

*IMDIS conference
23-25 September, 2013
Lucca, Italy*



SeaDataNet

*PAN-EUROPEAN INFRASTRUCTURE
FOR OCEAN & MARINE DATA
MANAGEMENT*

Second phase achievements and technical highlights

M. Fichaut, D. Schaap, G. Maudire and the SeaDataNet Consortium



SeaDataNet



EU – MAST
EU – MASTII

EU-FP5

EU-FP6

EU-FP7

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90s

EDMED
Euronodim
MEDATLAS
EDIOS

2002-2005

Sea-Search

2006-2011

SeaDataNet

2011-2015

SeaDataNet II

SeaDataNet has set up and operates a pan-European infrastructure for managing marine and ocean data by connecting National Oceanographic Data Centres (NODCs) and oceanographic data focal points from 34 countries bordering European seas



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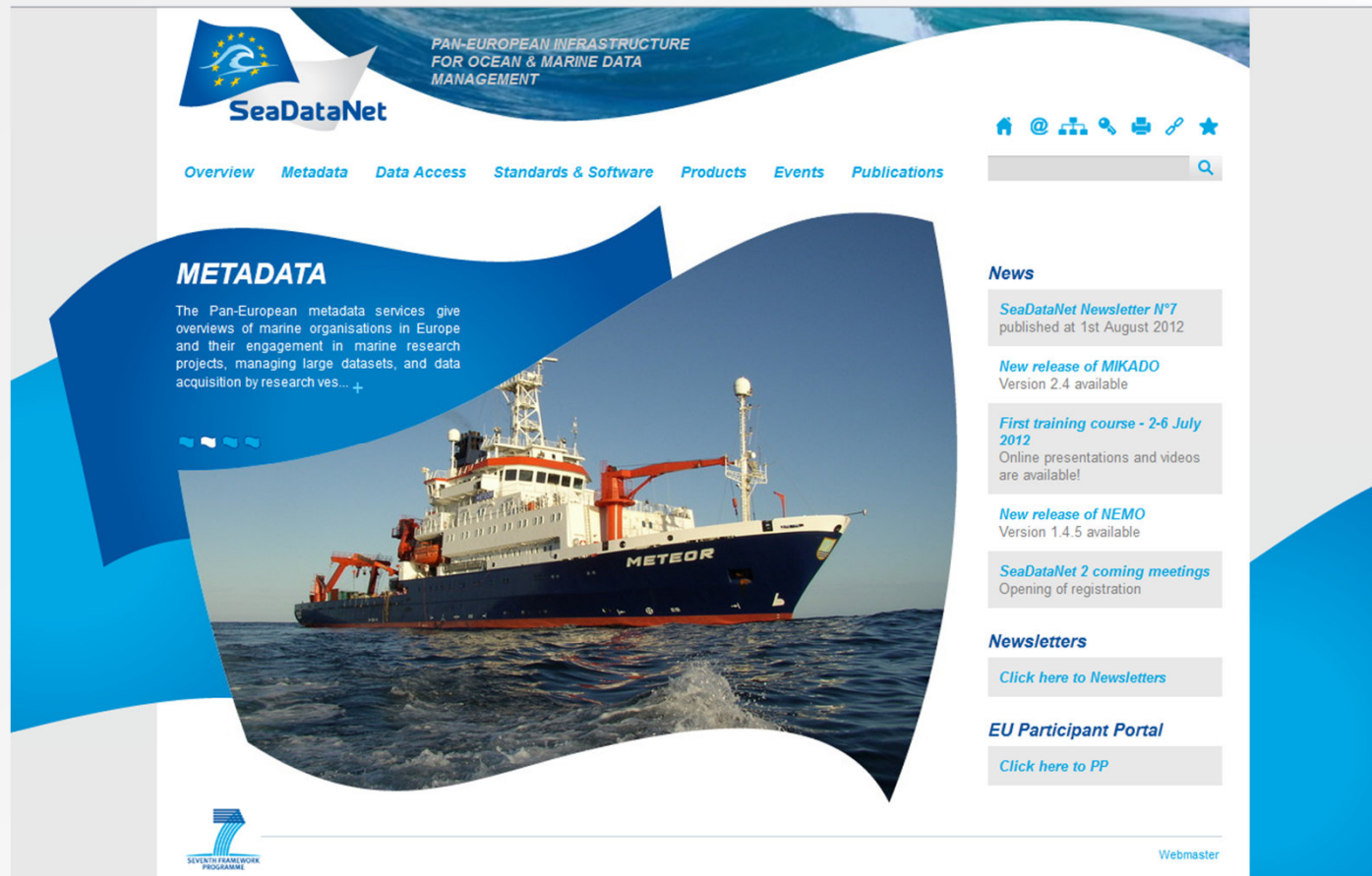
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SeaDataNet principles

- SeaDataNet is **based on a semi-distributed system** that incorporates and enhances the existing NODC network.
- Major technical development activity enables the **data centres to interact as a virtual data centre, able to deliver integrated data, meta-data and products of controlled quality through a unique portal**

SeaDataNet portal : <http://www.seadatanet.org>

- with harmonised services, products and tools



The screenshot shows the SeaDataNet portal website. At the top, there is a banner with the SeaDataNet logo and the text "PAN-EUROPEAN INFRASTRUCTURE FOR OCEAN & MARINE DATA MANAGEMENT". Below the banner is a navigation menu with links for Overview, Metadata, Data Access, Standards & Software, Products, Events, and Publications. A search bar is located on the right side of the page. The main content area features a large image of the research vessel "METEOR" at sea. To the left of the image, there is a section titled "METADATA" with a brief description of the metadata services. On the right side, there is a "News" section with several articles, including "SeaDataNet Newsletter N°7", "New release of MIKADO", "First training course - 2-6 July 2012", "New release of NEMO", and "SeaDataNet 2 coming meetings". Below the news section, there are links for "Newsletters" and "EU Participant Portal". At the bottom of the page, there is a logo for the "SEVENTH FRAMEWORK PROGRAMME" and a "Webmaster" link.

6 European catalogues maintained by NODCs

SeaDataNet portal provides an overview of the Marine organisations in Europe and their involvement in scientific cruises, data collection, marine projects

- **EDMO** : European Directory of Marine Organisations
- **EDMED** : European Directory of Marine Environmental Datasets
- **EDMERP** : European Directory of Marine Environmental Research projects
- **CSR** : Cruise Summary Reports
- **EDIOS** : European Directory of Ocean Observing Systems
- **CDI** : Common Data Index



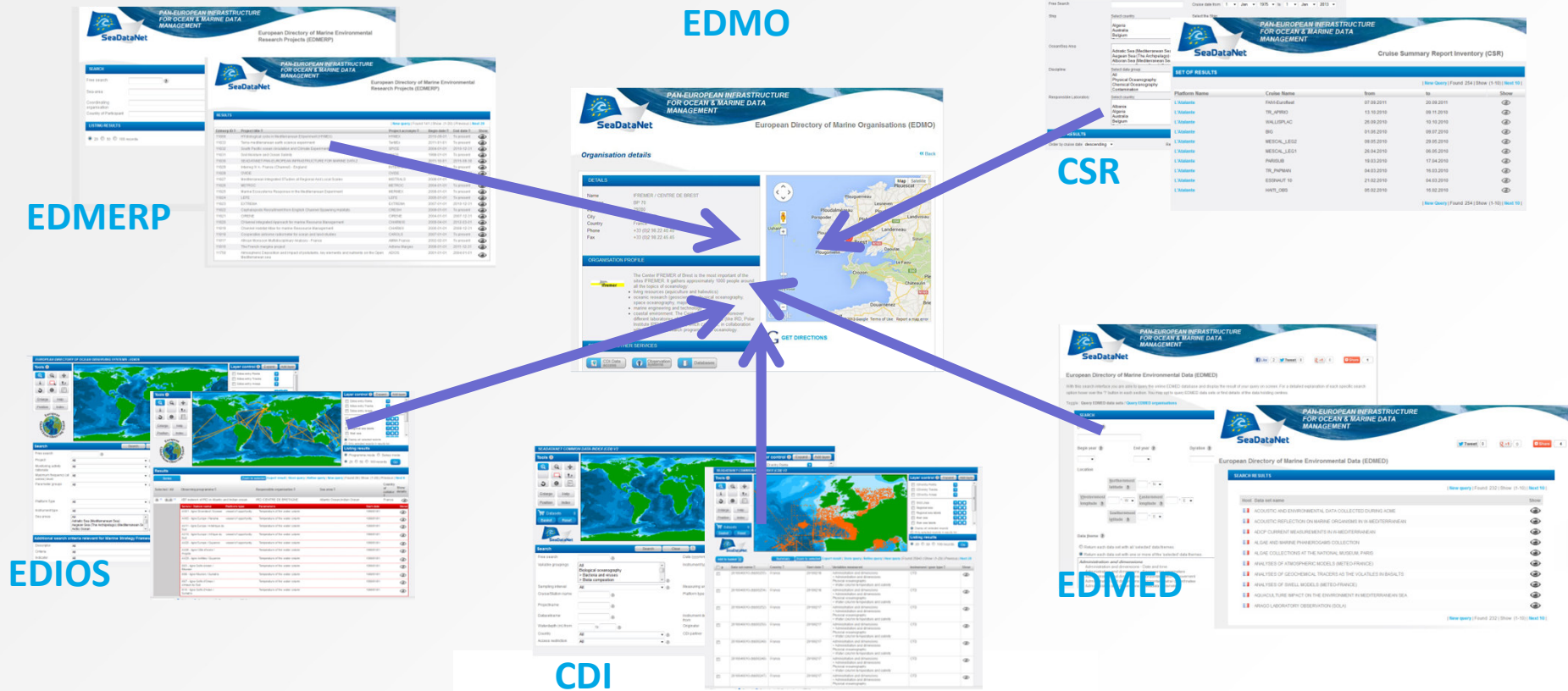
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All SeaDataNet catalogues have been harmonised and tuned in format, syntax and semantics (common vocabularies).

