EMODnet Chemistry 4
Black Sea Eutrophication & Contaminants Data products

Luminita Buga, George Sarbu, Gabriel Ganea

National Institute for Marine Research and Development “Grigore Antipa”

Romanian National Oceanographic and Environmental Data Center

ODIN BLACK SEA 10th Steering Group Meeting
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EMODnet

CHEMISTRY

Data & products on marine water quality

https://www.emodnet-chemistry.eu

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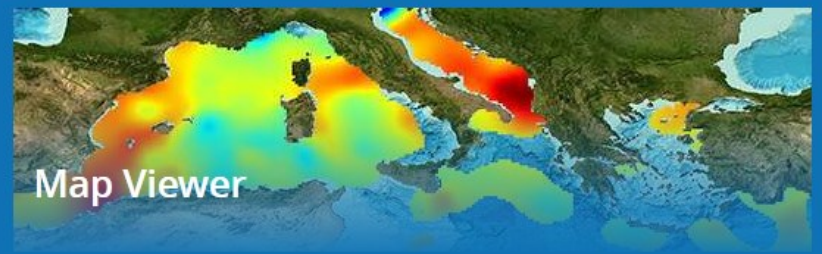
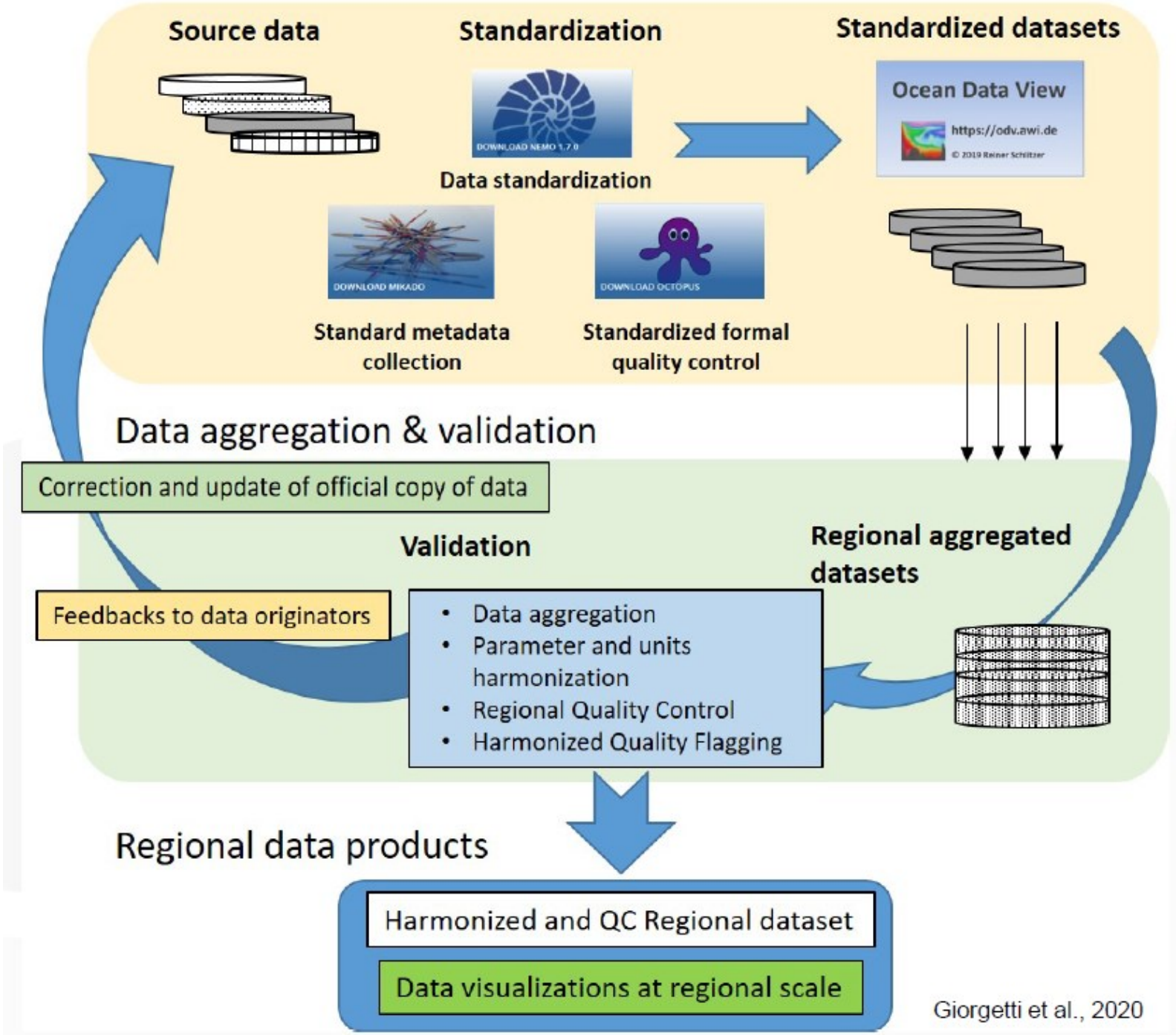
NIMRD/RoNODC Black Sea Regional Leader for EMODNET Chemistry Eutrophication& Acidity and Contaminants Data Products

