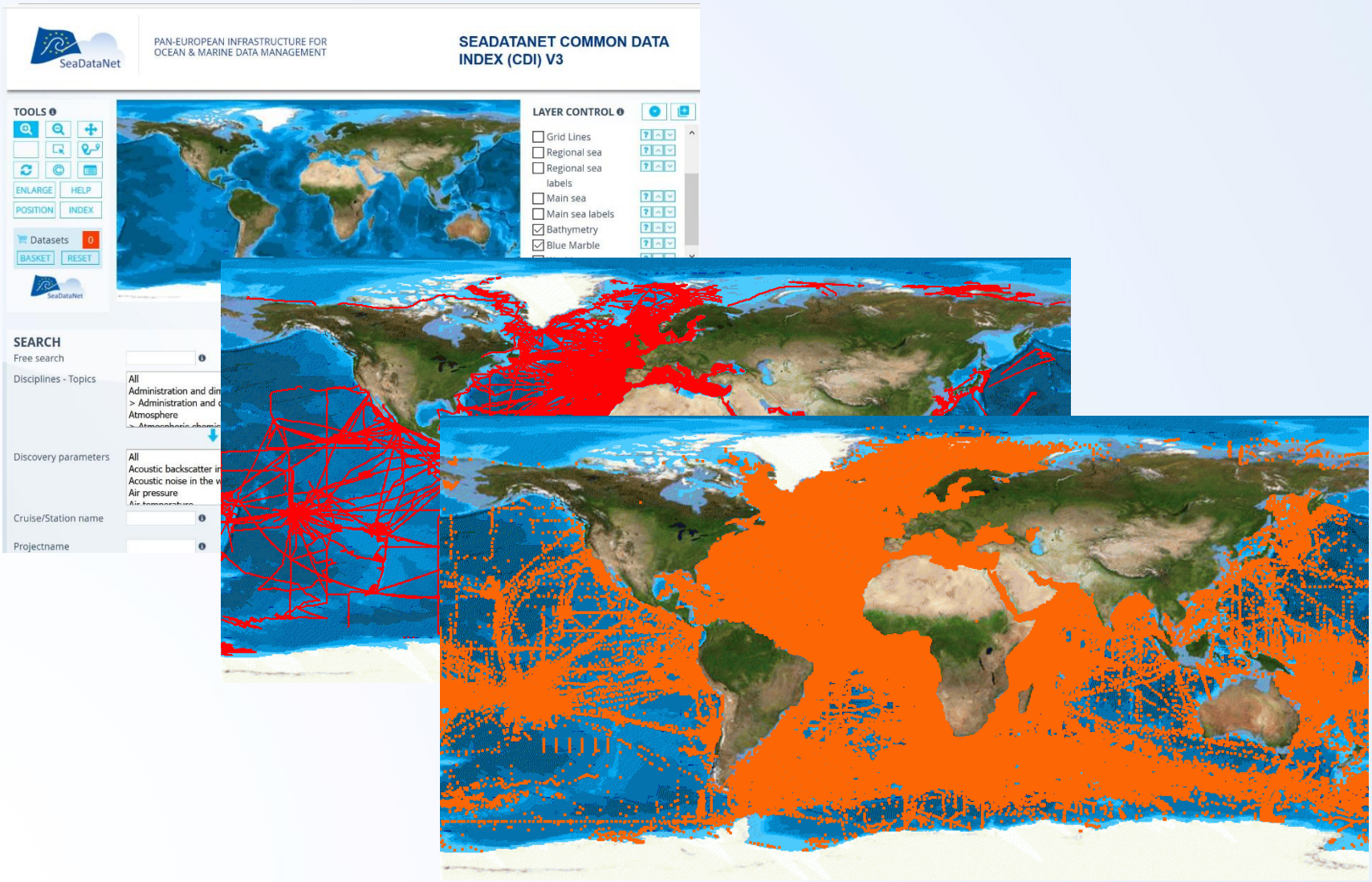
CDI Data Discovery and Access service



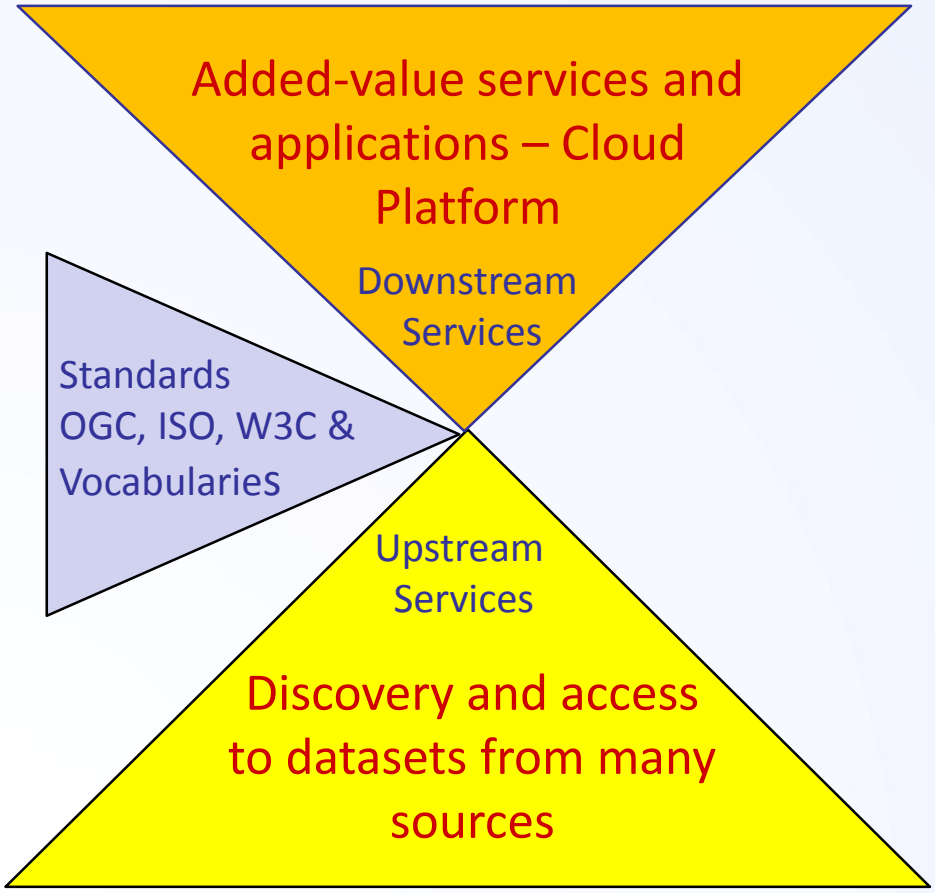
SeaDataCloud

- 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 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

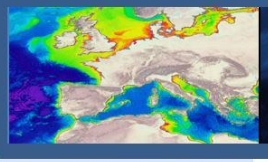
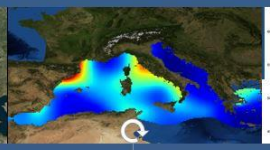
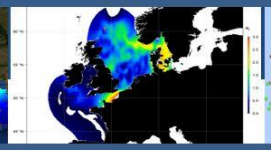
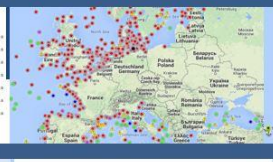
SeaDataNet cooperation

- **Copernicus Marine Environmental Monitoring Services (CMEMS):** providing long-term archives and standards
- **Marine Strategy Framework Directive (MSFD):** providing infrastructure, standards and data collections for several indicators
- **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