They have a common editor (MIKADO) and online CMS and online query interfaces





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CDI service for discovery and unified access of data

SEADATANET COMMON DATA INDEX (CDI) V2

Tools ?

Layer control ? Expand Add layer

- CDI entry Points ?
- CDI entry Tracks ?
- CDI entry Areas ?
- Grid Lines ?
- Regional sea ?
- Regional sea labels ?

Search

Free search

Variable groupings

- All
- Biological oceanography
- > Bacteria and viruses
- > Biota composition

Sampling interval

Cruise/Station name

Projectname

Datasetname

Waterdepth (m)

Country

SDN Portal

European data sources

sdn-userdesk@seadatanet.org – www.seadatanet.org

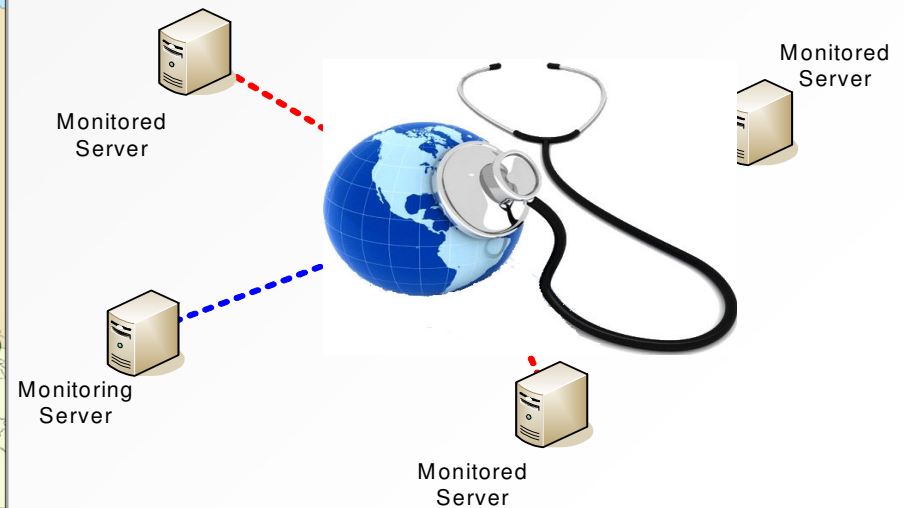
SeaDataNet 2 innovations after 2 years

More data and metadata available, more data centres connected

Catalogue	Nb (10/2011)	Nb (09/2013)	Increase	
EDMO : Marine organisations	2 094	2 384	290	14%
CSR : Cruises	32 113	43 687	11 574	36%
EDMED : Data sets	3 813	3 889	76	2%
EDMERP : Projects	2 338	2 698	360	15%
EDIOS : Programmes	294	356	62	21%
CDI : Data	1 053 706	1 350 455	296 749	28%
Connected data centres	65	88	23	35%

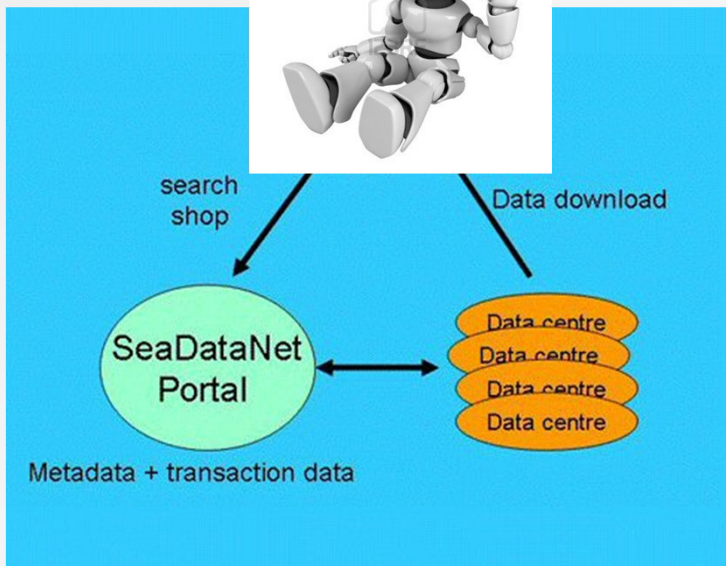
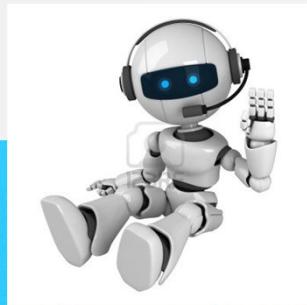
SeaDataNet 2 innovations

Monitoring of the infrastructure by NAGIOS software for core services centrally based (website, catalogues querying) and for local services (downloading)



SeaDataNet 2 technical innovations

Monitoring of the well functioning of the CDI data requesting and downloading process between central portal and connected data centres by ROBOT user, alert mailings and RSM logging of all steps




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Operated in cooperation with Black Sea SCENES EMODnet

Request Status Manager Menu Options

User

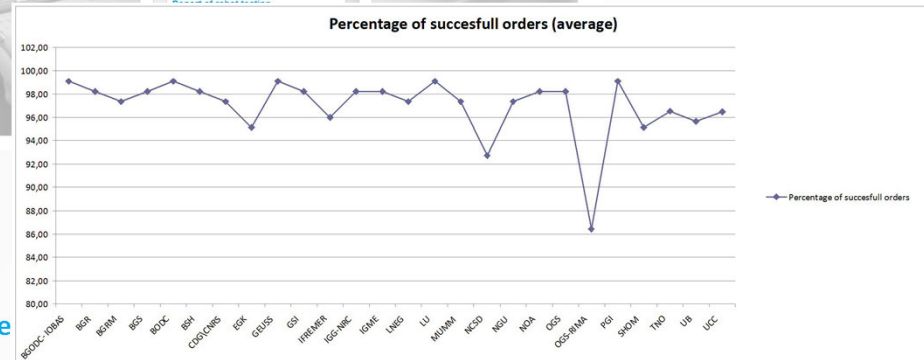
- Status of download requests
- Status of seismic viewing requests

Data provider

- Standing download orders
- Standing seismic viewing orders
- History of all download orders
- History of all viewing orders
- Report of all orders

Administration

- Master report of all orders
- Master report of robot testing



SeaDataNet 2 technical innovations - metadata

Compliance to INSPIRE by migrating CDI and CSR XML encoding to ISO-19139, adaptation of related tools (XML editor MIKADO, CDI and CSR central discovery services), and adapting to upgraded Vocabularies (NVS2.0)

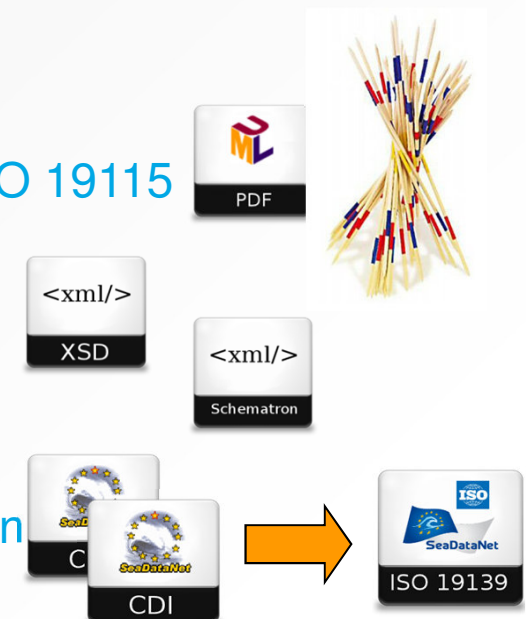


Abstract metadata model specification

- ✓ SeaDataNet metadata profile of ISO 19115 documentation

XML encoding implementation:

- ✓ Schema definition
- ✓ Schematron rules
- ✓ Sample metadata
- ✓ XML implementation documentation

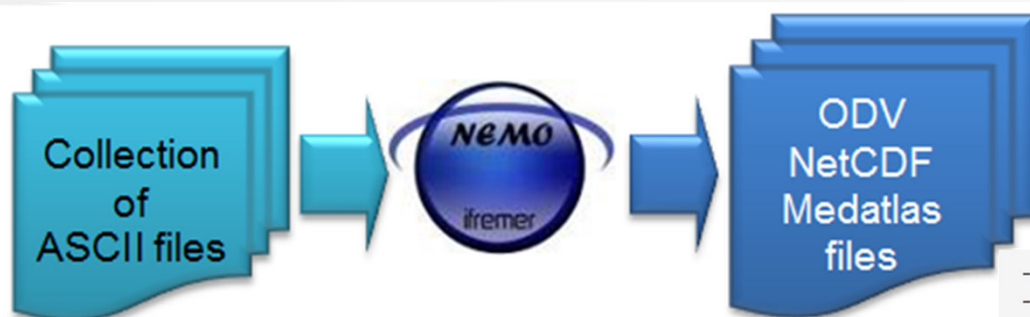


www.seadatanet.org/Standards-Software/Metadata-formats

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SeaDataNet 2 innovations

Extra Format for data files : **SeaDataNet NetCDF** (CF compliant) for vertical profiles, time series and trajectories, and related tools (NEMO, format converters) – formulated with international community – using Vocab (NVS2.0), EDMO



```
-- CF attributes optional for SeaDataNet
--
--     LONGITUDE:valid_min = -180. ;
--     LONGITUDE:valid_max = 180. ;
--
-- SeaDataNet semantic extensions - mandatory for SeaDataNet
--
--     LONGITUDE:sdn_parameter_urn = "SDN:P01::ALONZZ01" ;
--     LONGITUDE:sdn_parameter_name = "Longitude east" ;
--     LONGITUDE:sdn_uom_urn = "SDN:P06::DEGE" ;
--     LONGITUDE:sdn_uom_name = "Degrees east" ;
-- CRS Linkage - mandatory for SeaDataNet
--     LONGITUDE:grid_mapping = "crs";
```