The EMODnet Chemistry portal provides easy access to marine chemical data, standardised harmonized validated data collections and reliable data products, highly relevant to assess ecosystem status according to the Marine Strategy Framework Directive

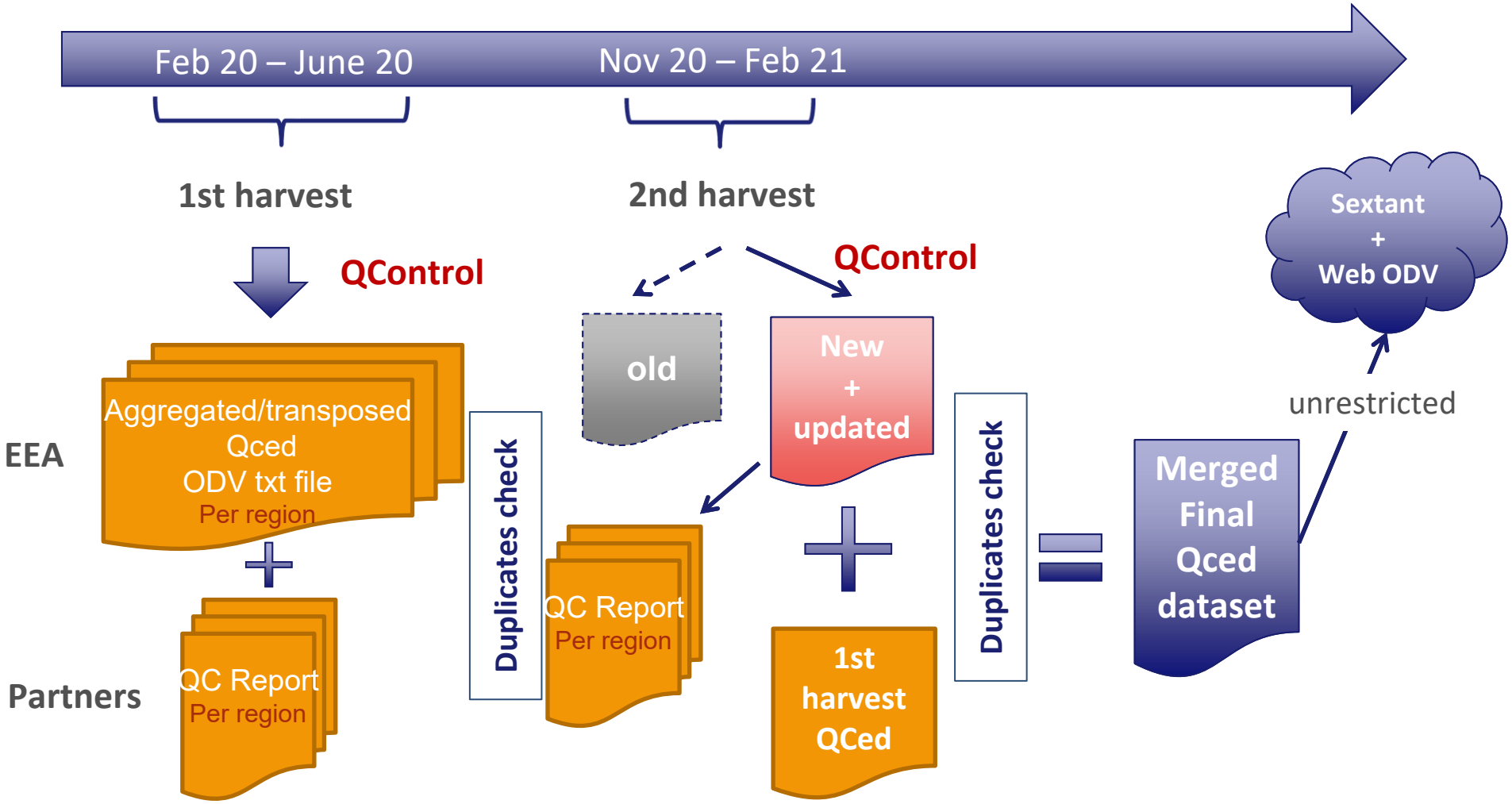


EMODnet
European Marine Observation and Data Network

Eutrophication & Contaminants Validated Data Collection loop



Harvestings and QC workflow: Eutrophication & Contaminants



QC Steps – Metadata & Data checks

- Remove empty metadata stations
- Check P02, P01 and split by matrix in contaminant data
- Correct the primary variable (incorrect units, wrong primary variable)
- Check bottom depths
- Correct latitude and longitude, time, date, stations on land
- Remove empty data stations
- Remove NRT Oxygen ARGO profiles
- Negative values change to QF=4
- Default values such as 99999 change to QF=4
- 0 values change to QF=4 or QF=6
- Values outside broad range change to QF=4 or QF=3.
- “Stuck” values change to QF= 4
- Spikes detection and change to QF=3
- Good values with QF=0 changes to QF=1
- Checks N02>N03 and NO3 plus NO2<NO3 and change to QF=3
- Check ratios P/N
- Check and remove duplicates (tolerance Time=0, Lat.=0, Long.=0)

Common Metadata & Data Errors

- Bottom depth
  - Bot. Depth = 0 where it is unknown