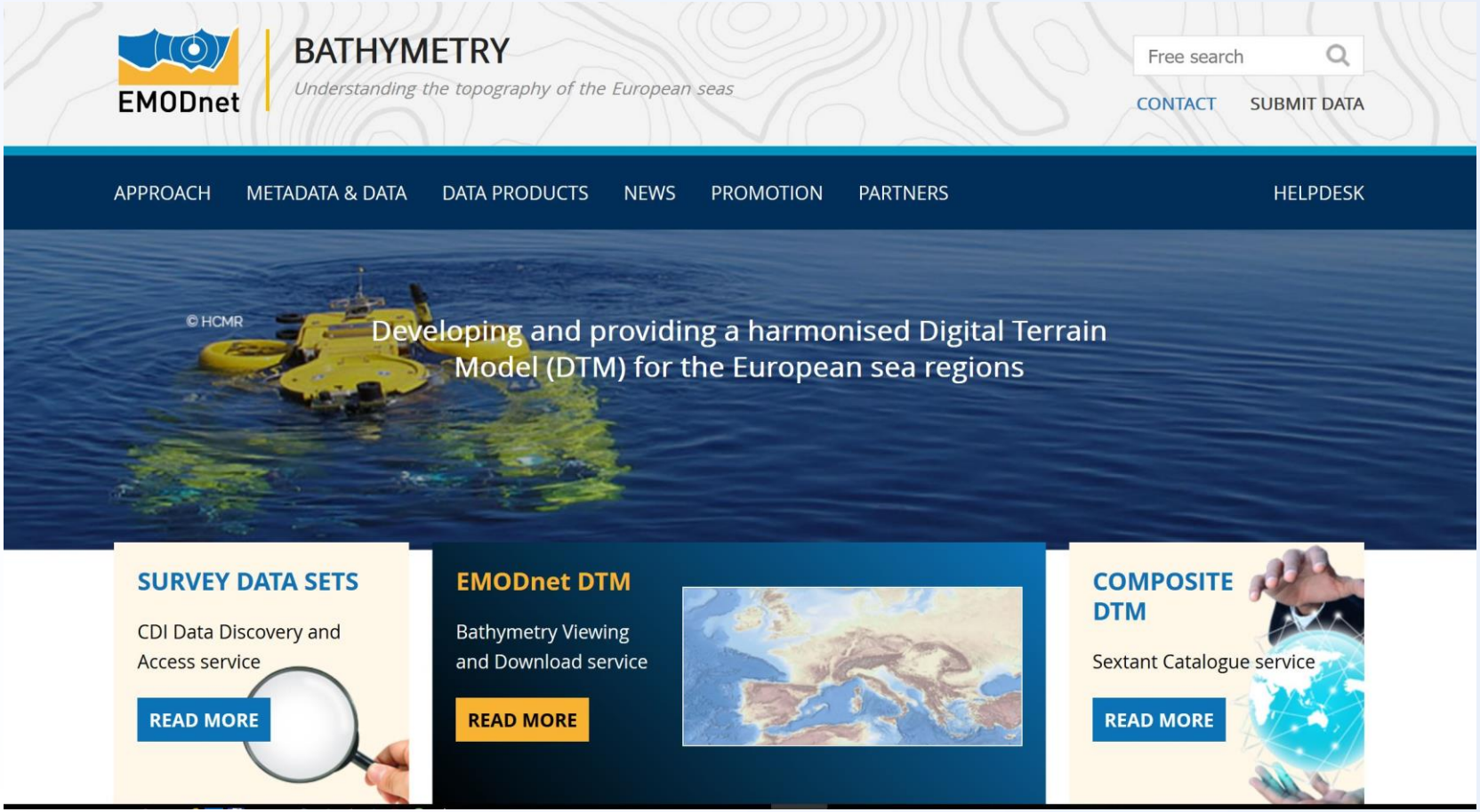
SeaDataNet and EMODnet

- 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

Bathymetry	Geology	Seabed Habitats	Chemistry	Biology	Physics	Human activities
						
Minimum cell water depth Maximum cell water depth Average cell water depth Standard deviation of cell water depth Number of values used for interpolation of cell water depth Horizontal coordinate reference system Depth reference system Lowest Astronomical Tide	Seabed substrate Sediment accumulation rate Sea-floor geology Seabed lithology Stratigraphy Coastline migration Aggregate resources Geological events	Data on modelled seabed habitats (depth, seabed substrate, broad scale biological zone, T, S, light, oxygen, energy due to waves & current) Broad-scale physical habitat map Detailed habitat maps from surveys Individual habitat modelling outputs Habitat point data	Pesticides & Biocides Antifoulants Phamaceuticals Heavy Metals Hydrocarbons Radionuclides Fertilizers Acidity Dissolved Gasses Plastics Marine Litter Beach litter Seafloor litter Micro litter Chlorophyll Silicates Organic Matter	Biomass Abundance Gridded Abundance maps *species groups:* • phytoplankton • zooplankton • angiosperms • macro-algae • invertebrate bottom fauna • birds • mammals • reptiles • Fish	Waves Water temperature Water salinity/conductivity/density Currents Light attenuation/ fluorescence Sea level Atmospheric parameters Wind Underwater noise Rivers Ice	Aggregate Extraction Dredging Fisheries Hydrocarbon Extraction Main Ports Mariculture Ocean Energy Facilities Pipelines and Cables Protected Areas Waste Disposal Wind Farms Other Forms of Area Management / Designation