SeaDataNet 2 innovations

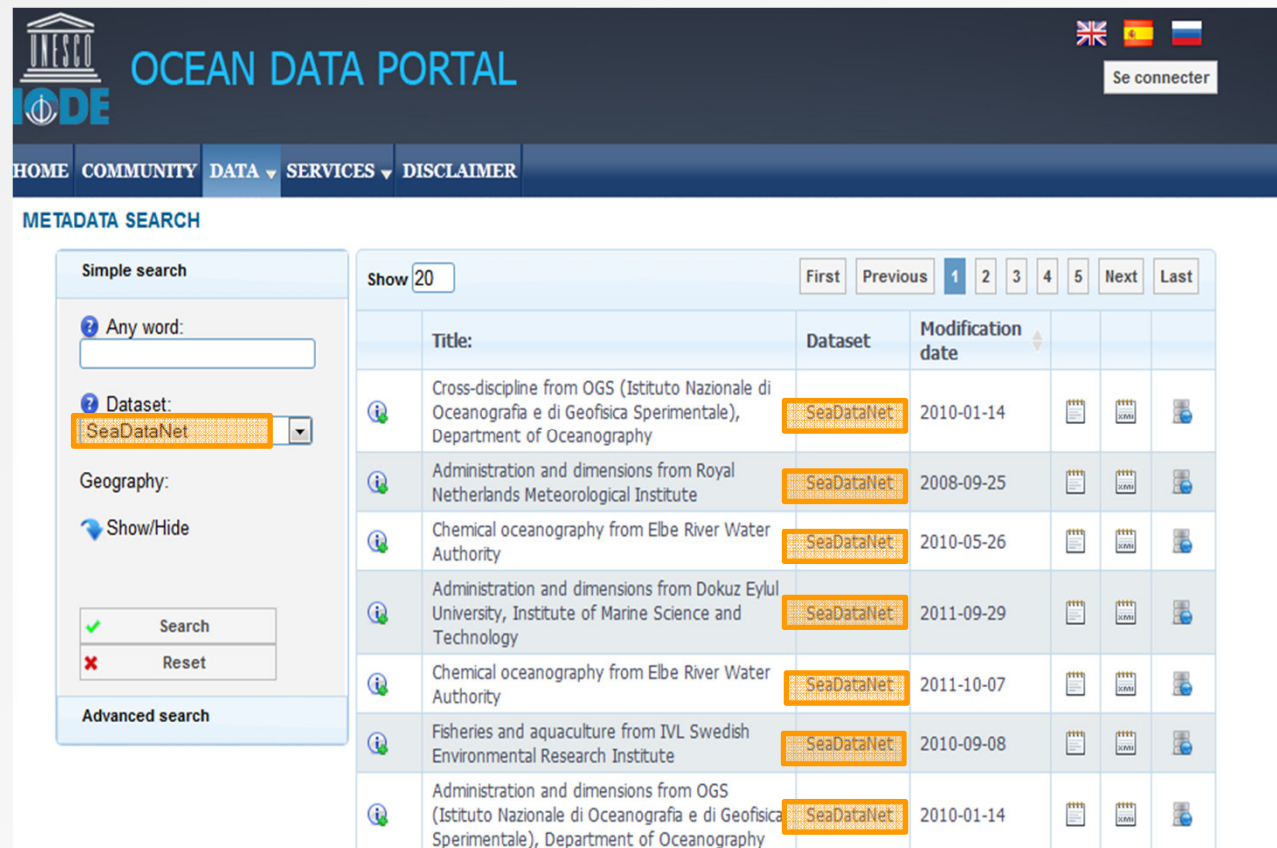
Improvement of the quality of the data set by

- Duplicate checks
 - within 0.001°, 3 minutes for same instrument types) done one the whole datasets by sea basin and implemented before the loading in the CDI central catalogue
- Format checks
 - total of 14 000 CDIs at ODV format corrected
- QC loop with MyOcean insitu-TAC
 - Aggregated SeaDataNet dataset delivered to MyOcean insitu-TAC for quality checks
 - Automatic QC performed on this aggregated dataset
 - List of errors sent to all NODC
 - 77% of the detected errors (around 14000 on climatology, spike, visual checks) = 'True error' => QC flag changed in SDN dataset



SeaDataNet 2 innovations

- Interoperability with the IOC-IODE Ocean data Portal (ODP) :
SeaDataNet data can be searched through ODP

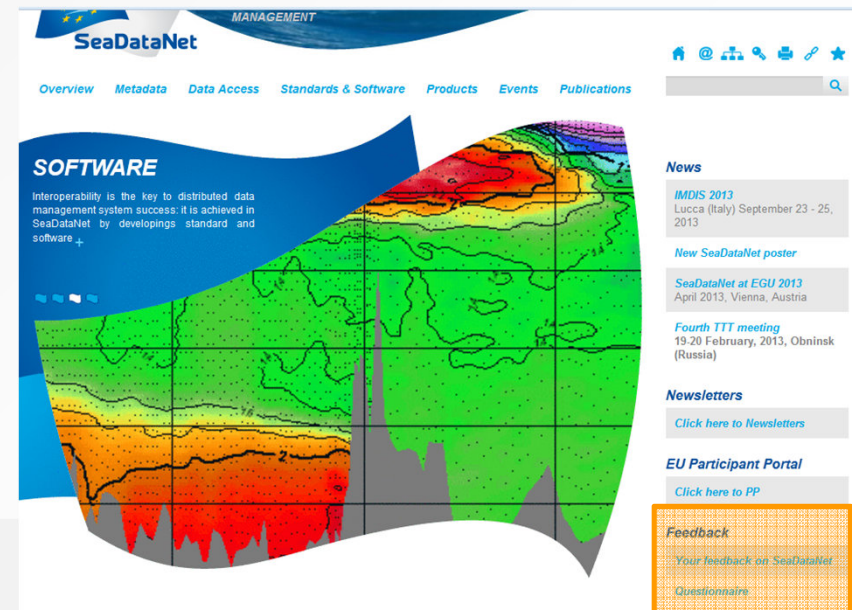


The screenshot shows the IOC-IODE Ocean Data Portal (ODP) interface. The top navigation bar includes links for HOME, COMMUNITY, DATA, SERVICES, and DISCLAIMER. The main content area is titled "METADATA SEARCH" and displays a list of search results. The search criteria are set to "Dataset: SeaDataNet". The results table shows the following data:

Title:	Dataset	Modification date			
Cross-discipline from OGS (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale), Department of Oceanography	SeaDataNet	2010-01-14			
Administration and dimensions from Royal Netherlands Meteorological Institute	SeaDataNet	2008-09-25			
Chemical oceanography from Elbe River Water Authority	SeaDataNet	2010-05-26			
Administration and dimensions from Dokuz Eylul University, Institute of Marine Science and Technology	SeaDataNet	2011-09-29			
Chemical oceanography from Elbe River Water Authority	SeaDataNet	2011-10-07			
Fisheries and aquaculture from IVL Swedish Environmental Research Institute	SeaDataNet	2010-09-08			
Administration and dimensions from OGS (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale), Department of Oceanography	SeaDataNet	2010-01-14			

SeaDataNet 2 innovations

- Dialogue with potential and existing users of SeaDataNet started: short questionnaire sent to:
 - User panel selected from a small group of people coming from different communities
 - SeaDataNet users having downloaded data sets from the CDI interface
- Some of their suggestions already taken into account (search by sea region, increased number of CDIs per order (500 => 10.000))
- Feedback option on SeaDataNet web site





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Cooperation

sdn-userdesk@seadatanet.org – www.seadatanet.org

SeaDataNet 2 cooperation

- For refining and enriching the SeaDataNet standards
- For making the SeaDataNet approach and standards fit for purpose of many different user communities
- For expanding the SeaDataNet infrastructure with more data centres and more volumes of multi-disciplinary data
- For developing added-value services on top of the SeaDataNet infrastructure
- For developing interoperability to other infrastructures



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SeaDataNet 2 cooperation with EuroGOOS

- maintaining the European Directory of Ocean observing systems (EDIOS) and quality controlling and archiving long-term data series. See www.edios.org

The screenshot shows the EDIOS web application interface. At the top, it says "EUROPEAN DIRECTORY OF OCEAN OBSERVING SYSTEMS - EDIOS". The interface includes a "Tools" panel on the left with search, zoom, and position controls. A central map displays yellow observation tracks over the European region. On the right, a "Layer control" panel allows users to toggle various layers like "Edios entry Points", "Grid Lines", and "Regional sea". Below the map, a "Results" section shows a table of 15 data series.