  - Bot. Depth = 9999 or similar instead null
  - Bot. Depth > Regional max bottom depth
- Primary variable
  - Files without or wrong primary variable in ODV.txt files
  - Wrong units (ex. Pressure in meters)
- Not valid P02 in CDI
  - P01and P02 in CDI should belong to the same matrix (L04)
- Zero values where it must be null or correctly flagged (QF=6 for below detection limit)
- Null values with flag different than 4 or 9
- Data with no QC (values with flag = 0)
- Wrong units
- “Stuck” values
- Negative values
- Errors in Nitrogen & Phosphorus N/P, OP/TP, NO3 – NO2 < 0, NO3 > NO2 plus NO3

Duplicates

- Different types detected:
  - **Exact duplicates** (same position, same time, same parameters and values) => deleted
  - **False duplicates – repeated casts** (same position, same time, same parameters but different values => not deleted (possible solution: partners should change time)
  - **False duplicates – different chemical analysis** (same position, same time, different parameters) => not deleted (partners should merge CDIs):
    - Add new parameters of the same data type (ex nutrients) in the existing CDIs, ODVs and do not create new ones

More details on Quality Control steps:

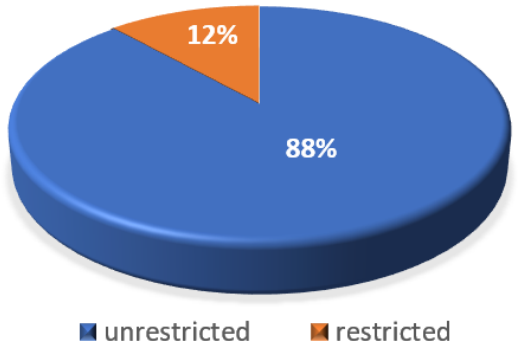
https://www.emodnet-chemistry.eu/doi/documents/Eutrophication_QC_Steps_Collection2021.pdf

