SeaDataNet

History of the building and upgrade of an European oceanographic data infrastructure

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https://cloud.ifremer.fr/index.php/s/vKeMb4bD3pPXaoD

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Innovation platform "Sustainable Sea and ocean Solutions", 23 February 2022
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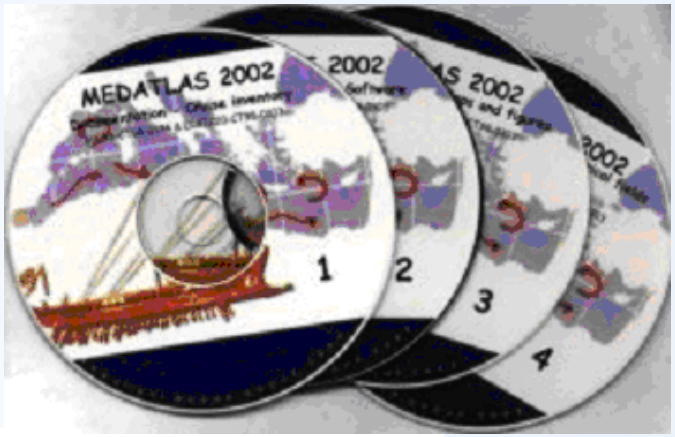
Part 2

The SeaDataNet infrastructure

- History
- Objective and principle
- Roadmap
- Method applied to reach interoperability of data and metadata
- Content and example of services

Need for standardisation

- Over the last 30 years, development of European projects
  - Bringing together NODCs from different countries in joint oceanographic data projects
  - Need for standardisation, to disseminate homogeneous and coherent data sets: CD-ROMs at the end of the 1990s, beginning of the 2000s



The SeaDataNet infrastructure

- Stop projects requiring the centralisation of homogeneous data
- Data remain in NODCs but are accessible from a single location: the SeaDataNet portal = virtual data centre, based on the European research infrastructure (RI) SeaDataNet

SeaDataNet

EU – MAST

EU –MASTII

EU-FP5

EU-FP6

EU-FP7

H2020

90s

EDMED

Euronodim

MEDATLAS

2002-2005

Sea-Search

2006-2011

SeaDataNet

2011-2015

SeaDataNet II

2016-2021

SeaDataCloud

Partners : 35 countries, bordering European seas

Coordonnated by IFREMER

SeaDataNet - Objectives

- Federation of the the oceanographic data centres of 35 countries bordering the European seas
- Creation of a single virtual data centre, allowing a user searching for physics/chemistry data to connect to all 35 countries from a single user interface
- Distribute complete datasets in specific sea basins to privileged users (modellers)
- Creation and dissemination of products (climatologies and aggregated datasets) made from the data put into the infrastructure

SeaDataNet Infrastructure - Principle

- semi-distributed system that aggregates **NODCs** and enhances the existing NODC network.
- The technical developments implemented allow the NODCs connected to the SeaDataNet system to be seen as a **single virtual data centre** able to deliver **quality controlled data**, metadata and products through a **single web portal**

SeaDataNet – Road map

- SeaDataNet (2006-2011) : 10 M€
  - System implementation in 2 steps
    - Connection of the 10 most technologically advanced data centres to implement and test the system
    - Connecting the other 29 data centres in a progressive way with assistance from the 10 already connected
- SeaDataNet 2 (2011-2015) : 6 M€
  - Make the system more reliable (monitoring), more automated (machine-to-machine data exchange) and sustainable (infrastructure funded outside the European project)
  - Connect more data centres
  - Add more data, and more types of data (biology)

➔ Bigger, Better, Faster

SeaDataNet – Road map

- SeaDataCloud (2016-2021) : 10 M€
  - Improving access to data
  - Take into account the evolution of technologies => Cloud, HPC
    - More data processing capacity
    - Improved response times
  - Give a central role to the users
    - Provide the user with tools in a virtual environment (VRE, Virtual Research Environment) in which he/she will be able to work on his/her own data + data from SeaDataNet
    - To store his/her working environment: MySeaDataCloud

SeaDataNet : Method

- Development of standards
  - Common vocabulary for metadata
  - Common protocol for data and metadata control (Have comparable data)
  - Common file formats
- Definition of common catalogues
- Definition of rules for making data available
- Use of common software developed in the framework of SeaDataNet and made available to all partners (and more)

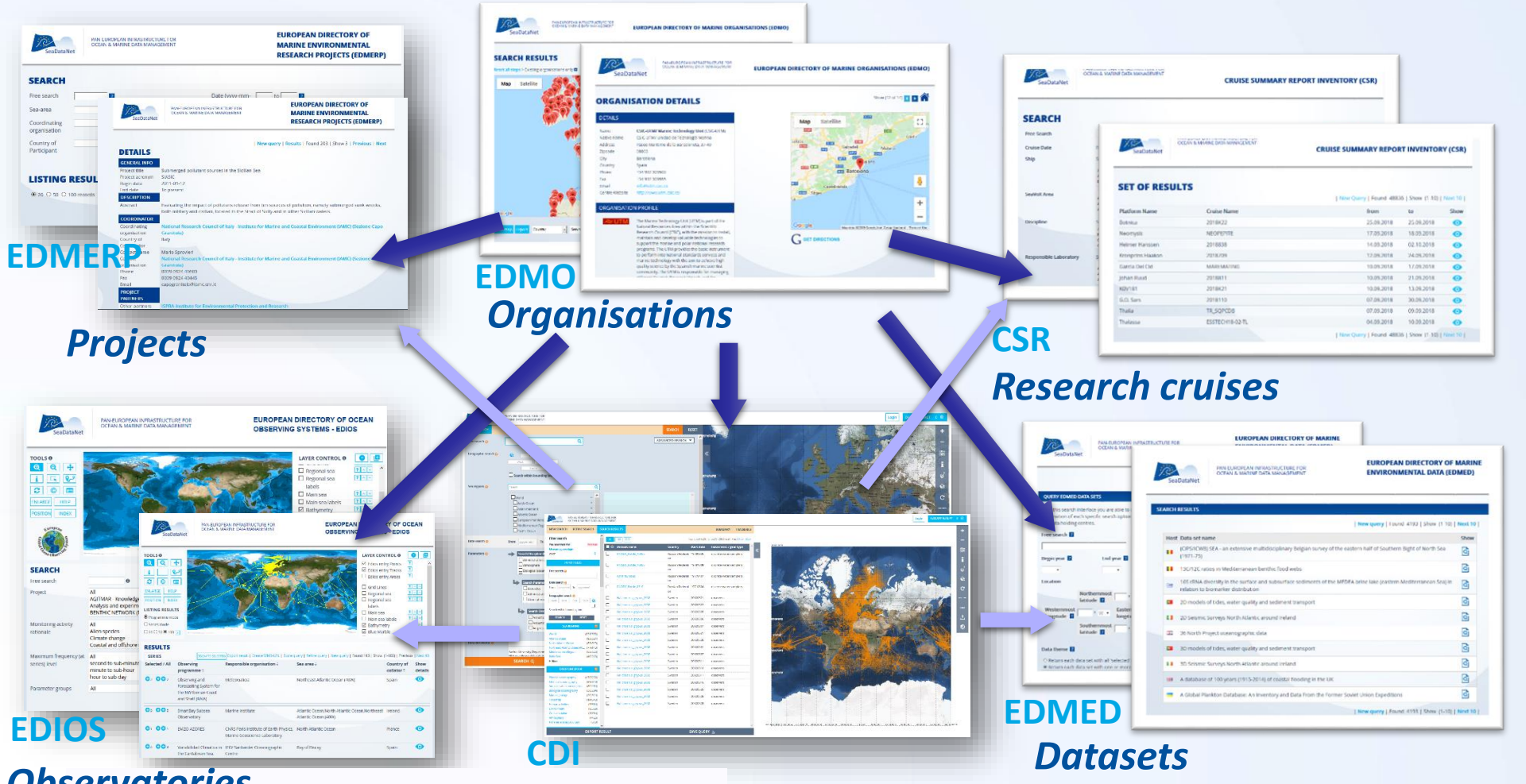
Speak the same language: Common vocabularies ➔ Interoperability

