

# DIVA as a Virtual Research Environment

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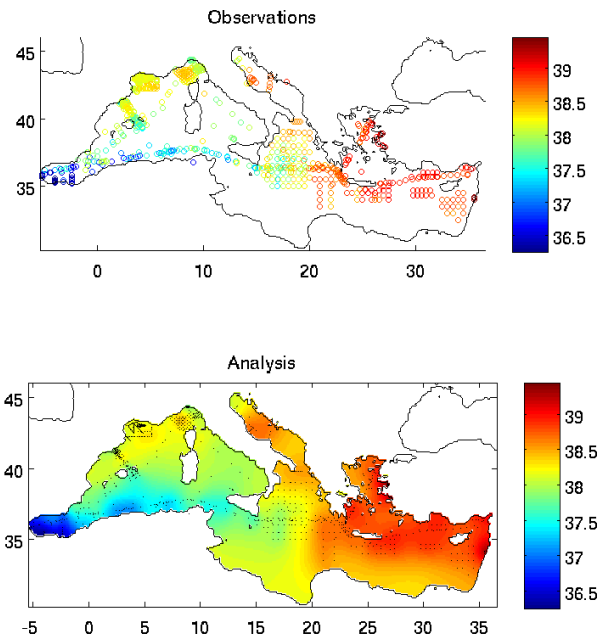
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# What is DIVA?

- DIVA: Data Interpolating Variational Analysis
- Objective: **derive a gridded climatology from in situ observations**
- The variational inverse methods aim to derive a continuous field which is:
  - **close to the observations**
  - **"smooth"**
- DIVA works internally on a finite element mesh:
  - decouples basins based on **topography**
  - can take **ocean currents** into account
  - can detect **trends** in your data
  - can detect and remove **outliers**
  - consistent **error variance estimation**



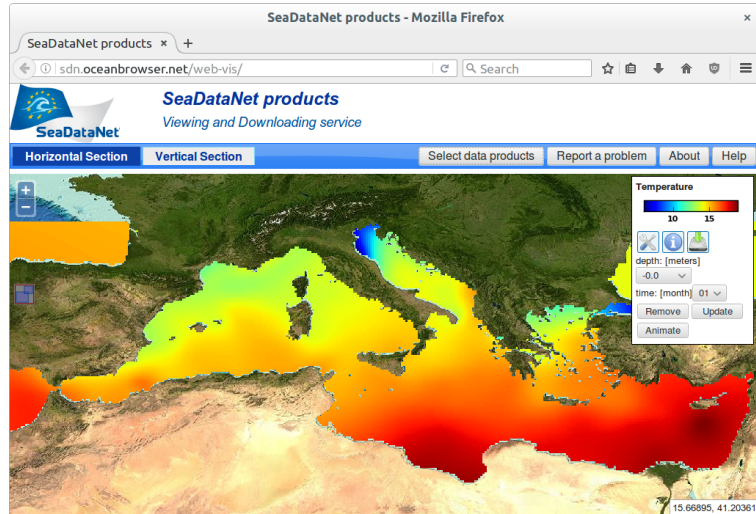
# Application of such climatologies

Various applications and interpretations of marine data require a gridded field covering the complete domain as a first step:

- computation of **budgets** (e.g., heat, salt content),
- identification of long-term **trends**,
- identification and characterization of **oceanographic features**,
- determination of **derived variables** from parameters not necessarily measured at the same location (for example density which is a function of temperature and salinity),
- **model** initialization and validation.

# What is OceanBrowser?

- Web-interface to **visualize gridded** data sets in NetCDF
- Implements the **Web Map Service** protocol
- Horizontal and vertical sections
- Scalar and vector fields
- OceanBrowser is used in
  - **SeaDataNet**
  - **EMODNET Chemistry**
- In those projects it is used to visualize gridded data sets generated by the tool DIVA



SeaDataNet: <http://sdn.oceanbrowser.net/web-vis/>

# DIVA-on-web

- Web interface for **2d analyses** (longitude/latitude)
- No registration required
- Data uploaded as text file
- For example (longitude, latitude, value):

29.76 45.15 16.14  
29.76 45.15 16.34

Upload Grid Analysis

Statistics Download Link or embed Report a problem Help

**Upload observations**

Text file ODV4

File:  temperature\_argo.txt

Column separator:

Decimal separator:

**Format**

The file must be an ASCII text file with three columns. The columns represent longitude, latitude and value of the observation respectively. For example:

29.7667 45.15 16.146  
29.7667 45.15 16.346  
...