Selected / All	Observing programme	Responsible organisation	Sea area	Country of collator	Show details
11 / 11	XBT network of IRD in Atlantic and Indian ocean.	IRD /CENTRE DE BRETAGNE	Atlantic Ocean,Indian Ocean	France	
21 / 21	ORE - SSS : Sea Surface Salinity Observation Service	CNRS / LEGOS	Worldwide	France	
1 / 1	MFS VOS TRANSECT PORT SAID - MESSINA - GENOVA - GIBRALTAR	ENEA Centro Ricerche Ambiente Marino - La Spezia	Mediterranean Sea - Eastern basin,Mediterranean Sea - Western basin	Italy	
1 / 1	MEDITERRANEAN FORECASTING VOLUNTEER OBSERVING SHIPS	ENEA Centro Ricerche Ambiente Marino - La Spezia	Ligurian Sea (Mediterranean Sea),Mediterranean Sea - Western basin,Tyrrhenian Sea (Mediterranean Sea)	Italy	
34 / 34	NRW Bottlenose Dolphin Monitoring	Natural Resources Wales	Irish Sea and St. George's Channel	United Kingdom	
15 / 15	NRW Aerial scoter monitoring	Natural Resources Wales	Bristol Channel	United Kingdom	
1 / 2	Eutrophication Monitoring	Centre for Environment, Fisheries and Aquaculture Science, Lowestoft Laboratory	Bristol Channel,English Channel,Irish Sea and St. George's Channel,North Atlantic Ocean,North Sea	United Kingdom	
1 / 39	Coastal Temperature Network	Centre for Environment, Fisheries and	Bristol Channel,English Channel,Irish Sea	United	



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SeaDataNet 2 cooperation with MyOcean

- for streamlining the provision of long-term archives for optimising marine forecast services; SeaDataNet has an MoU with MyOcean to formalise the cooperation
- Together with EuroGOOS developing the EMODNet Physics portal streamlining availability and access of NRT and archived metocean data



Pillars under EMODnet Physics portal

Fixed stations
FerryBox
(EuroArgo)
(Gliders)
European operators

European Institutes operators and data centres





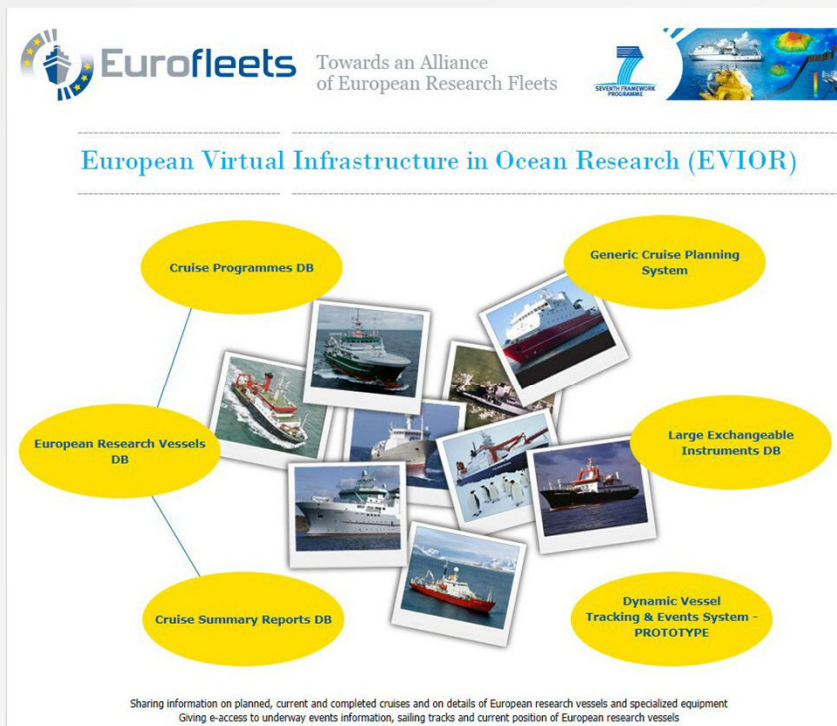
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SeaDataNet 2 cooperation with EuroFleets, POGO and EurOcean

- collecting and providing information on ocean-going research vessels, and their operators, planned and completed cruises.



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Welcome to the Cruise Programmes

Start - Scheduled

Geographical box

Time period

Research Vessel

- Polarstern (13)
- Belgica (8)
- G.O. Sars (7)
- Sonne (5)
- Nana S. Merian (4)
- More

Country operator

- Germany (20)
- Norway (10)
- Belgium (8)
- France (6)
- United Kingdom (3)
- More

Discipline

- Biological oceanography (15)
- Physical oceanography (12)
- Marine geology (8)
- Chemical oceanography (6)
- Fisheries and (6)

Zoom in to selected 20 50 100 records

Cruise name	Vessel	Country operator	Departure	Arrival	Berths	Status
3	2014-10-07	Unknown				
4	2014-07-28	Unknown				
8	2014-04-23	Unknown				
5	2014-04-08	Unknown				
3	2013-03-05	Unknown				
9	2013-12-18	Unknown				
4	2013-10-16	Unknown				
8	2013-08-12	Unknown				
9	2013-05-15	Yes				

Eurofleets European Vessel Database

Back to Search

Pourquoi pas?

Contact Information

Owner: Institut français de recherche pour l'exploitation de la mer (IFREMER)

Operator: IFREMER / GENAUR BREST

Contact person: Jean Xavier Castrec

Address: Centre IFREMER de Brest, BP 71, 29280 PLOUZANE, France

Telephone: +33 298 324453

Website: http://www.ifremer.fr/flotte/navires/hautesmeres/pourquopas/index.htm

Email: jean.xavier.castrec@ifremer.fr

Observations: --

Technical Details

Main Dimensions

- Length: 107.60
- Draft (m): 6.9

Main Vessel Activity

Main Activity: Multiple activities

Operating area: --

The directory is a searchable database of European research vessels. Operator/managers can enter/update their research vessel online. Please contact the helpdesk for an account.

© Powered by Oceanica



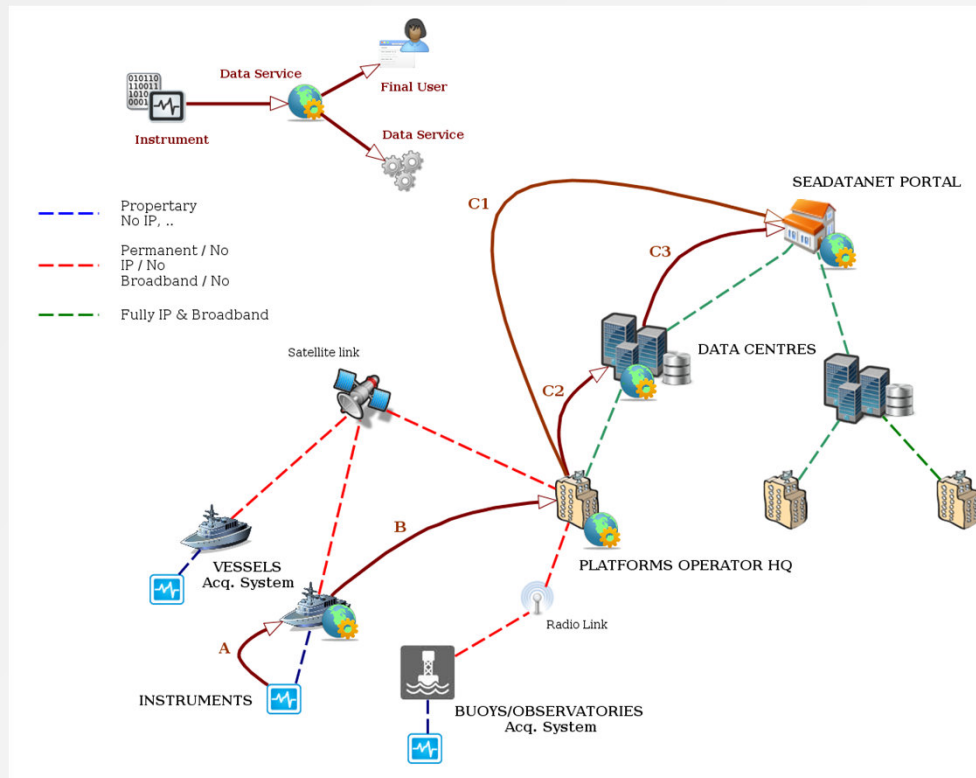
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SeaDataNet 2 cooperation with EuroFleets

- streamlining the flow of data from the research cruises to the data centre by developing SWE standards and applications



The screenshot shows the Eurofleets web application. It includes a header with the Eurofleets logo and the tagline 'Towards an Alliance of European Research Fleets'. The main interface features a map of the Mediterranean region with a red track overlaid. On the left, there are controls for 'Select Research Vessel' (radio buttons for 'Sarmiento de Gamba' and 'Hesperides'), 'Select mode' (radio buttons for 'Dynamic position, bearing and speed of selected RV' and 'track-chart from prototype start to present with geographic positions, speeds and bearings'), and 'Retrieve the 24 hours Ship Summary Report (SSR) and related log of events by clicking on any position of the vessel track.' (radio buttons for 'Off' and 'On'). Below the map is a table with the following data:

Description	Values
main_code	2
vessel_name	Hesperides
vessel_c174	SDN:C174:198:29HE
last_navigation_update	2013-04-11T11:47:28

Date	Speed	Bearing
2013-02-03T00	5.9	315.68
2013-02-03T01	5.4	312.39
2013-02-03T02	5.9	315.01
2013-02-03T03	5.9	317.98

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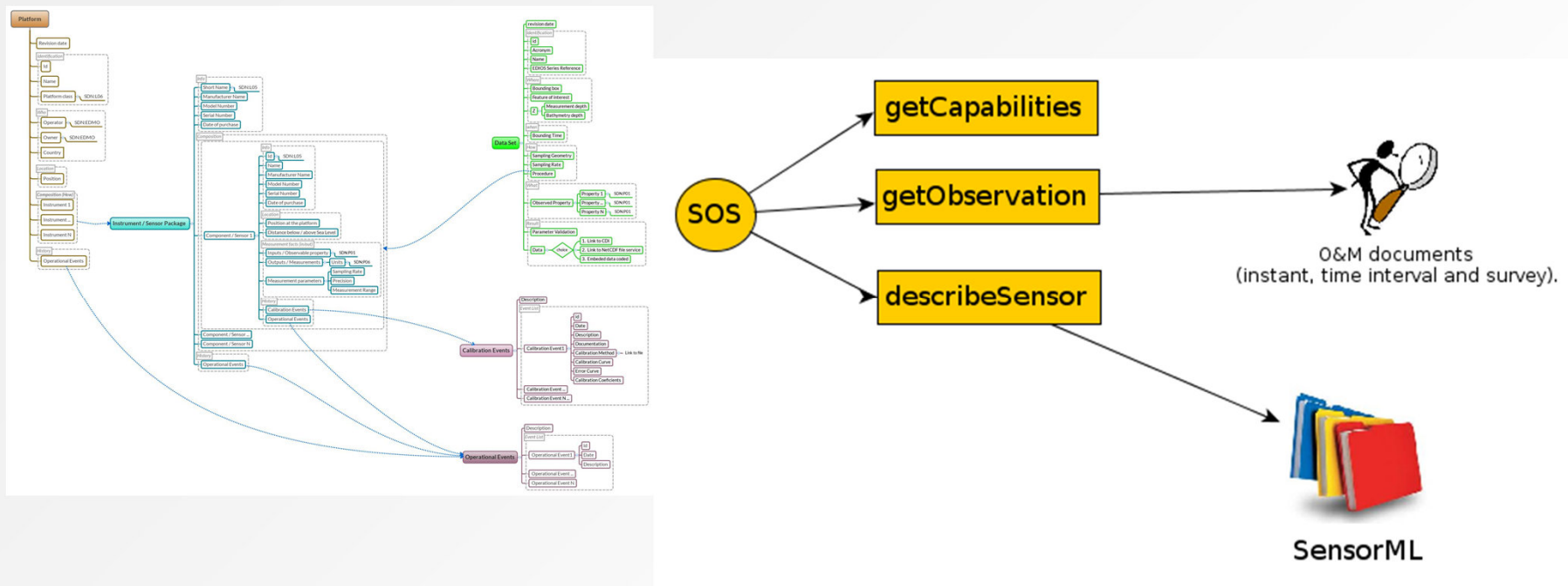
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SeaDataNet 2 cooperation with JERICO