- Vocabulary lists maintained by the British Oceanographic Data Centre (NercVocabularyServer/BODC)
- 90,000 terms in over 110 vocabulary lists
  - Geographical area, ships, ports, scientific disciplines, data types, parameters, measurement units, instruments, positioning systems.....
- On-line through
  - Web site : https://www.seadatanet.org ➔ Look-up vocabularies
  - Web services: http://www.bodc.ac.uk/products/web_services/vocab/

To speak the same language : Common metadata descriptions ➔ interoperability

- Following International/European standards
  - Metadata descriptions based upon ISO-19115 and ISO-19139 for the compliancy to INSPIRE
  - available on-line on SeaDataNet website (https://www.seadatanet.org/Standards/Metadata-formats) and on the Ocean best practices repository (https://www.oceanbestpractices.org/)

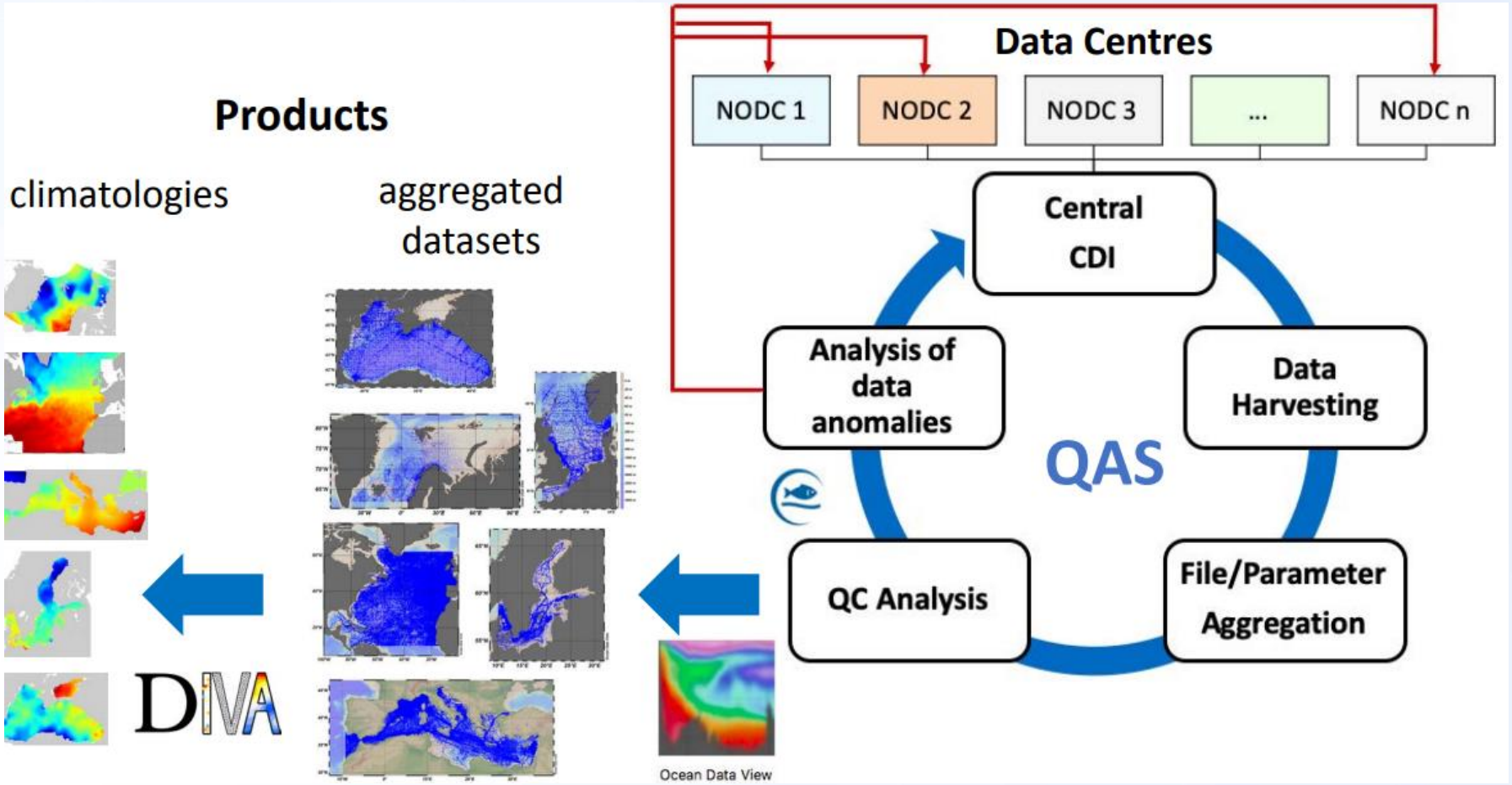
6 common catalogues of metadata



Have comparable data ➔ interoperability

- Same file formats relying on the common vocabularies
    - ODV - Ocean Data view (ASCII)
    - MEDATLAS (ASCII)
    - NETCDF – CF (Binaire)
- Quality check protocol based on international (IOC/IODE) recommendations applied by all data centres
  - With automatic and manual checks
- Same quality flags on all measurements (part of the common vocabularies)
- Quality Assurance strategy, implementing a QC -Loop

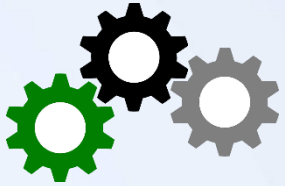
QC-Loop with feedback to data centres



Have common tools for data and metadata preparation

- **Tools are distributed to all SeaDataNet partners**
  - **MIKADO** : To generate the metadata descriptions of the SDN catalogues
  - **NEMO** To convert files to SeaDataNet formats
  - **OCTOPUS** : To convert from One SDN format to another
  - **Ocean Data View (ODV)** : To visualise and QC the data
  - **DIVA** : For data analysis and product generations (climatology)
  - **Download Manager (DM) and Replication Manager (RM)** : to send datafiles from one data centre to the users or to the cloud