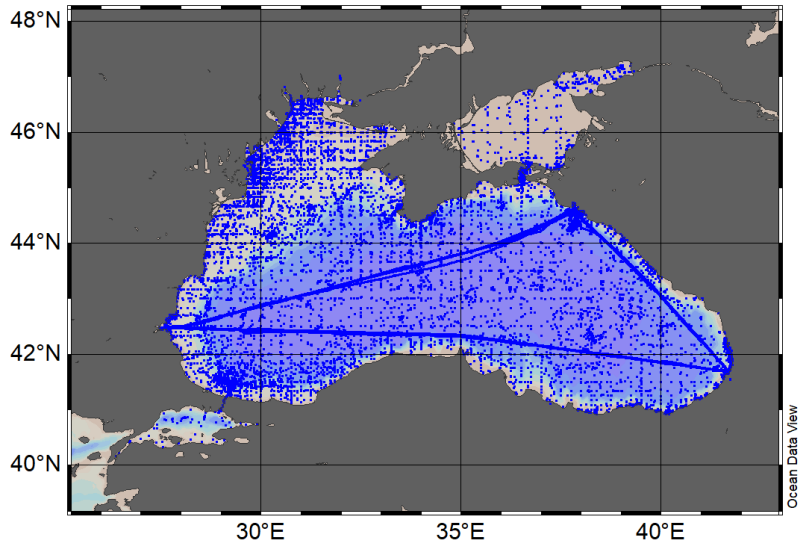
https://nodc.inogs.it/doi/documents/EMODnetChemistry_QC_Steps_Contaminants_4.2021.pdf

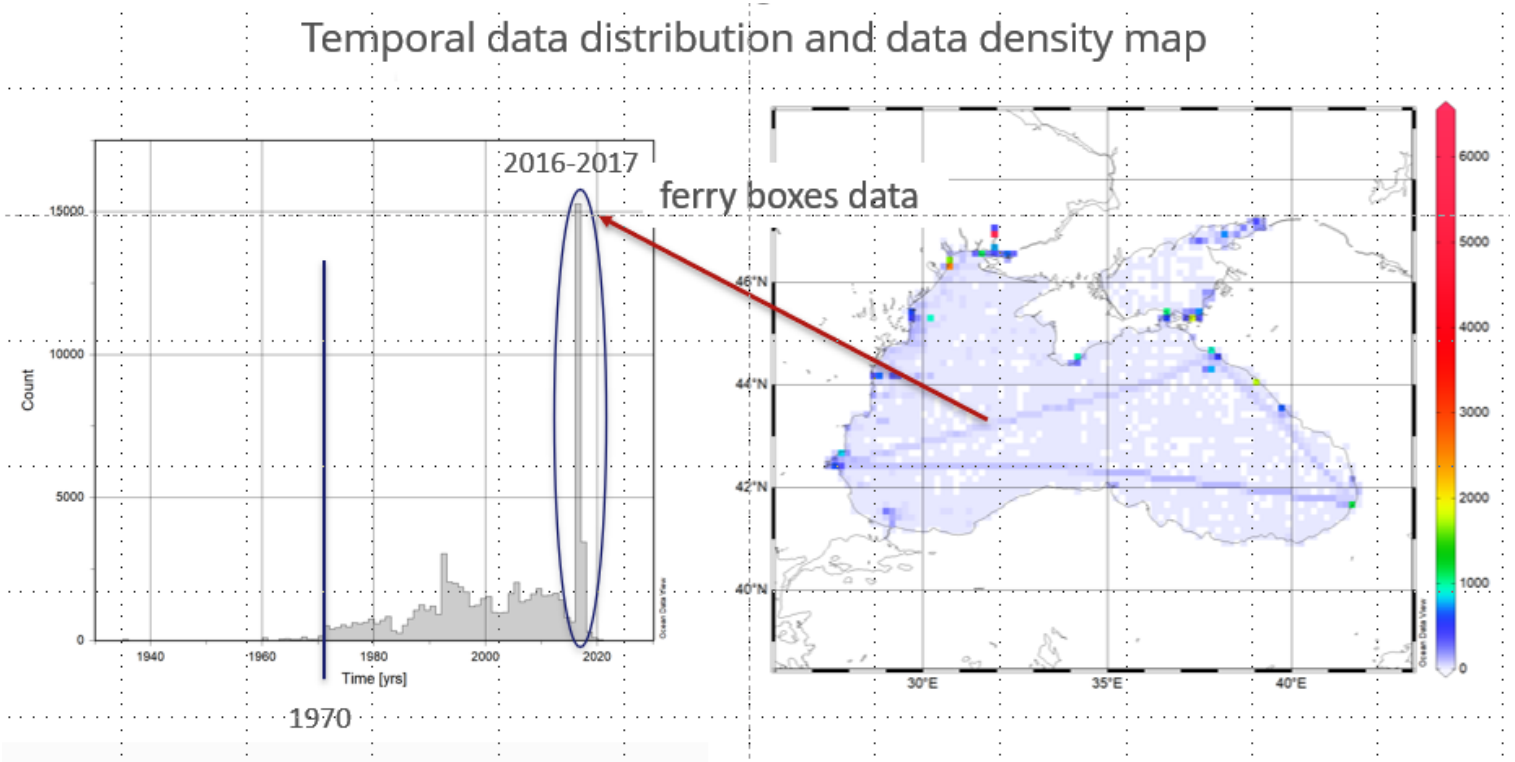
Black Sea Eutrophication and acidity aggregated dataset