EMODnet Bathymetry portal

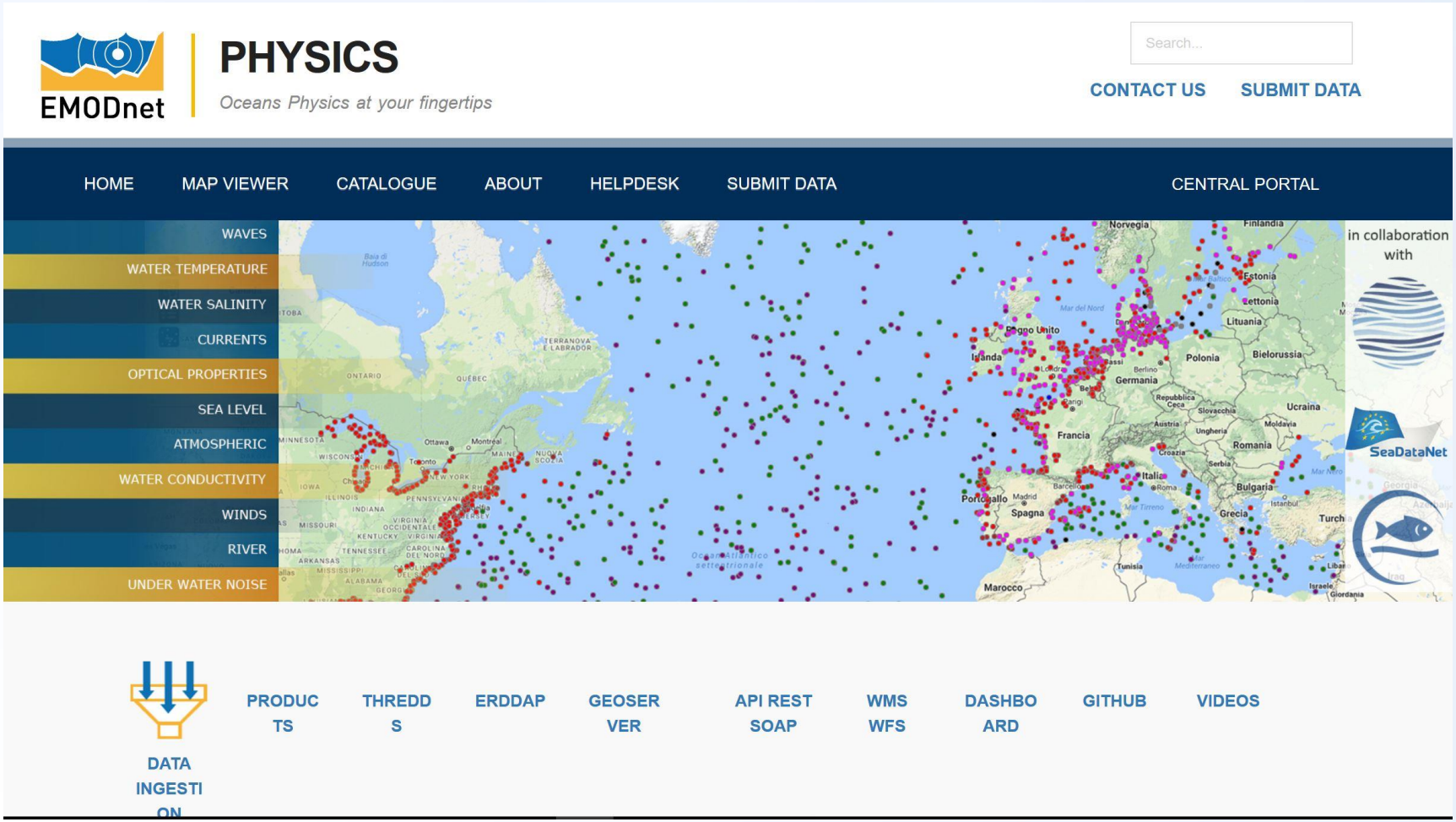


www.emodnet-bathymetry.eu

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

EMODnet Physics



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Pillars under EMODnet Physics