Have common tools for data and metadata access



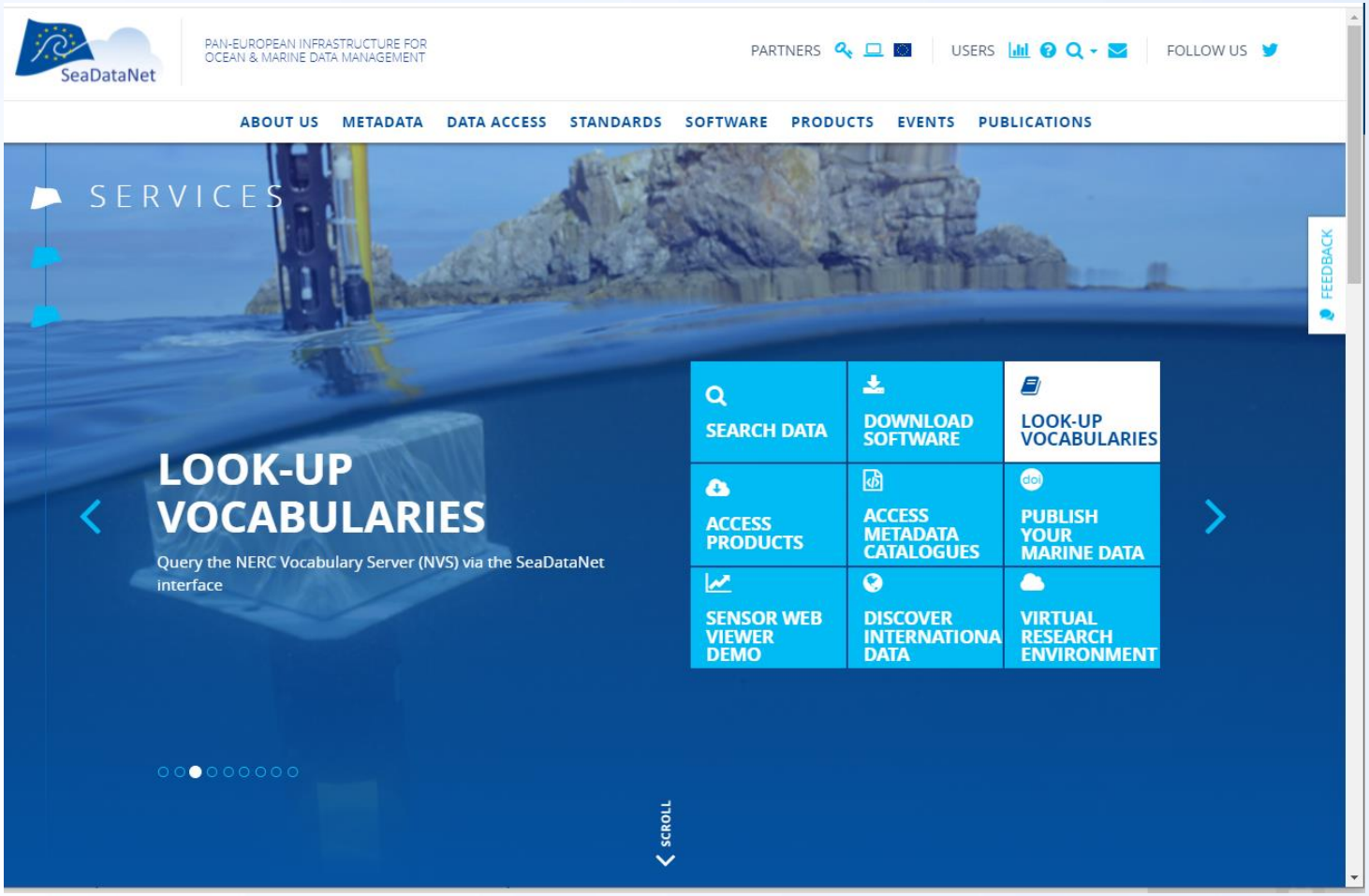
- **Installed on central servers: :**
  - **Central catalogues and the corresponding CMS =** Content Management System for updating (for projects and cruises and datasets)
  - **Web interfaces** for querying the various catalogues and searching for data
  - **Request Status Manager (RSM):** so that a user can track the progress of his or her data request
  - MARINE iD for identification in case of data downloading

Define the data policy

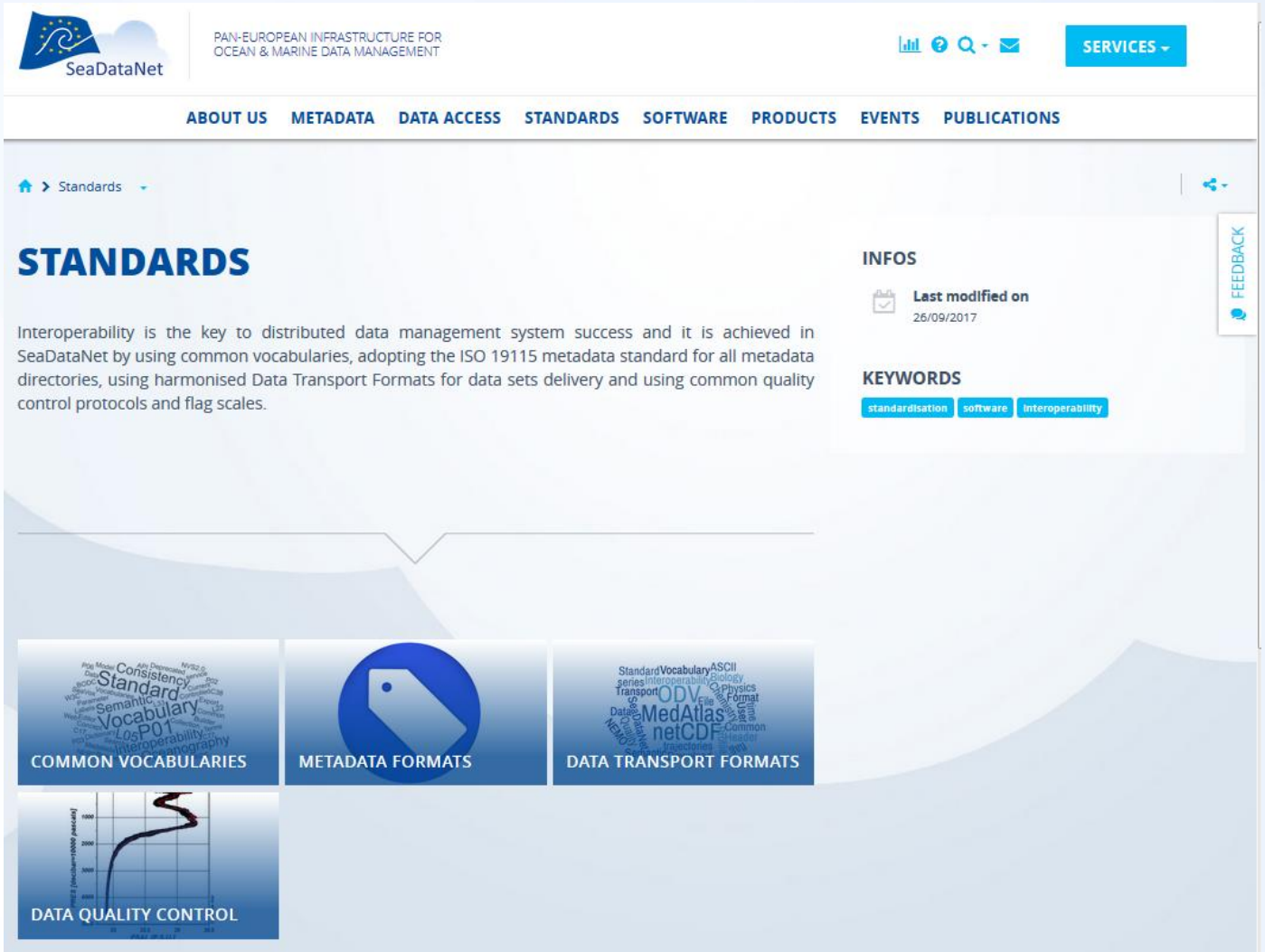
- Most of the SeaDataNet data are publicly available (CC-by licence) for download (91%)
- 9% of restricted data are managed too : restriction like moratorium or other access restrictions
  - The metadata of restricted data are available but
  - Their distribution is under the responsibility of each data centre that have included them in the SeaDataNet infrastructure : case per case negotiation with the data user

SeaDataNet portal- https://www.seadatanet.org/

- Metadata
- Data
- Standards
- Tools
- Products



Standards


SeaDataNet
PAN-EUROPEAN INFRASTRUCTURE FOR
OCEAN & MARINE DATA MANAGEMENT
SERVICES
ABOUT US
METADATA
DATA ACCESS
STANDARDS
SOFTWARE
PRODUCTS
EVENTS
PUBLICATIONS
Standards
STANDARDS
Interoperability is the key to distributed data management system success and it is achieved in SeaDataNet by using common vocabularies, adopting the ISO 19115 metadata standard for all metadata directories, using harmonised Data Transport Formats for data sets delivery and using common quality control protocols and flag scales.
INFOS
Last modified on
26/09/2017
KEYWORDS
standardisation
software
interoperability
FEEDBACK
COMMON VOCABULARIES
METADATA FORMATS
DATA TRANSPORT FORMATS
DATA QUALITY CONTROL

SeaDataNet

Innova

Tools

DOWNLOAD SOFTWARE

SOFTWARE

INFOS

Last modified on
16/09/2019

A major objective and challenge in SeaDataNet is to provide an integrated and harmonised overview and access to data resources, managed by distributed data centres. Moreover it is an objective to provide users common means for analysing and presenting data and data products. Therefore the Technical Task Team of SeaDataNet has designed an overall system architecture, and is developing common software tools for data centres and users.