- Developing SWE standards and services for Real-Time data flow from fixed monitoring stations





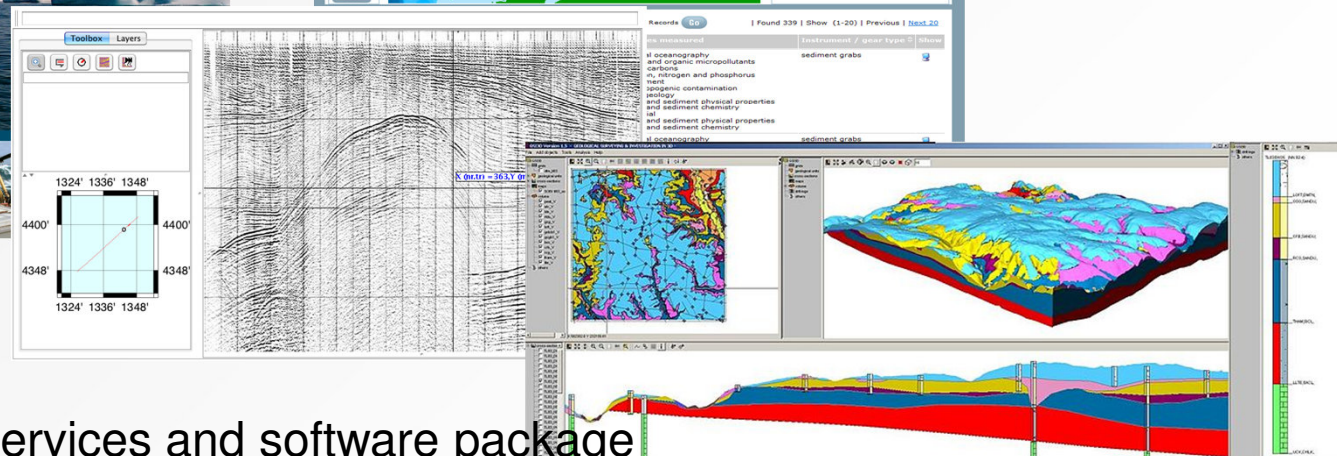
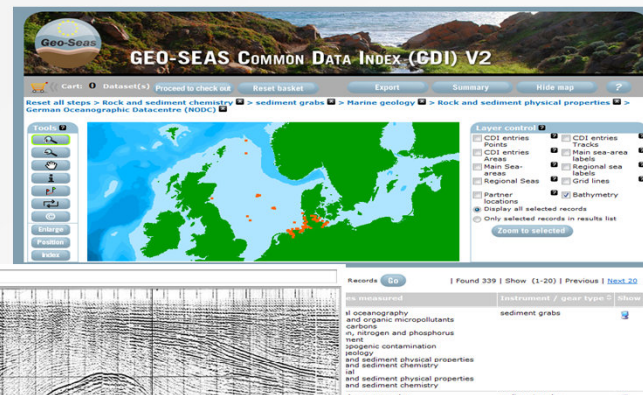
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SeaDataNet 2 cooperation with Geo-Seas

- Adopting and adapting SeaDataNet standards and infrastructure for discovery and access to geological and geophysical metadata, data and data products



HR seismic viewing services and software package
for lithological log visualisation and 3 D viewer
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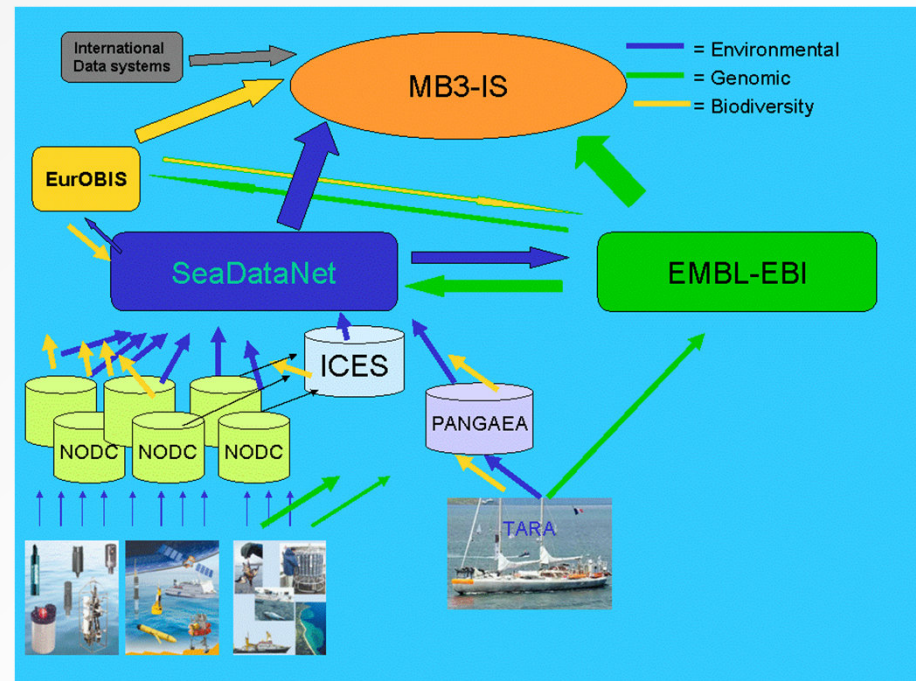
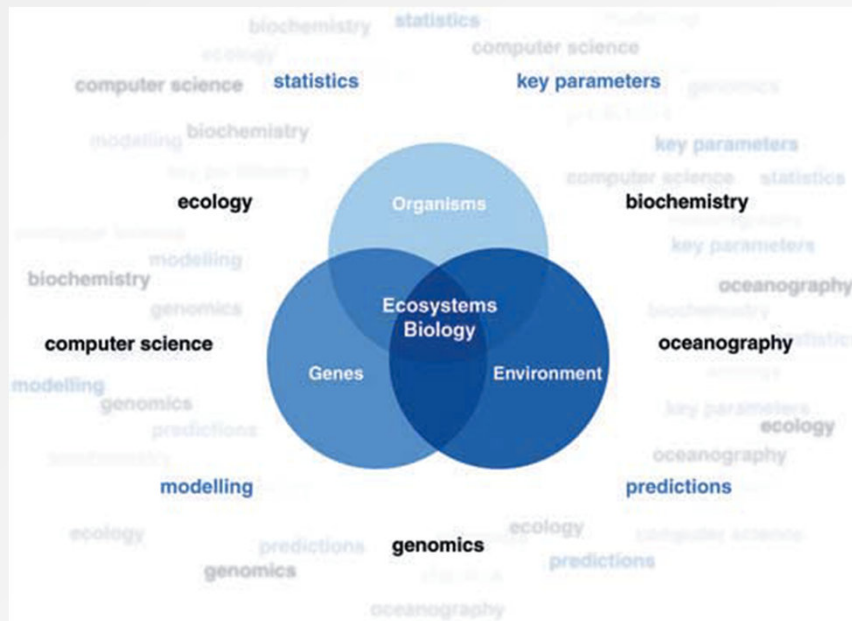
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SeaDataNet 2 cooperation with Micro-B3

- aims for a better understanding of the complexity of marine microbial communities and their role in climate change.
- data sets and information on marine organisms and genes need to be complemented with their environmental context



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SeaDataNet 2 cooperation UBSS and CaspInfo

- Marine Data Management capacity building and expanding the SeaDataNet infrastructure for the Black Sea and Caspian Sea regions

Blackseascene Common Data Index (CDI) V1 - Windows Internet Explorer

http://www.blackseascene.net/v_cdi_v1/browse_step.asp

Blackseascene Common Data Index (CDI) V1

Black Sea SCENE
Blacksea SCENE Common Data Index (CDI) V1

Back to portal

Cart: 0 Dataset(s) Proceed to checkout Reset basket Summary Show on map ?