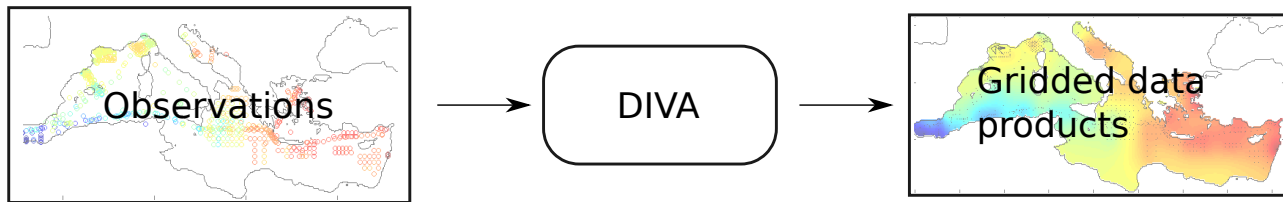
[Sample global temperature data from ARGO](#)

-90.00000, 111.09375

GHER SeaDataNet DIVA

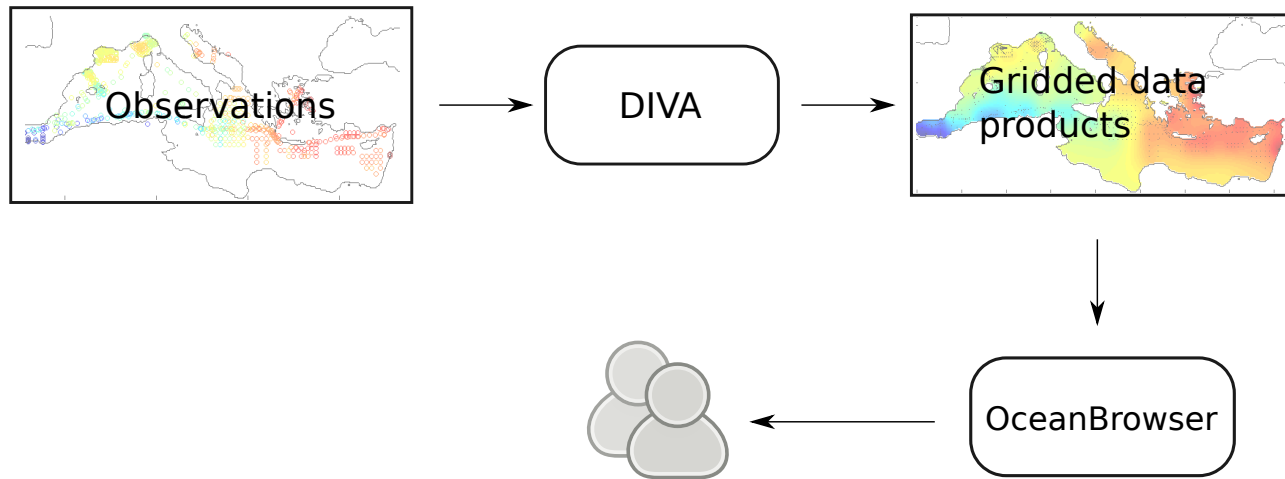
- <http://ec.oceanbrowser.net/emodnet/diva.html>

# Overview



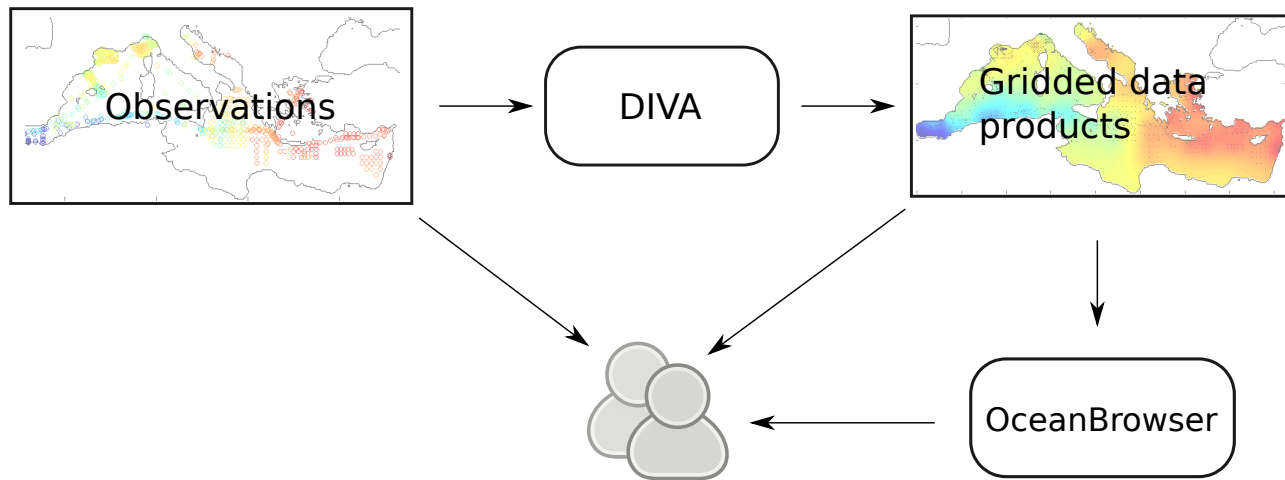
- DIVA creates gridded data products based on in situ observations