38 Originators, 21 Data Holding Centers, 7 Countries

- Vertical Profiles: **70972** vertical profiles
- Temporal coverage: **1935 - 2020**
- **15** aggregated (P35) parameters

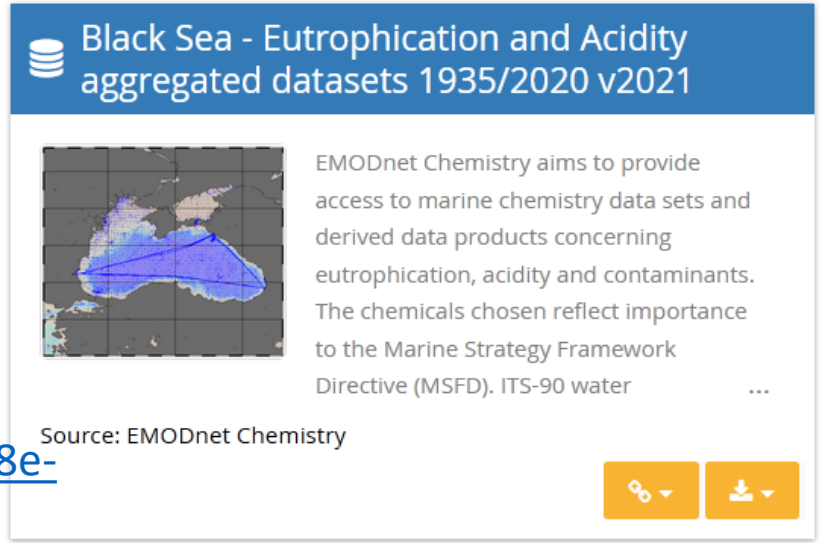






Parameter
Water body dissolved oxygen concentration [umol/l]
Water body dissolved oxygen saturation [%]
Water body nitrate [umol/l]
Water body nitrate plus nitrite_original [umol/l]
Water body nitrite [umol/l]
Water body ammonium [umol/l]
Water body nitrate plus nitrite [umol/l]
Water body dissolved inorganic nitrogen [umol/l]
Water body total nitrogen [umol/l]
Water body phosphate [umol/l]
Water body total phosphorus [umol/l]
Water body silicate [umol/l]
Water body chlorophyll-a [mg/m^3]
Water body pH [pH units]
Water body total alkalinity [mEquiv/l]

Black Sea Eutrophication and Acidity Collection v2021



Unrestricted part of the collection (62704 vertical profiles) available from:

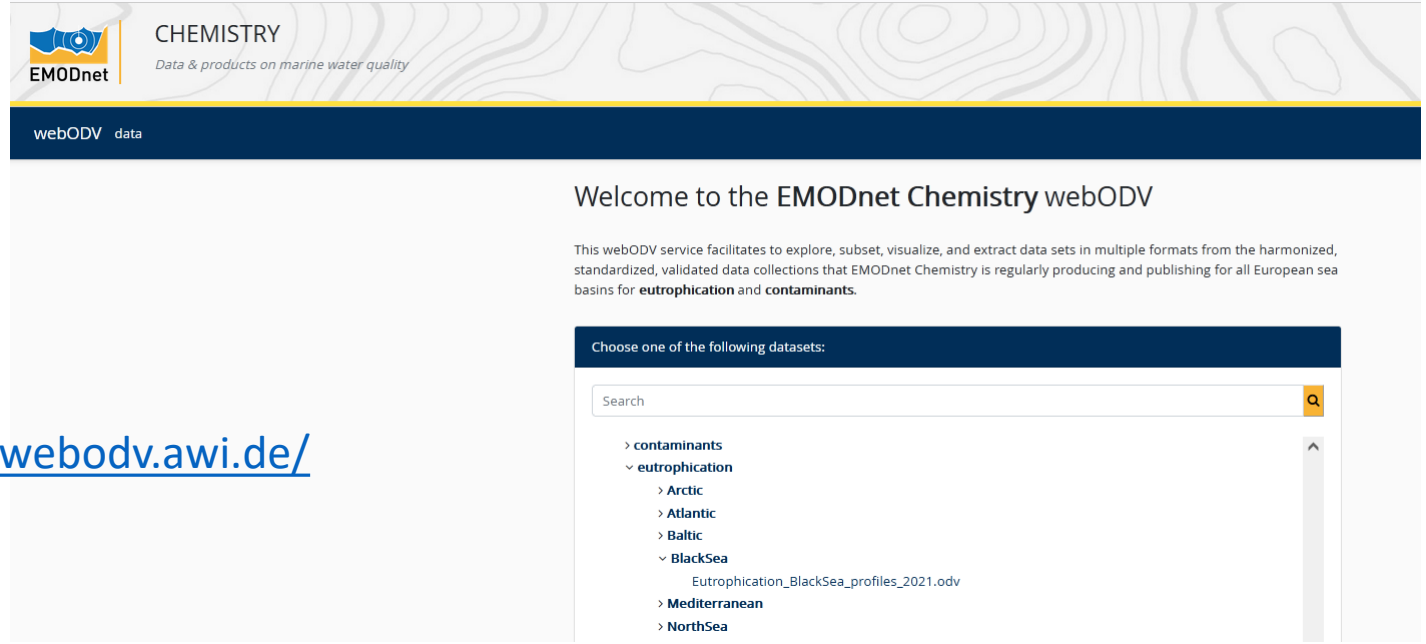
Data Products SEXTANT Catalogue

https://www.emodnet-chemistry.eu/products/catalogue

https://www.emodnet-chemistry.eu/products/catalogue#/metadata/b55f9e70-ce8e-4d7c-b6bf-bd0587e90bf9

DOI page

https://doi.org/10.6092/E9JP-RA41



webODV

https://emodnet-chemistry.webodv.awi.de/

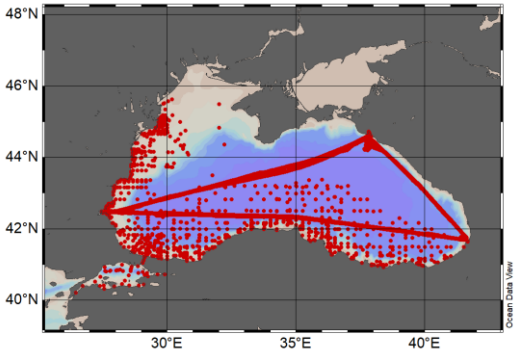
Strengths and weaknesses
Eutrophication & Acidity collection v2021

Strengths

- Good data (94% good data vs 6% bad data)
- Good coverage (space and time) for most of the parameters for Black Sea
- Cooperativeness of data providers
- Willingness to open the data (88% unrestricted data)

Weaknesses

- Low coverage (in space and time) for Sea of Azov and Sea of Marmara
- Low coverage (in space and time) for Chl