Reset all steps

20 80 100 Records Go | Found 91505 | Show (1-20) | Previous | Next 20

data set name	Variables measured	Instrument / gear type	Show
NODC_Bottle_10855	Administration and dimensions > Administration and dimensions Physical oceanography > Water column temperature and salinity	discrete water samplers	Show
NODC_Bottle_10855	Administration and dimensions > Administration and dimensions Physical oceanography > Water column temperature and salinity	discrete water samplers	Show
NODC_Bottle_10855	Administration and dimensions > Administration and dimensions Physical oceanography > Water column temperature and salinity	discrete water samplers	Show
NODC_Bottle_10855	Administration and dimensions > Administration and dimensions Chemical oceanography > Carbon, nitrogen and phosphorus > Carbonate system > Dissolved gases > Nutrients Physical oceanography > Water column temperature and salinity	discrete water samplers	Show

Internet | Protected Mode: Off 100%

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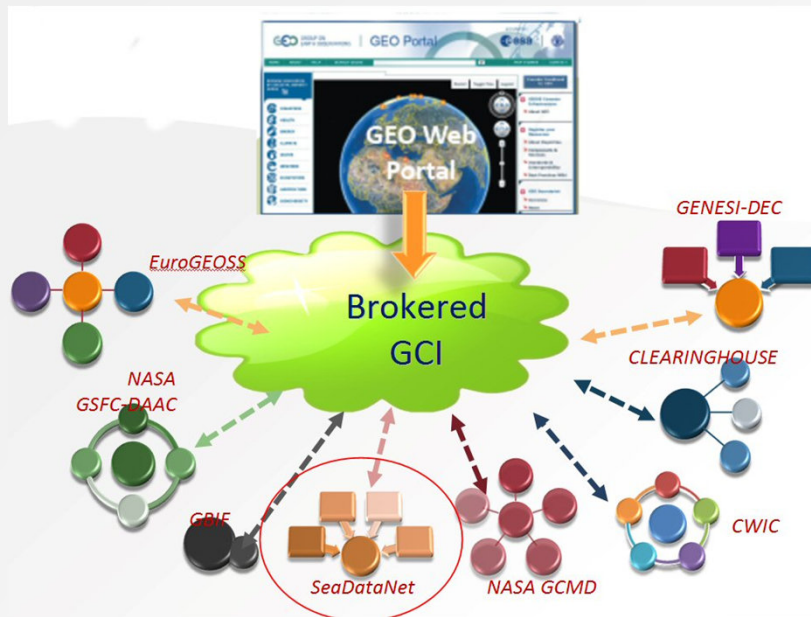
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SeaDataNet 2 cooperation with GEOSS

- Populating the GEOSS portal via the EuroGEOSS Brokerage service



The screenshot shows the GEO Portal interface. The top navigation bar includes 'HOME', 'ABOUT', 'HELP', 'SEARCH GEOSS', and 'MAP VIEWER'. The main content area features a map of Europe with a red box highlighting a region. Below the map is a table of data from the SeaDataNet Common Data Index (CDI) V2.

#	Data set name	Country	Start date	Variables measured	Instrument (gear type)	Show
1	19920125e4d_MLID4B	Germany	19920723	Marine geology - Rock and sediment physical properties - Rock and sediment lithology and mineralogy - Temperature	unconsolidated sediment covers	🔍
2	19920125e4d_MLID4B	Germany	19920723	Marine geology - Rock and sediment physical properties - Rock and sediment lithology and mineralogy - Temperature	unconsolidated sediment covers	🔍
3	19920125e4d_MLID4B	Germany	19920723	Marine geology - Rock and sediment physical properties - Rock and sediment lithology and mineralogy - Temperature	unconsolidated sediment covers	🔍
4	19920125e4d_MLID4B	Germany	19920723	Marine geology - Rock and sediment physical properties - Rock and sediment lithology and mineralogy - Temperature	unconsolidated sediment covers	🔍
5	19920125e4d_MLID4B	Germany	19920723	Marine geology - Rock and sediment physical properties - Rock and sediment lithology and mineralogy - Temperature	unconsolidated sediment covers	🔍

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SeaDataNet 2 and EMODNet

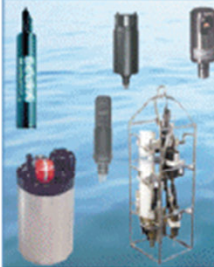


- EU has adopted the Marine Directive and Maritime Policy.
- The Commission proposed to take steps towards an overarching **European Marine Observation and Data Network (EMODNet)**
- The initial Roadmap for EMODNet was released in April 2009
- A cost – benefit analysis reveals that the cost of marine observation in Europe is circa 400 Million Euro per year for space data and another 1 Billion Euro per year for in-situ data => better availability and access can give benefits of at least 300 Million Euro per year for industry, research, government and public



Essential Components of an Observation Network

Sensors to measure continuously and autonomously physical, chemical and biological parameters



- salinity, temperature
- turbidity, oxygen
- chlorophyll, nutrients
- pH, alkalinity
- bathymetry
- primary production

Platforms or structures anchored on the seabed, floating in the water column or drifting at the sea surface, and remote sensing from satellites.



- buoys, floats
- gliders
- mooring
- AUVs, lander
- FerryBox
- cabled networks
- remote sensing

Sampling and consecutive laboratory analyses from research ships, or shore, including water, sediments and biota (phytoplankton, bacteria, zooplankton, fish)



- inorganic trace compounds
- gases, e.g. CO₂, CH₄, DMS
- organic micropollutants
- abundance & function of biota

Communication systems to transfer in real-time data from sensors to the network and to the land stations



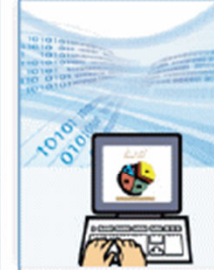
- satcom
- GSM, GPRS
- fibre optics
- acoustics

Data collection and management system for direct control of data quality, and data storage systems to enable data analysis and use for model applications



- data bases
- quality control
- data standards

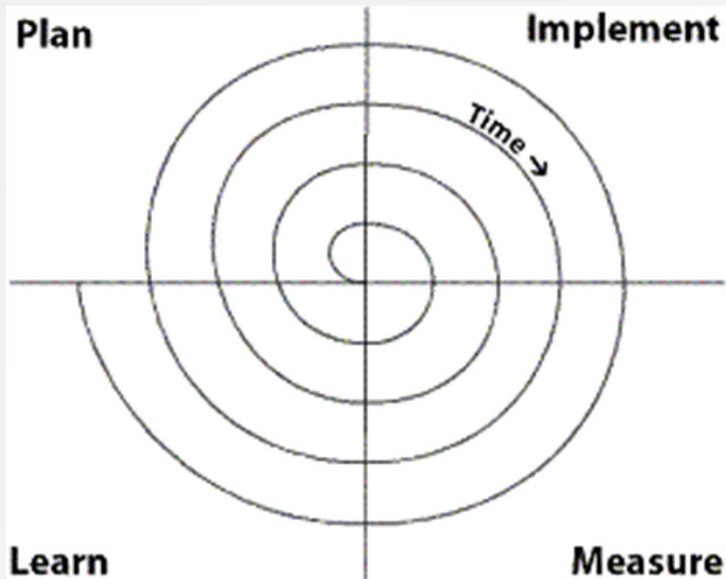
Software and web based information tools to analyse data for trends, compliance to EU directives, to distribute and disseminate data to end users



- analysis
- Presentation
- web
- GIS

a network of existing and developing European observation systems, linked by a data management structure covering all European coastal waters, shelf seas and surrounding ocean basins, accessible to everyone

2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Phase 1 – limited sea basins											
				Phase 2 - low resolution							
						Phase 3 - multi-resolution					



PROTOTYPING:

allows users to assess and improve product by trying it out



SeaDataNet 2 and EMODNet



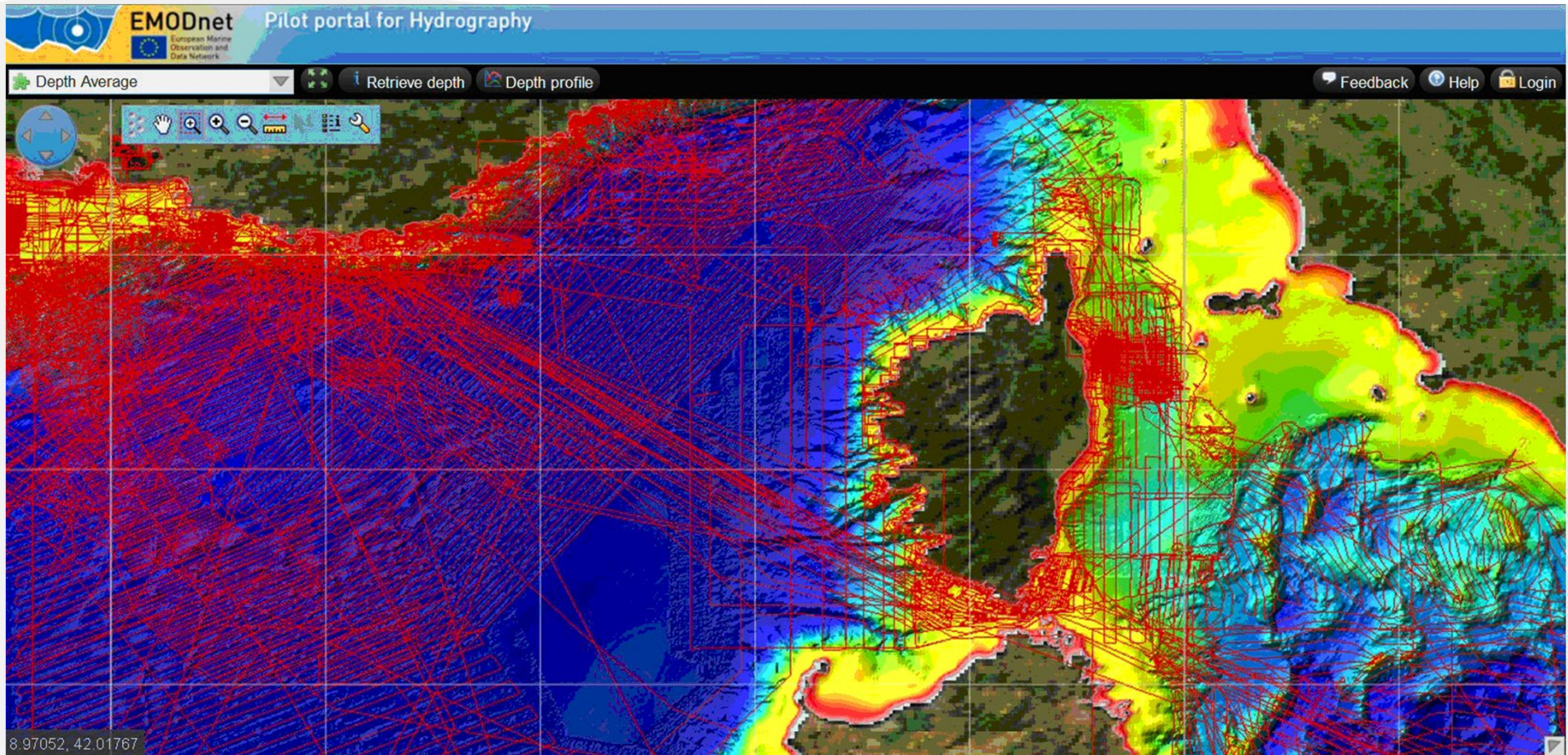
- Preparatory actions were launched for phase 1 2009 – 2011 followed by phase 2 2012 – 2014.
- Concern setting up and further developing portals to provide data products services for data themes over a number of maritime basins:
 - Geology, Chemistry, Biology, Hydrography, Marine Habitats, Physics
- Overall SeaDataNet has qualified itself as leading infrastructure for the EMODNet data management component and is driving several preparatory projects