Common software tools are being developed and freely made available to **Data Centres and/or End Users** for:

- Editing and generating XML metadata entries: **MIKADO javatool**
- Tool for the generation of spatial objects from vessel navigation during observations: **EndsAndBends**
- SeaDataNet file format convertor : **OCTOPUS**
- Conversion of any ASCII format to the SeaDataNet ODV4 ASCII format: **NEMO javatool**
- Connecting systems of Data Centres to the SeaDataNet portal for data access: **Replication Manager javatool**
- Analysing and visualising of data sets: **Ocean Data View (ODV) software package**
- Interpolation and variational analysis of data sets: **DIVA software package**

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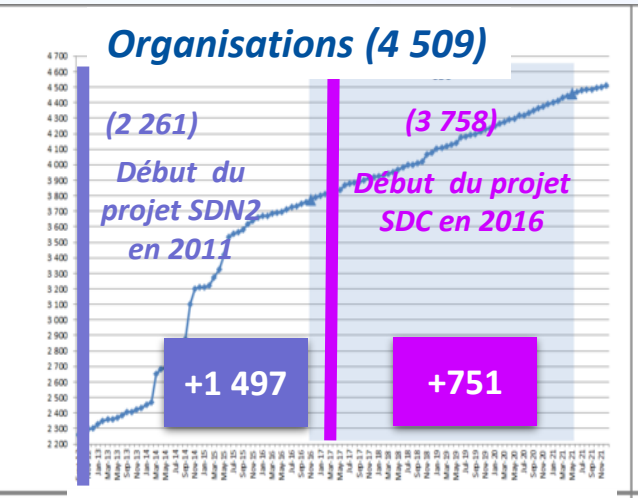
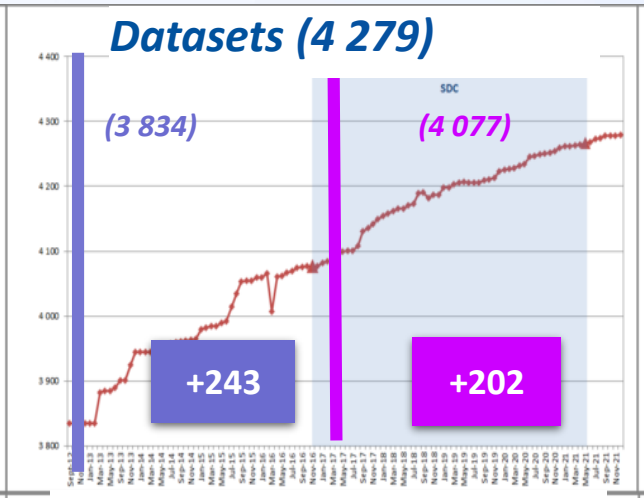
Capacity building

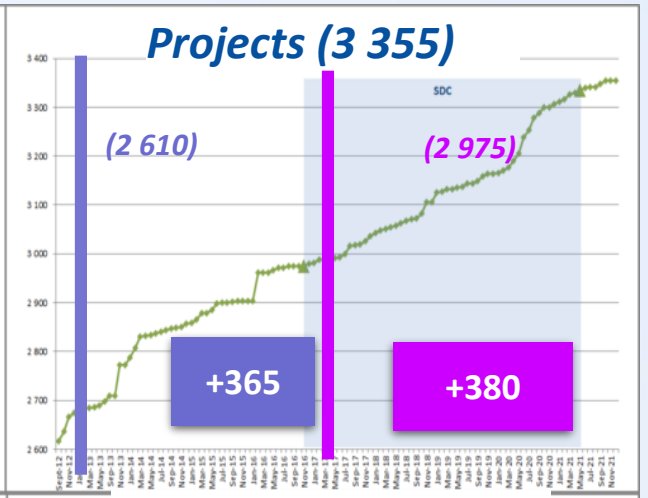
- Around every 2 years: Training for all data centres connected to SDN infrastructure

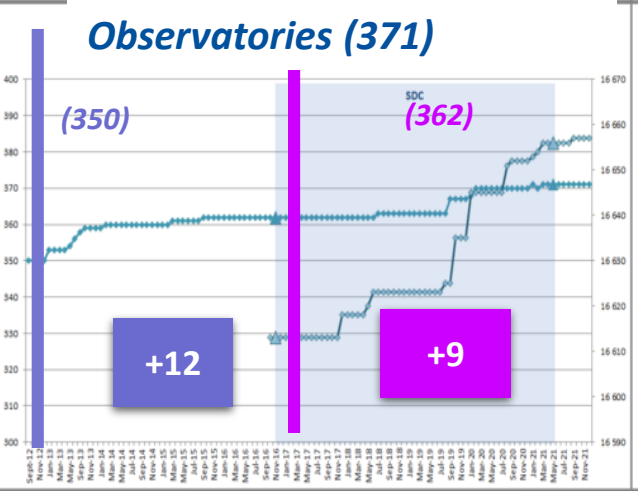
Current content of the SDN infrastructure