EuroGOOS
European Global Ocean Observing System

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

Copernicus

Copernicus Marine Environment Monitoring System (CMEMS)

SeaDataNet

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:

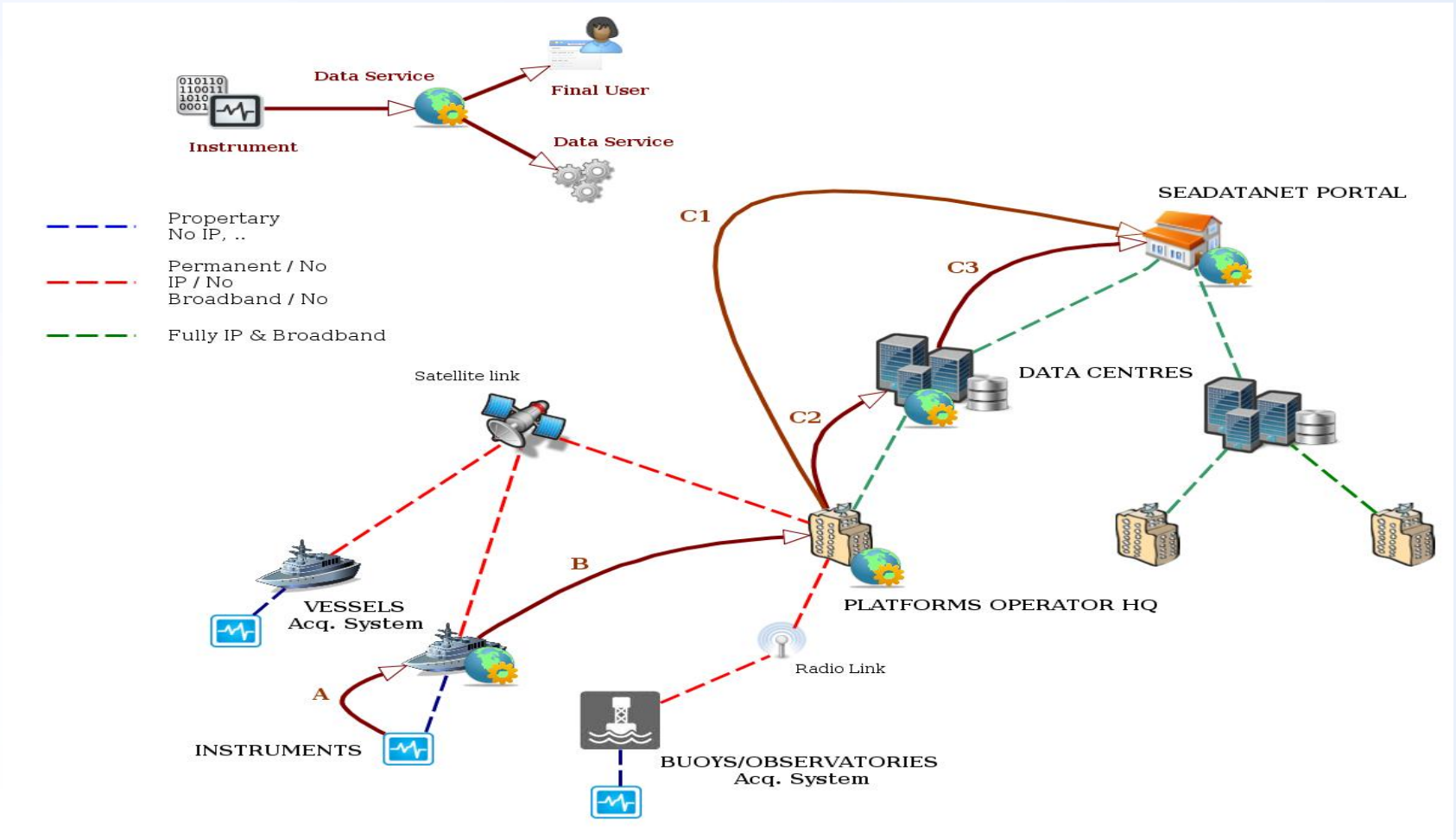
http://seadatanet.maris2.nl/v_bodc_vocab_v2/welcome.asp