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EMODNet Bathymetry



Viewing service with downloadable digital bathymetry (DTM – 450 m grid) and overlay of CDI survey data sets

<http://med.skb.sea-data.net> - www.sea-data.net



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EMODNet Bathymetry



EMODnet Pilot portal for Hydrography
Data Discovery and Access Service

Cart: 0 Dataset(s) Proceed to check out Reset basket Export Store query Summary Hide map ?

Reset all steps

Tools

- +
-
- Hand
- i
- P
- ↺
- ©
- Enlarge
- Position
- Index

Layer control Expand Add layer

- CDI entry Points ?
- CDI entry Tracks ?
- CDI entry Areas ?
- Grid Lines ?
- Regional sea ?
- Regional sea labels ?
- Main sea ?
- Main sea labels ?
- Bathymetry ?
- Blue Marble ?

Display all selected records
 Only selected records in results list

Zoom to selected

Search by:

Geographical Box

Time period

Add to basket 20 50 100 Records Go | Found 9126 | Show (1-20) | Previous | Next 20

#	Data set name	Variables measured	Instrument / gear type	Show
<input type="checkbox"/>	fisheries	Marine geology > Gravity, magnetics and bathymetry Terrestrial > Terrestrial	NAVSTAR Global Positioning System receivers, single-beam echosounders	
<input type="checkbox"/>	korinth_feb2004	Marine geology	NAVSTAR Global	

Discovering and requesting access to bathymetric survey data sets (single and multibeam) (9100+)

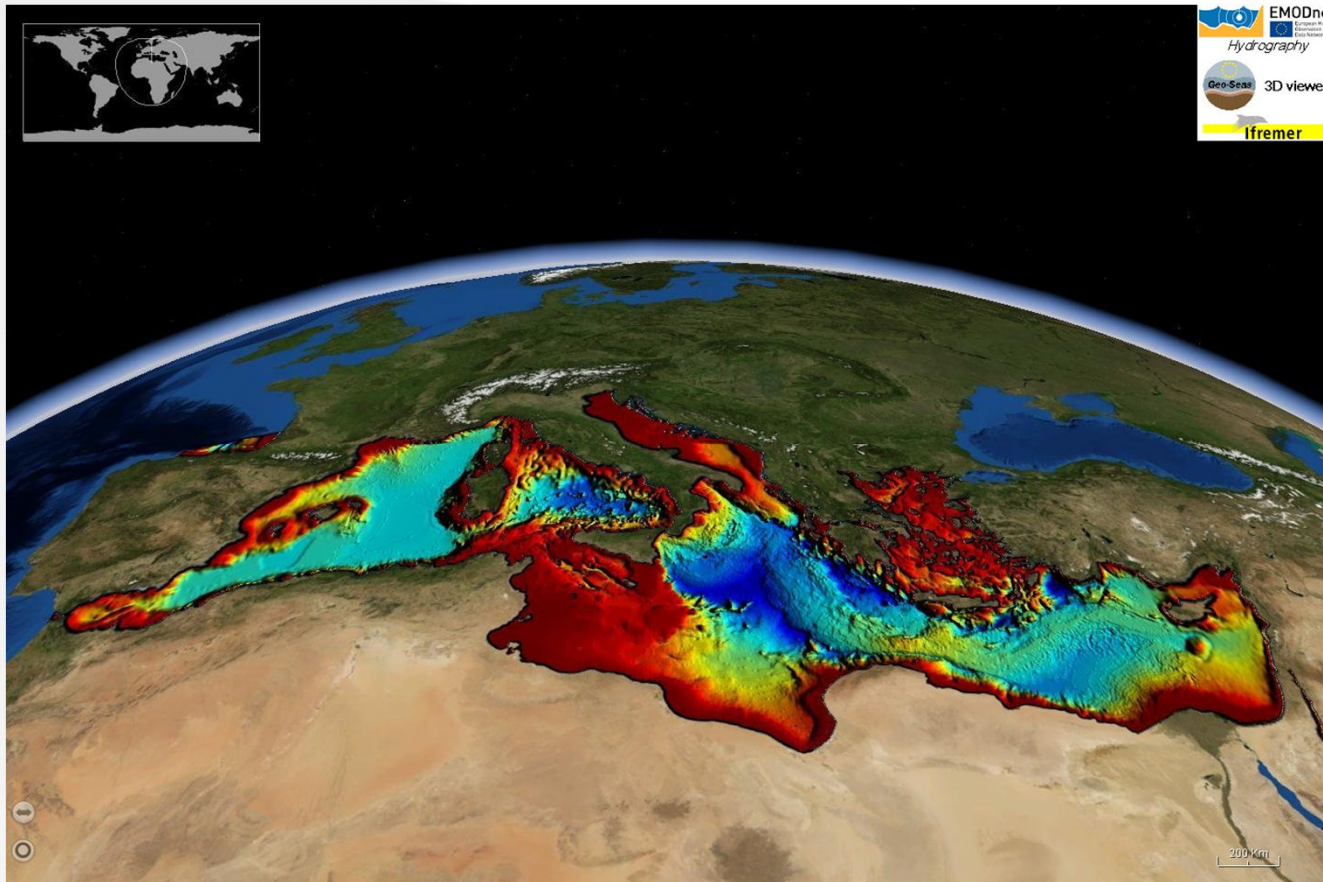
sdn-userdesk@seadatanet.org www.seadatanet.org



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EMODNet Bathymetry



3D software developed as part of Geo-Seas to visualise the
EMODNet Digital Bathymetry

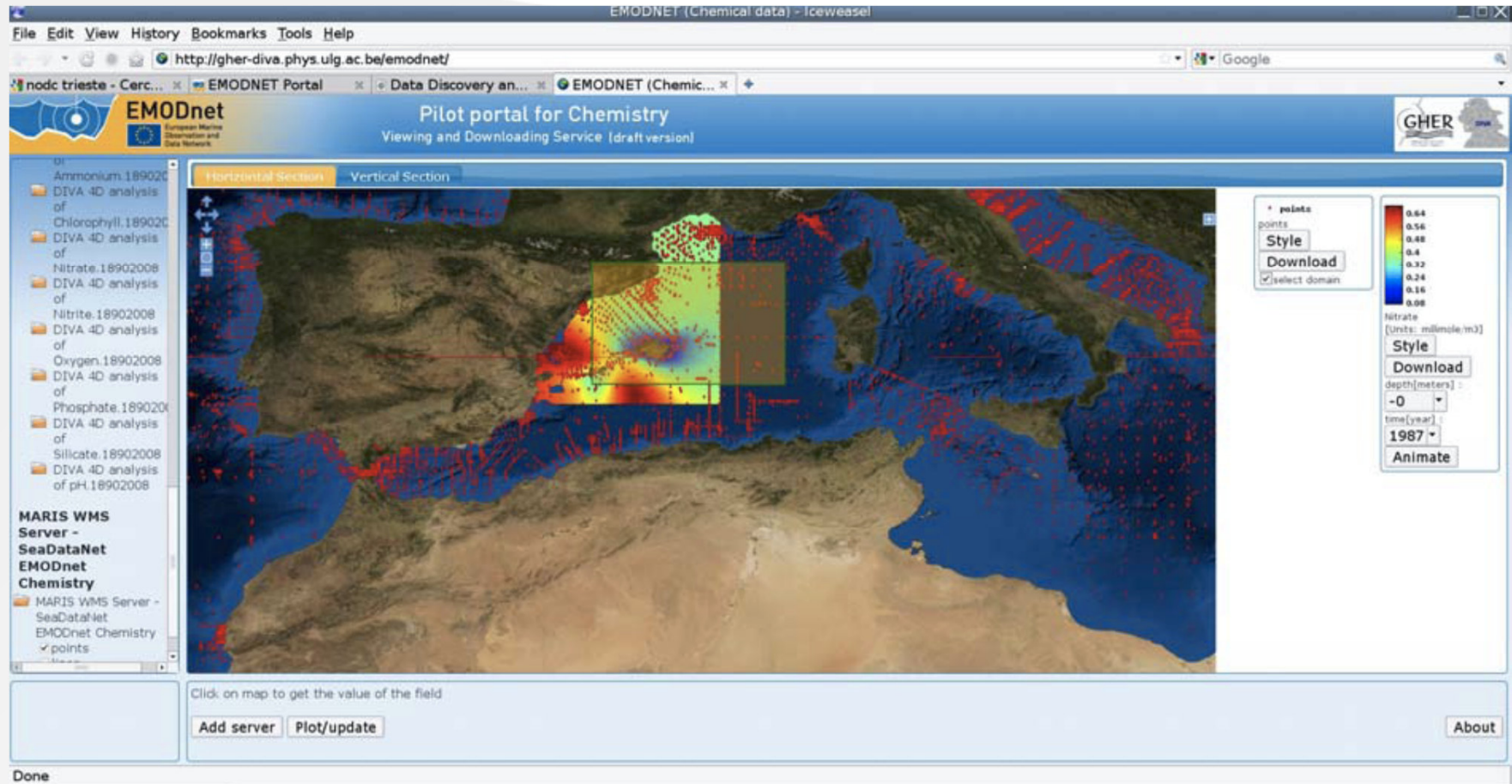
jon-merdes@seadatanet.org | www.seadatanet.org