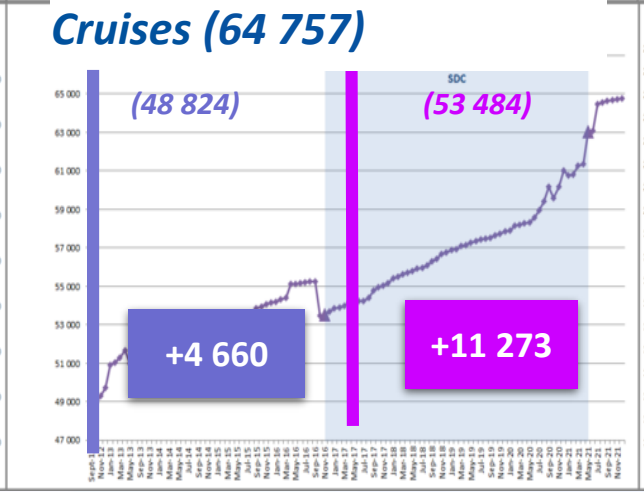
- Content of the catalogues

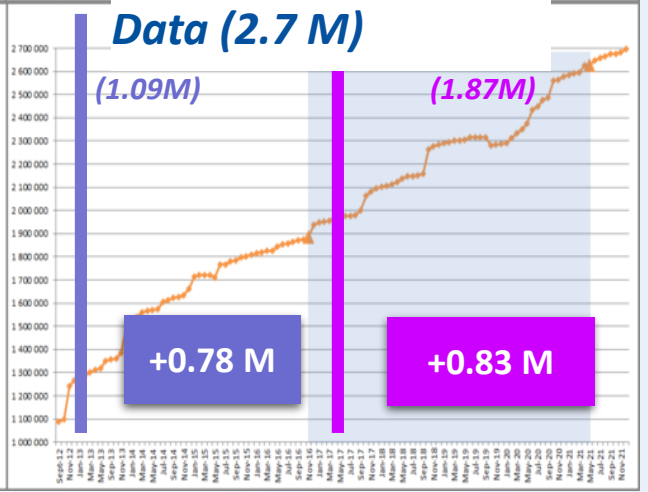




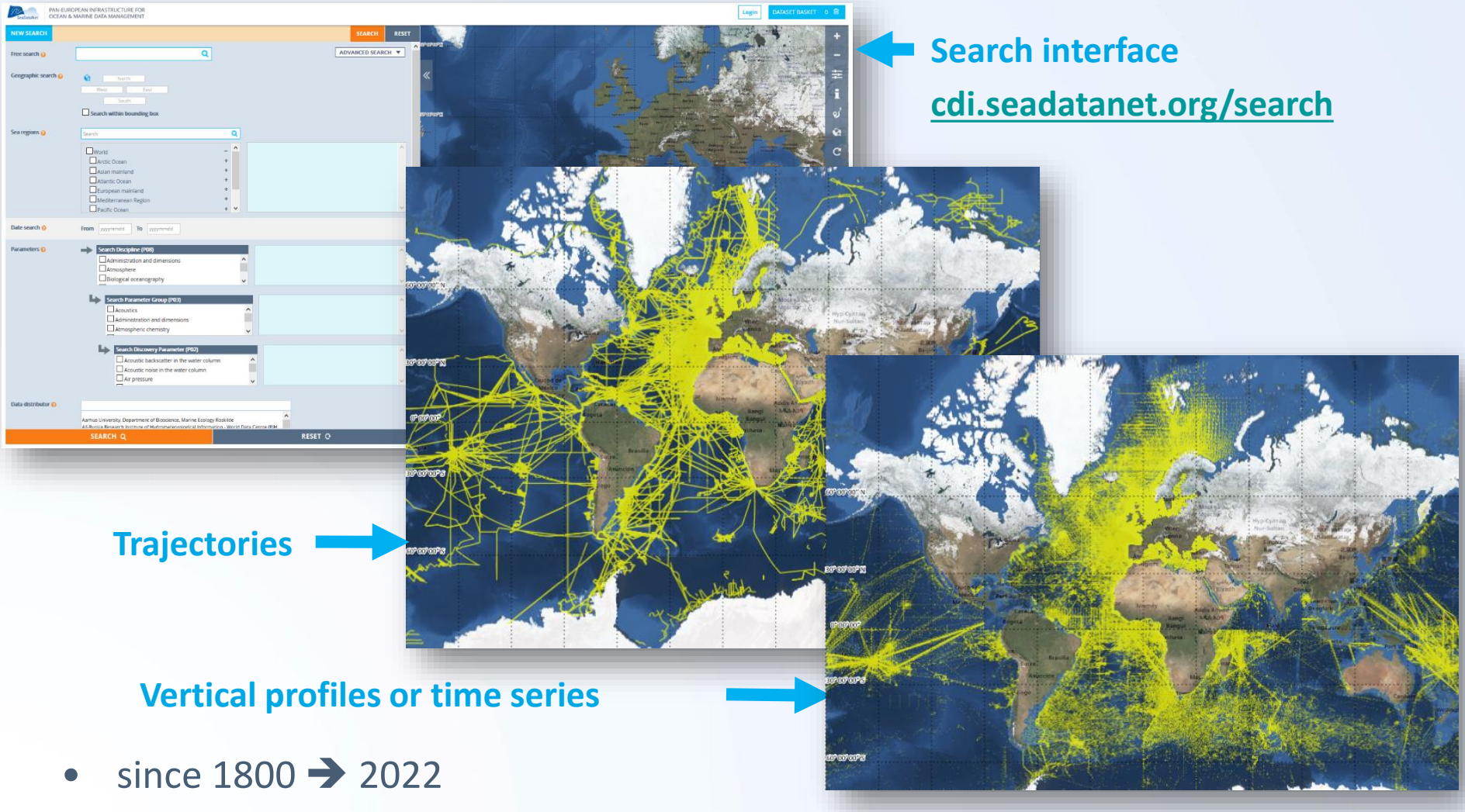








SeaDataNet



Search interface

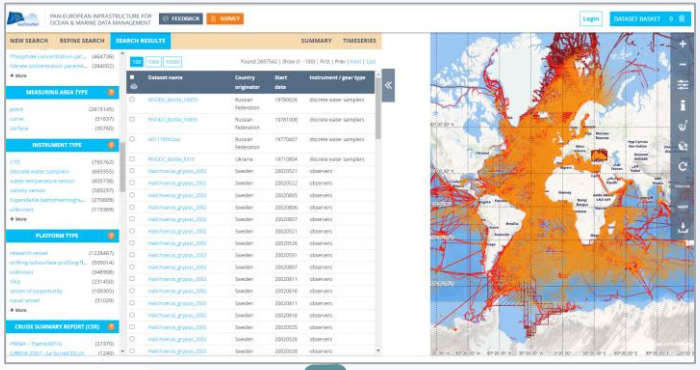
cdi.seadatanet.org/search

Trajectories

Vertical profiles or time series

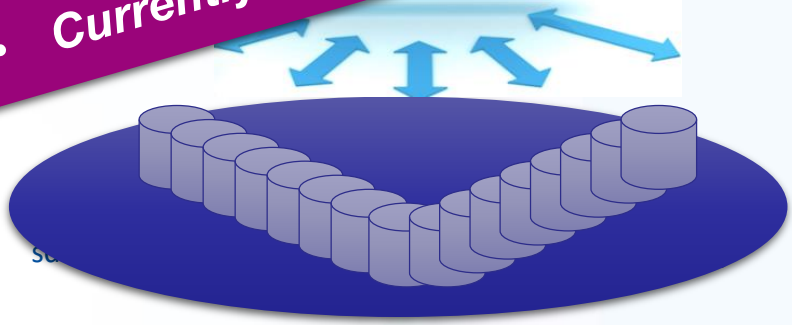
- since 1800 ➔ 2022
- 2.69 Millions of CDI for physics, chemistry, biology, geology and geophysics
- 91 % free access after Marine-ID connection

Service to users: Discovery and Access to data



Data discovery

- **At the end of the 1st project (2011): 40 data centres, data distributed in NODCs**
- **2nd project (2016): 80 data centres , data distributed in NODCs**
- **Currently (2022): 113 data centres, public data duplicated in the Cloud**