W01	SeaDataNet Sensor Web Enablement and SensorML type vocabulary	SDN SWE type	0	35	1/5/2015 10:03:22 AM
W02	SeaDataNet Sensor Web Enablement and SensorML sub-type vocabulary	SDN SWE sub-type	0	6	1/5/2015 10:05:18 AM
W03	SensorML History Event Types	SensorML Event Types	1	14	6/24/2016 3:00:04 AM
W04	SensorML Capability Section Terms	SensorML Capabilities	2	14	12/9/2017 2:00:02 AM
W05	SensorML Characteristic Section Terms	SensorML Characteristics	3	10	12/9/2017 2:00:02 AM
W06	SensorML Classification Section Terms	SensorML Classifications	1	2	7/21/2016 3:00:02 AM
W07	SensorML Identification Section Terms	SensorML Identifications	2	14	12/9/2017 2:00:02 AM
W08	SensorML Contact Section Terms	SensorML Contacts	1	6	7/21/2016 3:00:02 AM

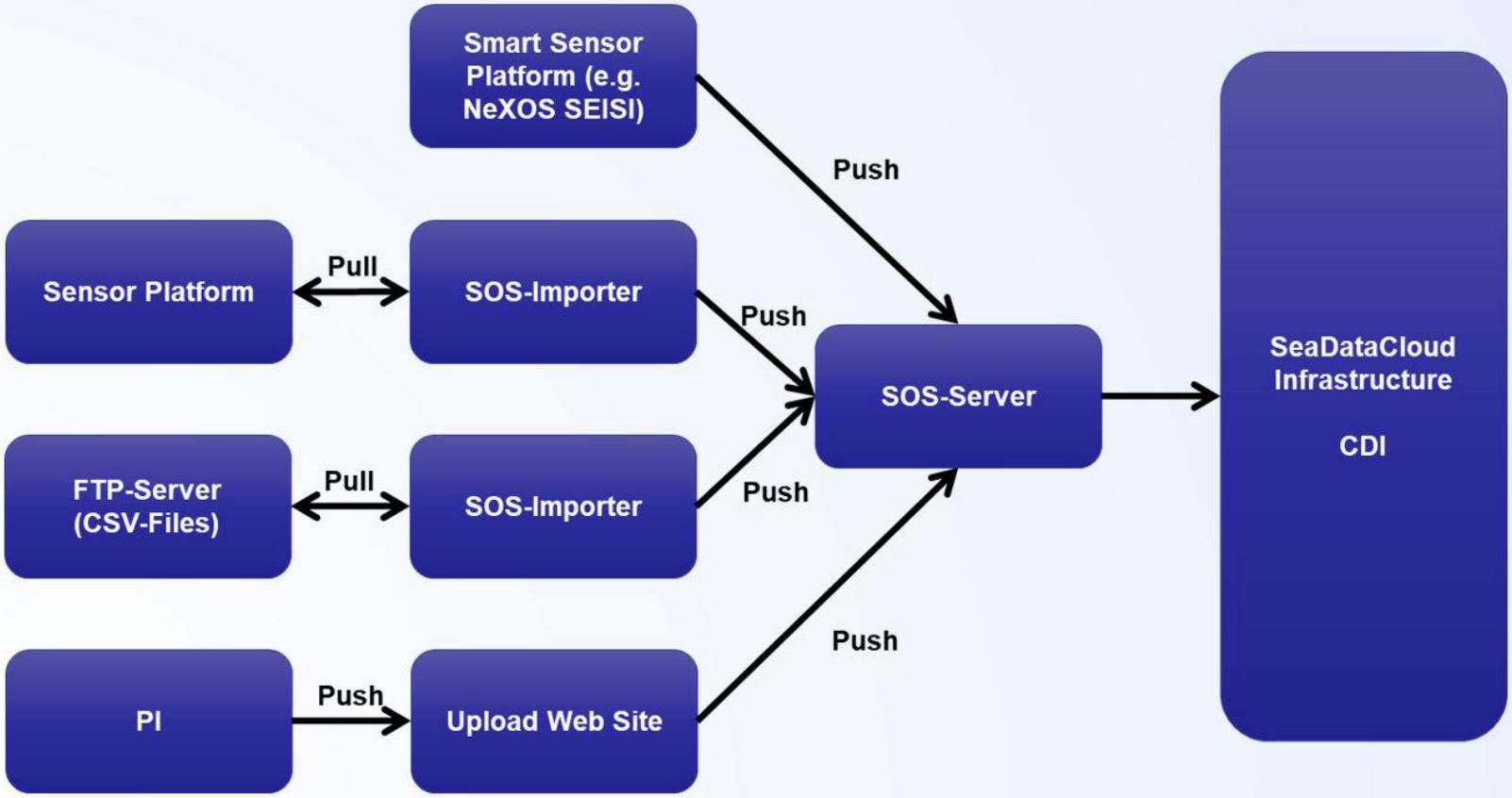
Promoting SWE uptake

- 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);