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EMODNet Chemistry



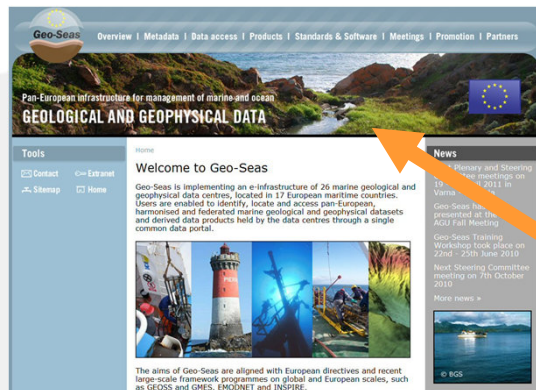
*Viewing service for Nitrate distribution in the Balearic spot with overlay of
CDI data sets*

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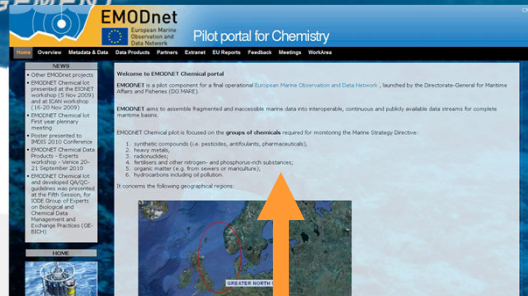
CDI Service as common service in many projects

FOR OCEAN & MARINE DATA MANAGEMENT

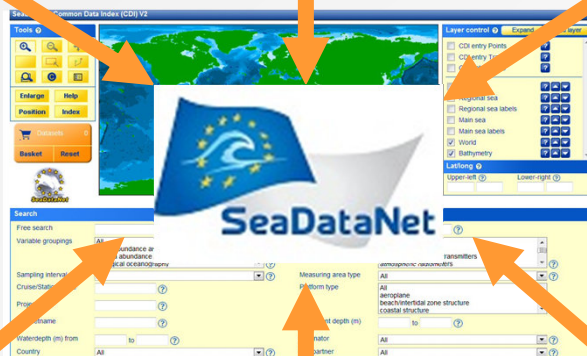
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www.geo-seas.eu



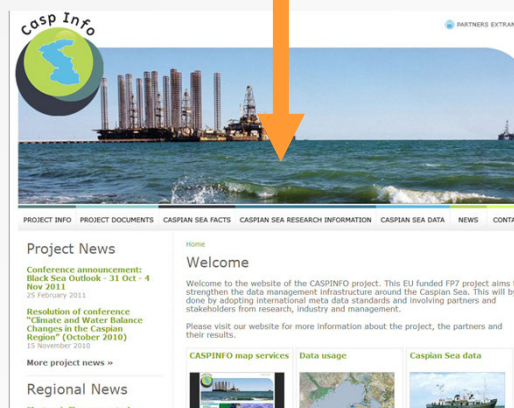
www.emodnet-chemistry.eu



SeaDataNet CDI Service

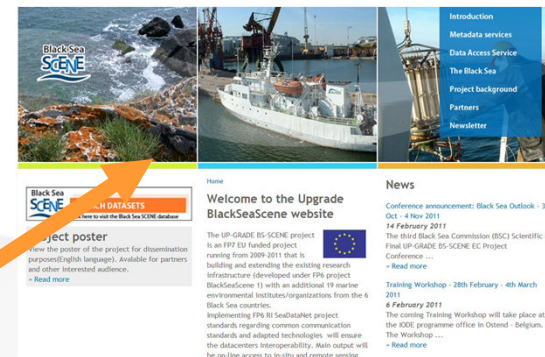


www.emodnet-hydrography.eu

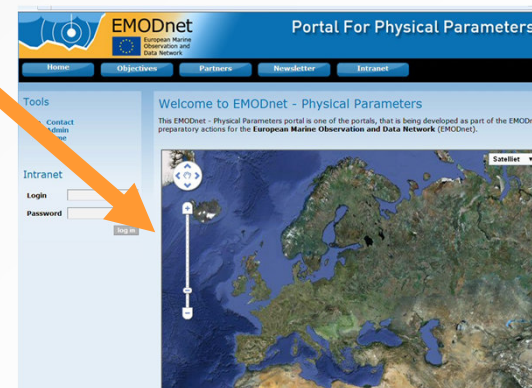


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www.caspinfo.net

IMDIS Conference, Lucca, Septembre 23-25, 2013



www.blackseascene.net



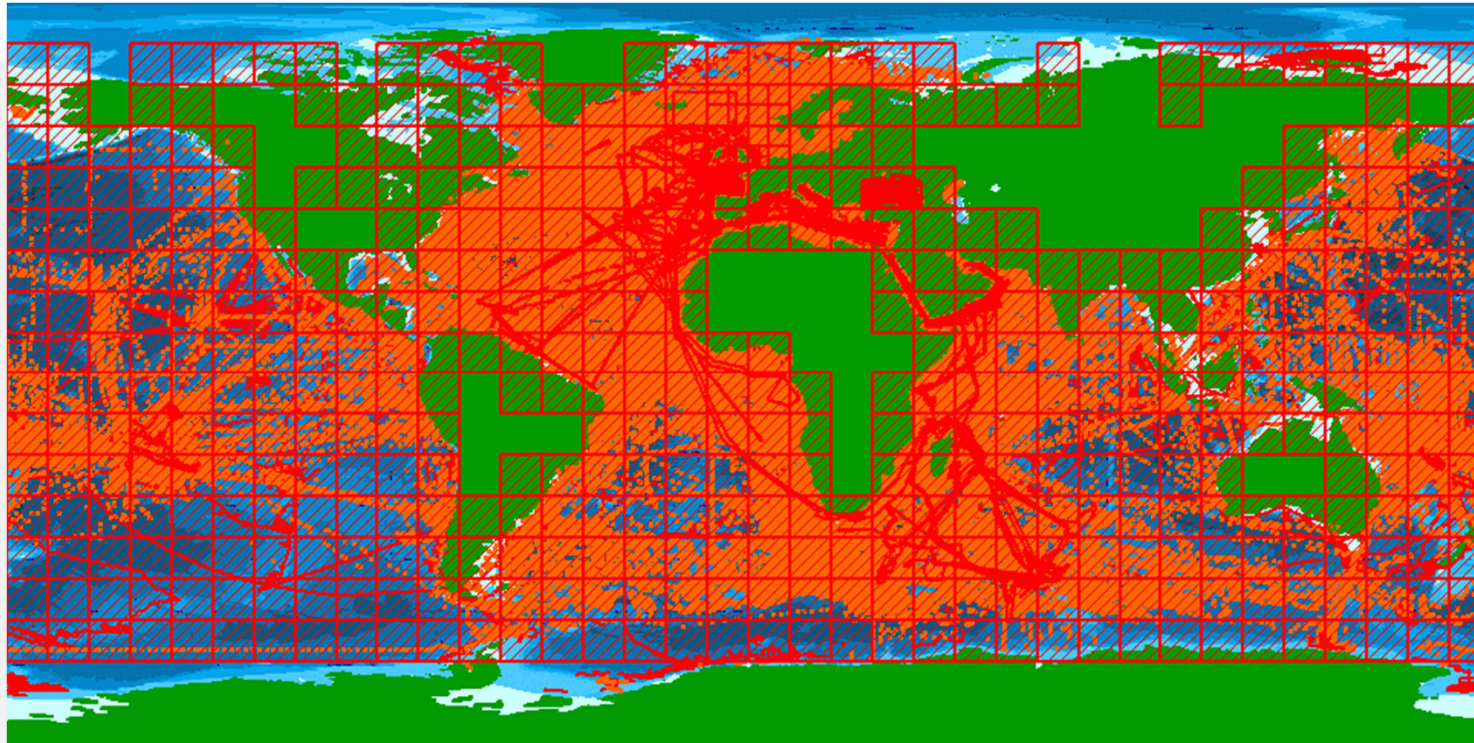
www.emodnet-physics.eu



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> **1,35 million** CDI entries from **29** countries and **88** data centres and **435** originators for physics, chemistry, geology, geophysics, bathymetry and biology; years **1800 – 2013**; **90%** unrestricted or under SeaDataNet licence

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SeaDataNet 2 - international

- Ocean Data Interoperability Platform (ODIP):
 - Europe (EU support)
 - USA (NSF support)
 - Australia (Gov support)
 - IOC-IODE (EU support)
 - Workshops for seeking common standards and interoperability solutions
- Ocean Data Portal (ODP) – UNESCO IOC-IODE:
 - Interoperability solutions for populating the Ocean Data Portal (ODP) in a structure way from the European marine data infrastructure
- Ocean Data Standards – UNESCO IOC-IODE:
 - Seeking global standards and promoting best practice



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SeaDataNet 2 – challenges coming years

- Improve capability for handling also **marine biological data** in close cooperation with EurOBIS, MarBEF, EMODNet Biology, Micro-B3 and LifeWatch initiatives
- Further developing and implementing **Machine to Machine interfacing and interoperability**
 - towards other infrastructures for metadata, data and product distribution
 - Towards added-value services by means of Work Flow processes (cloud computing)
- Further implementing SWE standards and services
- Establishing a governance structure for SeaDataNet with sustainable perspective, also in dialogue with EMODNet development

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IMDIS Conference, Lucca, September 23-25, 2013

Have a very interesting and pleasant IMDIS Conference



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