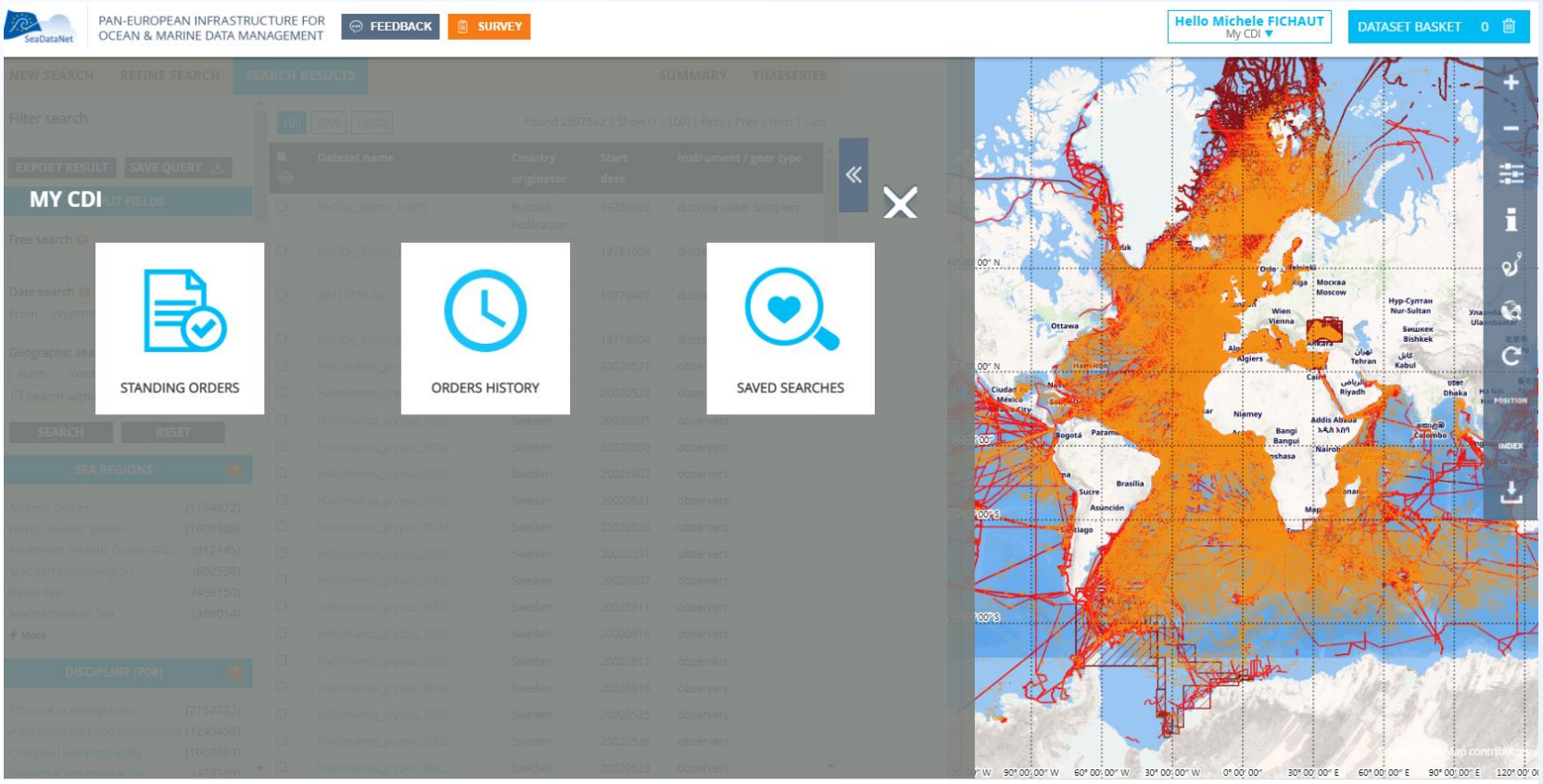
Data sources =

Data centres fed by

more than 800 collecting laboratories

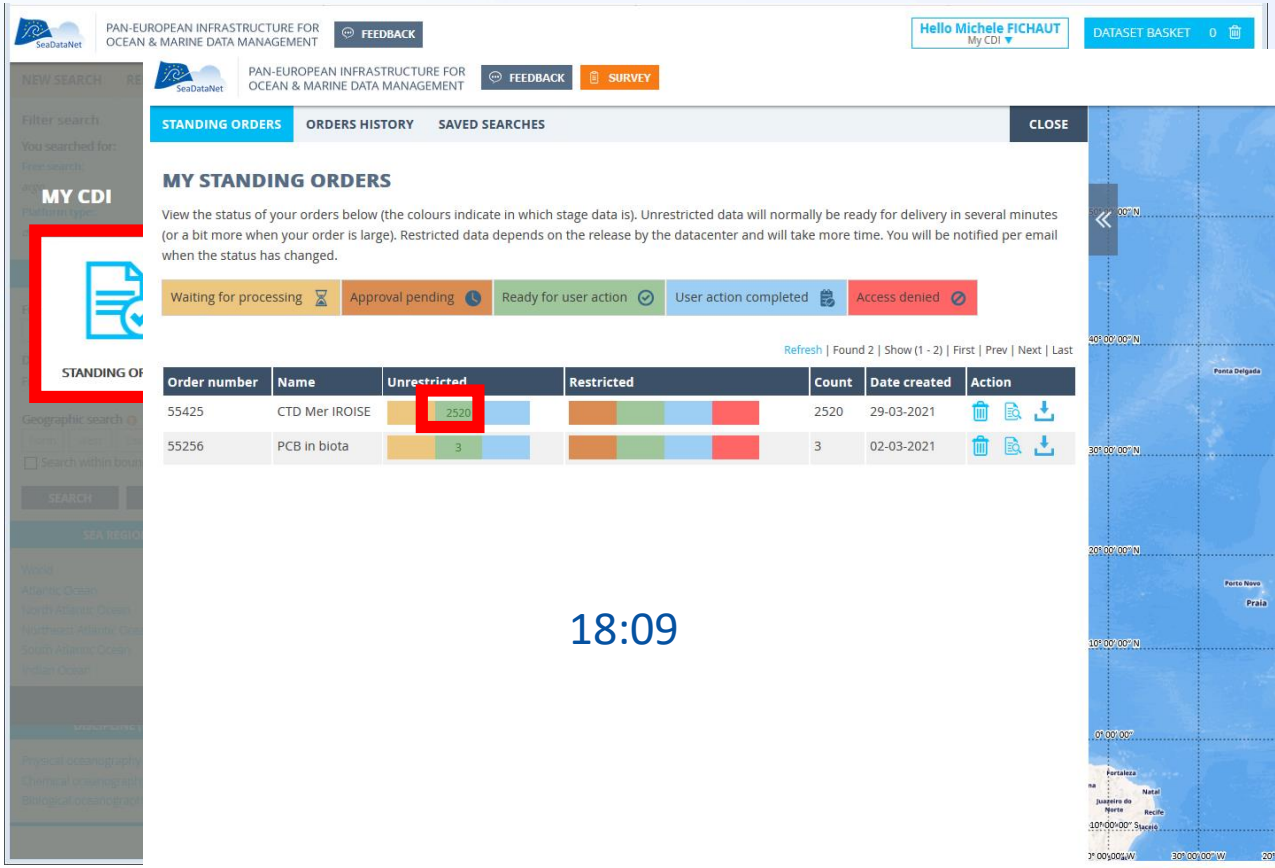
User personal environment: MySeaDataCloud

- To be able to save and share searches, to follow the status of data requests, to have an history of data downloads