# Overview



- Gridded data products are made available using OceanBrowser

# Overview



- Users can download the gridded data products and the underlying observations



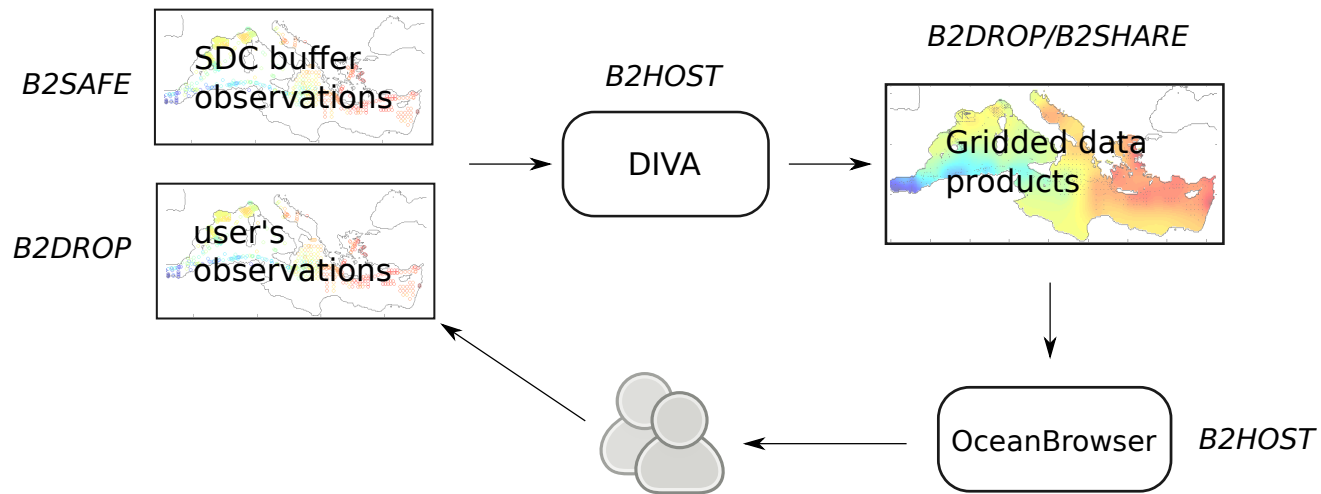
# Proposed implementation

- Users either:
  - will login to a work-space
  - **"demo account"** also available with a limited storage
- Input and output data set are identified a URL
- For SeaDataCloud data set
  - login credentials will be used to import the data into the users' work-space
  - the object behind the URL is a NetCDF or ODV format
- Other data set can be important using e.g. OPENDAP URLs

	<b>demo account</b>	<b>registered user</b>
storage	3 GB	20 GB
max. age of file	5 days	15 days

- The size of a DIVA analysis is about 500 MB
- Should be able to support ~30 users to make a DIVA analysis in parallel (a typical class room)

# EUDAT services



- Possible EUDAT services usefull for the DIVA VRE
- In addition: authentication service

# Summary

- DIVA is a tool to generate **gridded data fields from in situ observations**
- OceanBrowser allows the visualization of gridded data sets:
  - along a **horizontal section** (at given time and depth)
  - along a **vertical section** (e.g. at a fixed distance from coast)
- The DIVA Virtual Research Environment will provide a web interface to DIVA:
  - **Web API** to call DIVA
  - On top of the web API we will build a **user interface**

# User interface (mock-up)

- Provide URLs of input data
- Choose parameters
- Time frame
- Accepted quality flags

## DIVA 4D

Data

Domain

Analysis

Metadata

Contact

### Data

**Data sources**

URL of data sources

+

**Variables**

variables (e.g. Temperature)

+

**Year ranges**

Year ranges (e.g. 20002001)

+

**Month ranges**

Month ranges (e.g. 0101)

+

**Quality flags**

Quality flags

+

Submit

# Domain selection

- Coordinates of the domain
- Resolution

## DIVA 4D

[Data](#)[Domain](#)[Analysis](#)[Metadata](#)[Contact](#)

### Domain parameters

**Longitude of origin**

**Latitude of origin**

**Resolution (longitude)**

**Resolution (latitude)**

**Number of grid point (longitude)**

**Number of grid point (latitude)**

# Parameter of the analysis

- Parameters to choose

## DIVA 4D

[Data](#)[Domain](#)[Analysis](#)[Metadata](#)[Contact](#)

### Analysis parameters

**Signal to noise ratio**

**Correlation length**

# Additional meta-data

- Additional meta-data about the gridded product

## DIVA 4D

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### Metadata of the DIVA product

**Title**

**Acknowledgements**

**Data source**

**Additional comment**

# User information

- Contact information of the user

## DIVA 4D

[Data](#) [Domain](#) [Analysis](#) [Metadata](#) [Contact](#)

### Contact information

**Institution**

**Group**

**Email**



# Visualization

- User will get an email when a DIVA analysis is ready
- The DIVA analysis is saved on the user's work-space
- The DIVA analysis can be visualized in OceanBrowser
- User can download the analysis as a NetCDF file

## XML metadata for DIVA products

- Currently: standand-alone tool DIVAdoxml-gui
  - Institution names (EDMO code)
  - Vocabulary codes
  - EMODnet Chemistry aggregated parameter names (P35)
  - SeaDataNet Parameter Discovery Vocabulary (P02)
  - Salt and fresh water body names (C19)
- Remain to be seen: how this will be integrated in Sextant