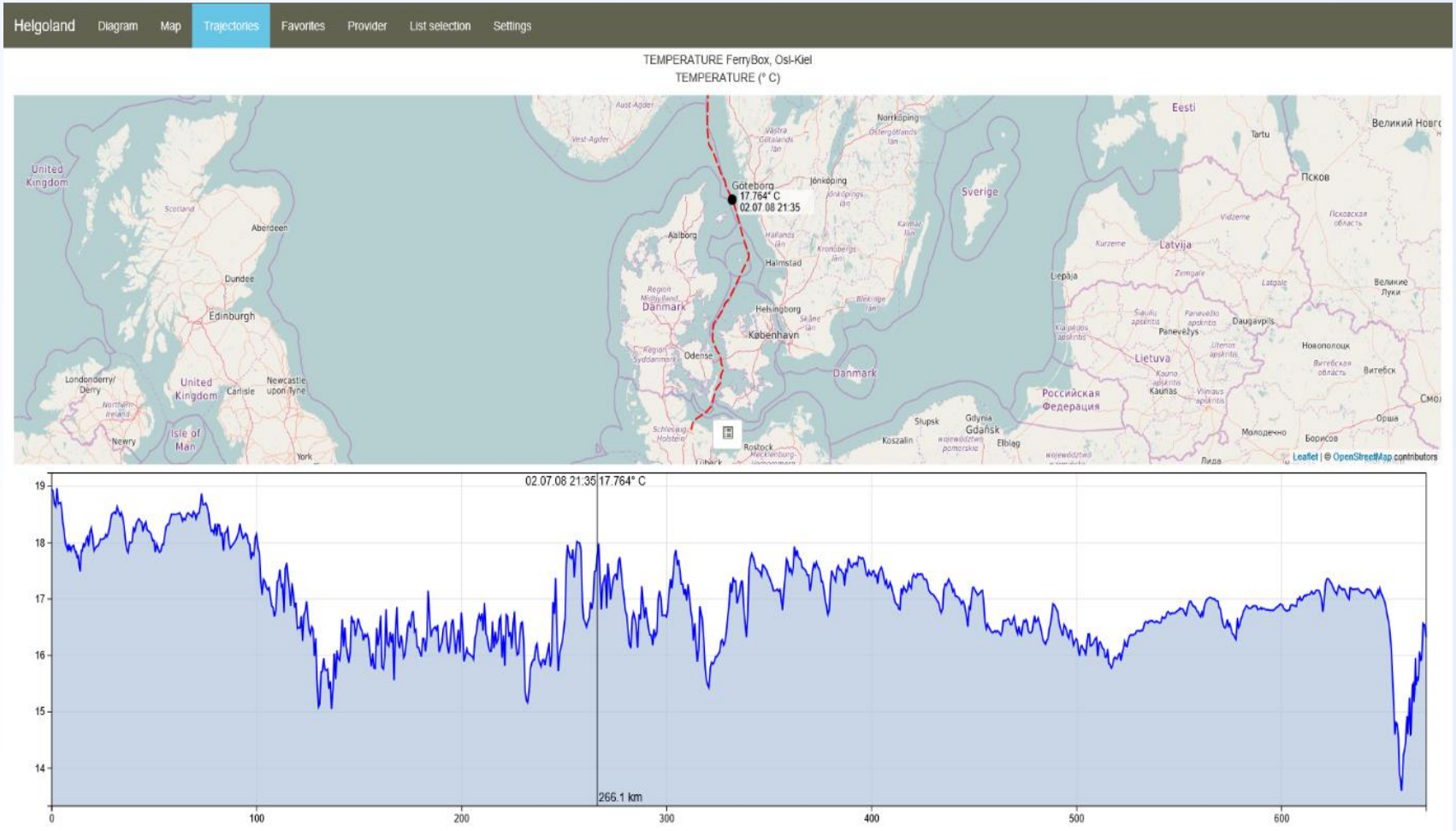
SWE for research vessels - Eurofleets



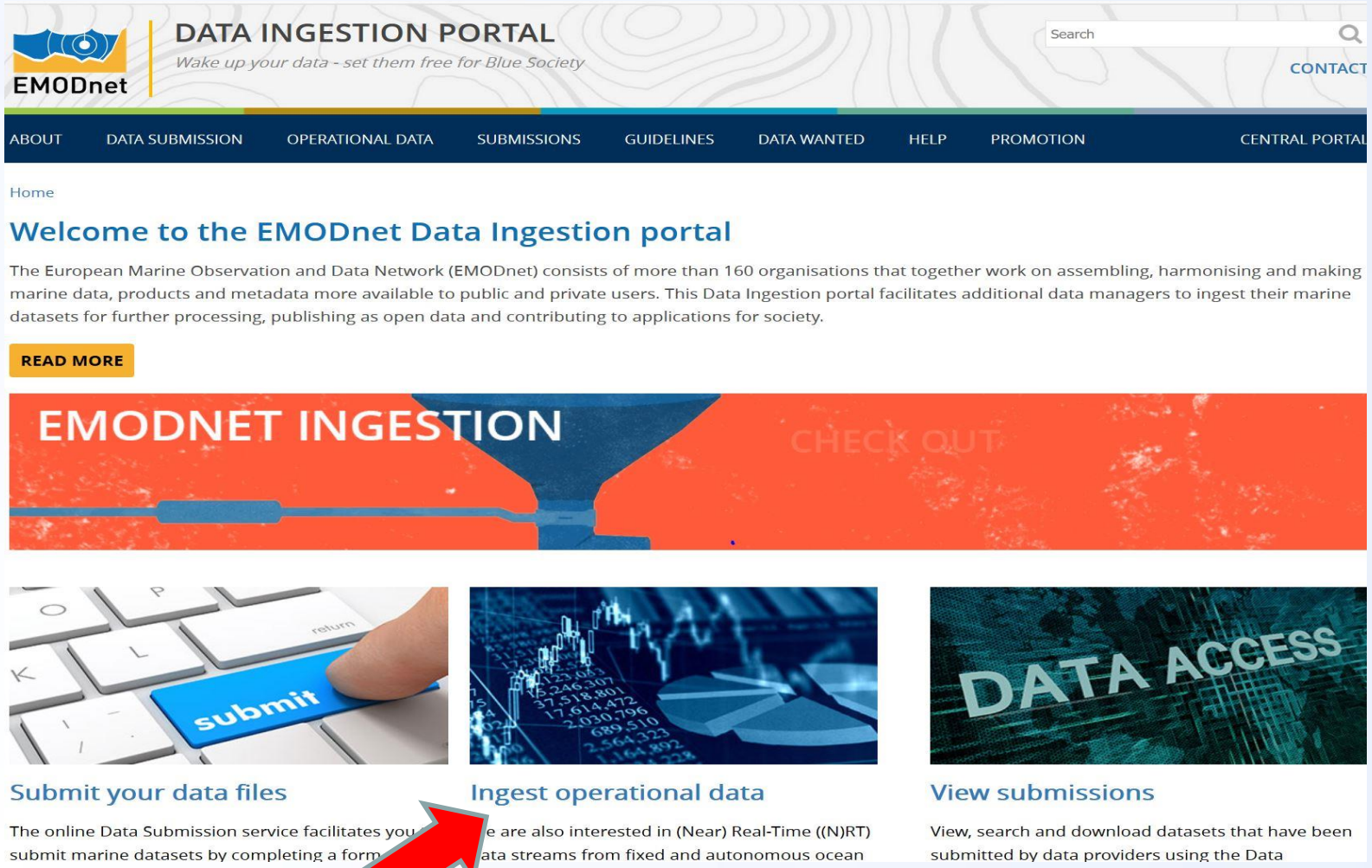
SDC – Developing SWE Ingestion service for SWE-based observation data streams



SDC – Further developing ‘Helgoland’ viewer



EMODnet Ingestion – promoting SWE uptake



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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