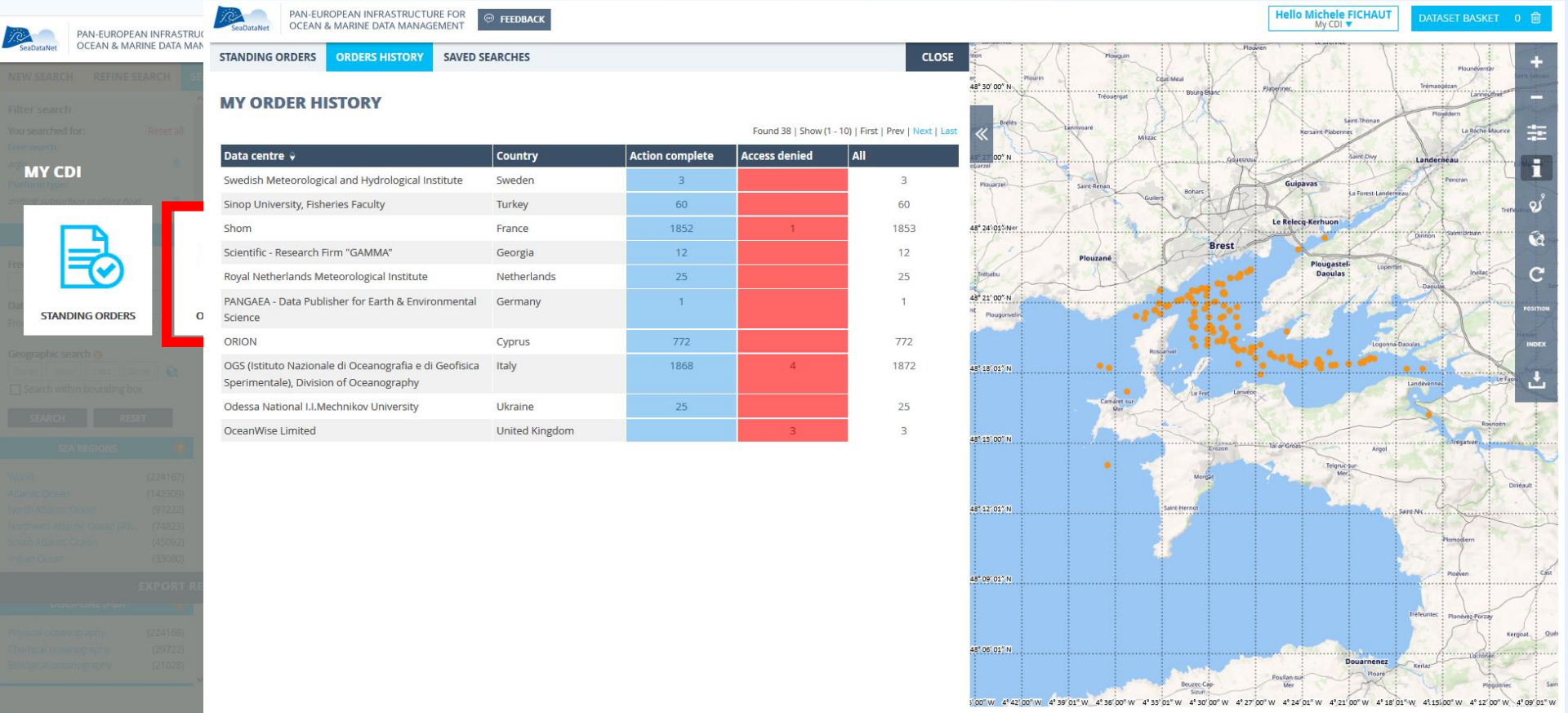
User personal environment: MySeaDataCloud

- Standing orders



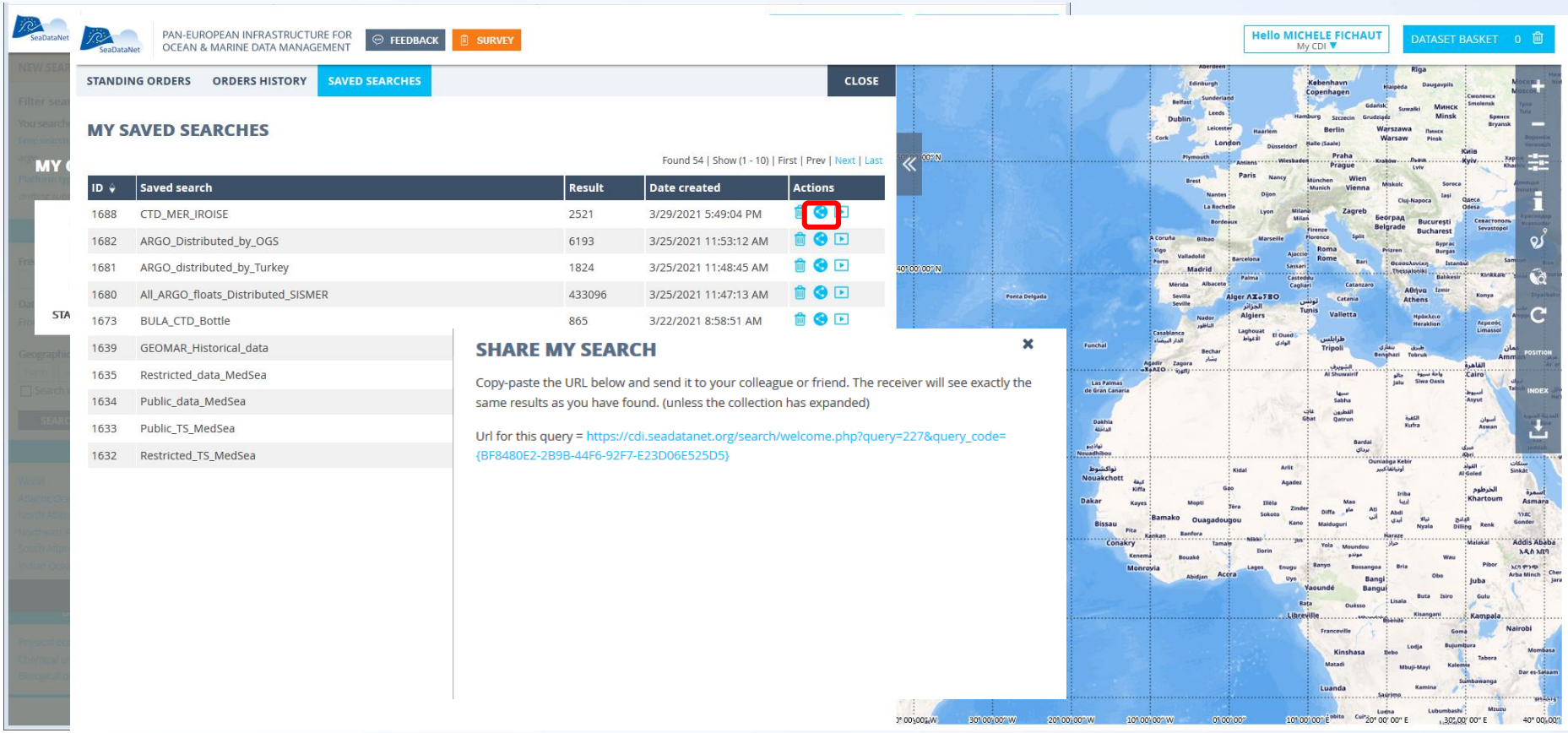
User personal environment: MySeaDataCloud

- Orders history



User personal environment: MySeaDataCloud

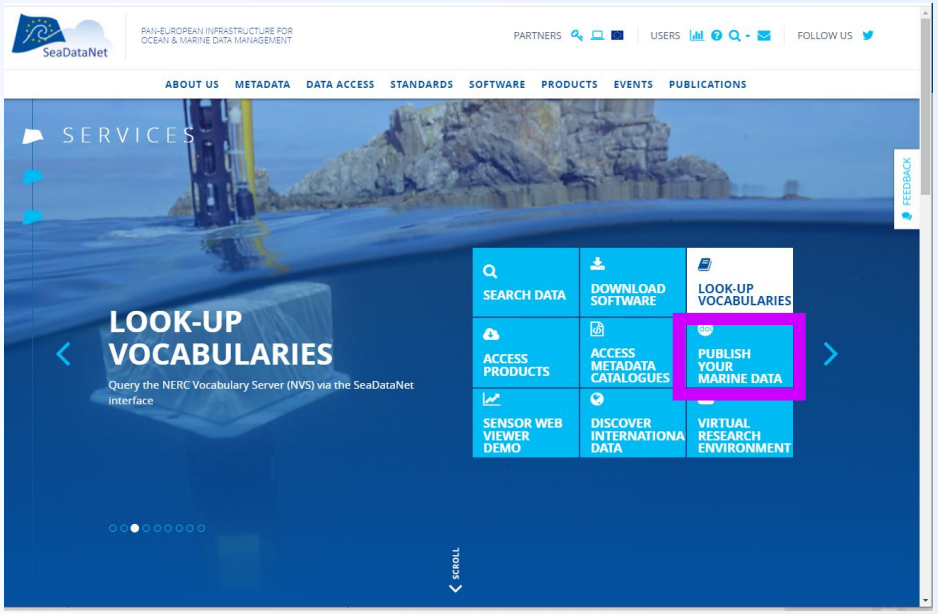
- Saved searches



Publishing service

SEANOE Sea scientific open data publication

- To offer scientists a place to publish their datasets and get DOI (Digital Object Identifier)
  - Useful for publications based on datasets, publisher often require a DOI on the studied dataset



Publishing service : landing page

Cruises PRIMO 1994 (CNR IT): Hydrographic measurements in the Sicily Channel and in the southern Tyrrhenian Sea (spring and fall 1994)

Click to download the data — DATA

Date	2021-12-13
Temporal extent	1994-05-20 -1994-10-18
Author(s)	Sparnocchia Stefania[1], Borghini Mireno[2]
Affiliation(s)	1 : CNR-ISMAR, Trieste, Italy 2 : CNR-ISMAR, La Spezia, Italy
DOI	10.17882/85185
Publisher	SEANOE
Keyword(s)	CTD, Sicily Channel, Tyrrhenian Sea, Western Mediterranean
Abstract	This data set contains the CTD data collected from the RV URANIA of the CNR (Italy) during the PRIMO-94 and PRIMO-94B cruises (20-29 May 1994 and 5-18 October 1994). These cruises were part of an intensive field program in the Sicily Channel and in the southern Tyrrhenian basin conducted by the Stazione Oceanografica of CNR in different periods from 1993 to 1995. Data have been used in several studies (see References). CTD profiles were collected using a Neil-Brown MKIII CTD. The probe was calibrated in temperature and conductivity at the SACLANT Center of La Spezia, before and after each cruise, and at sea in salinity and oxygen, against water samples. Declared instrumental precisions were 0.002 °C for temperature and 0.005 for salinity (PSS-78). The data set is provided per cruise as ODV Spreadsheet files in TXT format, containing: • Cruise name • Station number • Type of acquisition (here C) • Date in mon/day/yr and Time in hh:mm:ss • Coordinates in Longitude [degrees_east] and Latitude [degrees_north] • Bottom depth [m] • Depth, salt water [m] • Temperature, IPTS-68 [degC] • Conductivity [S/m] • Temperature, ITS-90 [degC] • Salinity, PSS-78 (Practical Salinity) • Dissolved oxygen [ml/l]
Licence	CC BY-NC
Utilisation	These data are published without any warranty, express or implied. The user assumes all risk arising from their use. These data are intended to be quality controlled, but it is possible that they contain errors. It is the unique responsibility of the user to assess if the data are appropriate for their use, and to interpret the data, data quality, and data accuracy accordingly. Authors welcome users to ask questions and report problems.
Acknowledgements	This data set was collected by the group known as the Stazione Oceanografica (Oceanographic Station) of the CNR, Pozzuolo di Lerici, La Spezia, led by Mario Astraldi and Gian Pietro Gasparini. We are grateful to Mr. Carlo Galli, Mr. Egisto Lazzoni and Mr. Domenico Bacciola for their remarkable contribution in the field and in the laboratory work. The research was funded by the EU through the MAST program (Contracts MAS2-CT93-0061 GEODYME and MAS2-CT93-0066 EUROMODEL II-MTP). The experiment in the Sicily Channel was a contribution to the IOC Programmes POEM and PRIMO.
Sensor metadata	Neil-Brown MK III CTD

Data

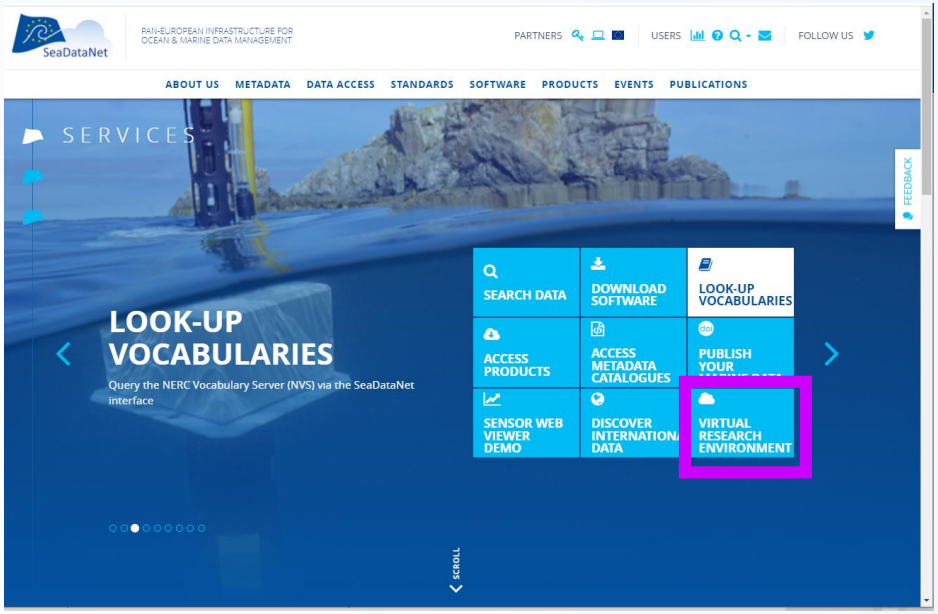
File	Size	Format	Processing	Access
CTD Data from PRIMO-94	9 MB	ODV		Open access
CTD Data from PRIMO-94B	9 MB	ODV		Open access

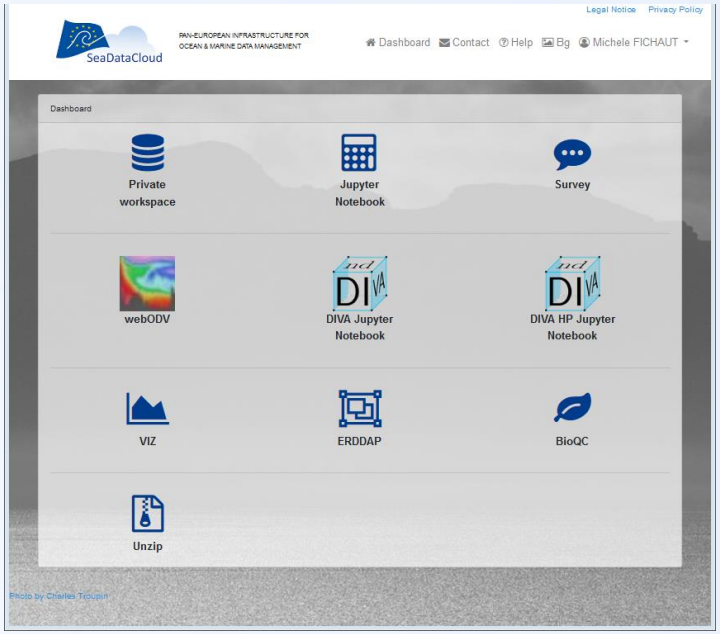
How to cite

Sparnocchia Stefania, Borghini Mireno (2021). **Cruises PRIMO 1994 (CNR IT): Hydrographic measurements in the Sicily Channel and in the southern Tyrrhenian Sea (spring and fall 1994).** SEANOE. https://doi.org/10.17882/85185

Virtual Research Environment for users

- A virtual environment in the Cloud,
  - With data and tools
  - Possibility to add his/her own data





SeaDataNet

European landscape in terms of Marine Data management 3 main components