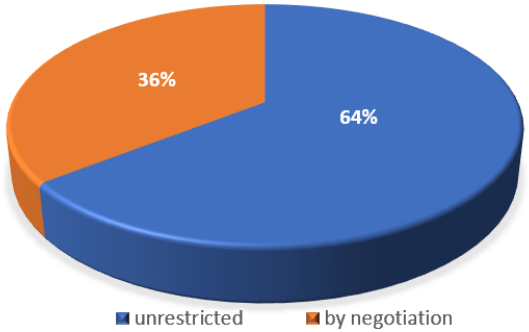


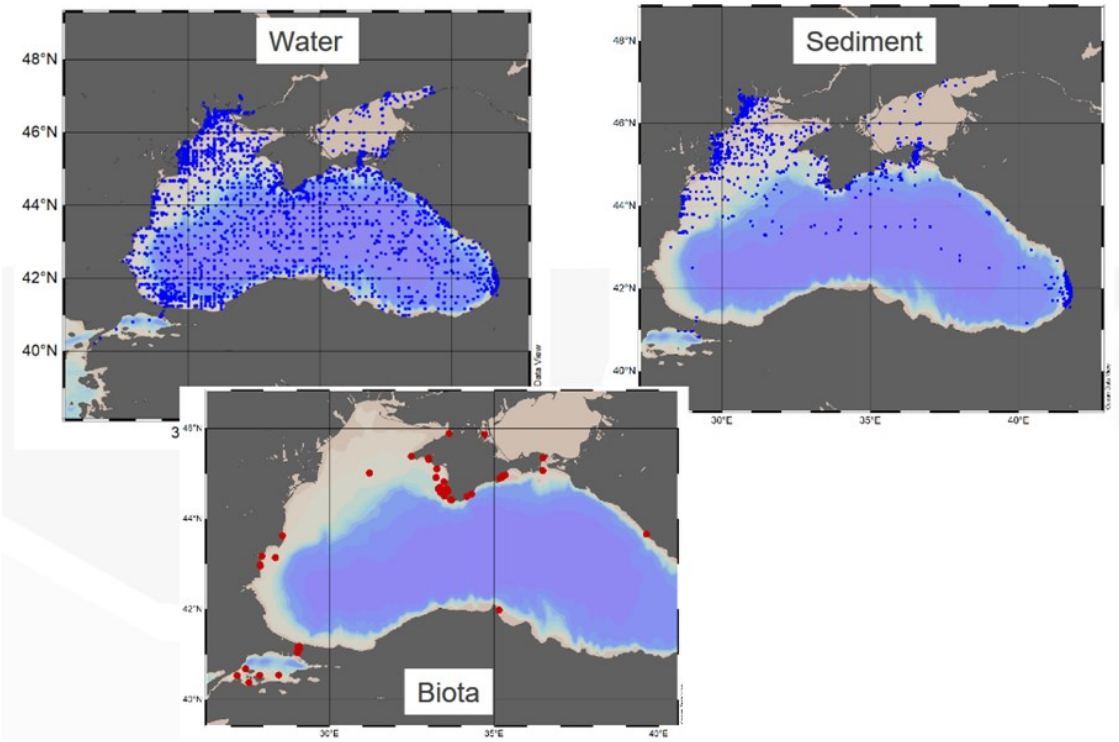
- Still high number of errors in ODV.txt files format
- Missing informations in metadata (project, cruise, etc)

Black Sea Harmonized Contaminants Collection

21 Originators, 13 Data Holding Centers, 7 Countries

- Vertical Profiles: **32134** vertical profiles:
  - 27426 in water
  - 4191 in sediment
  - 517 in biota

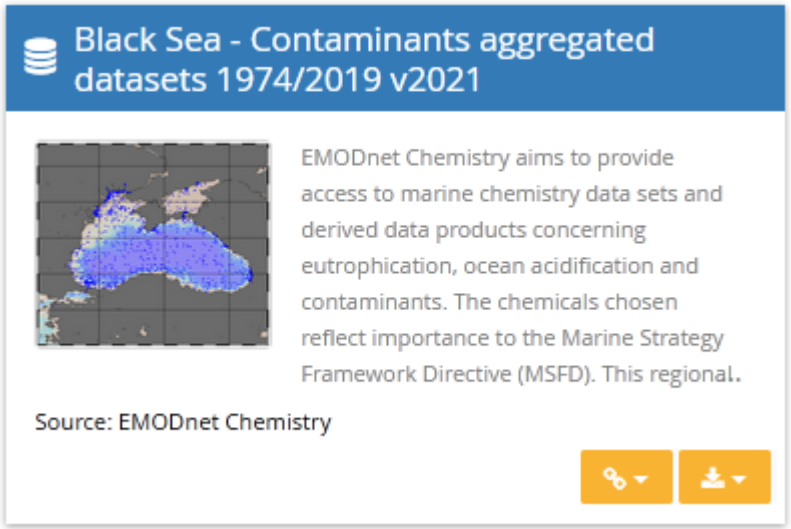




- Temporal coverage: **1974 - 2019**
- Harmonized parameters:
  - 147 in water
  - 139 in sediment
  - 310 in biota

Verical profiles per Parameter group (P36)	Water	Sediment	Biota
Total no. of Antifoulants	80	no data	no data
Total no. of Hydrocarbons	21941	1468	no data
Total no. of Heavy Metals	3509	2379	323
Total no. of PCB	1062	760	193
Total no. of Pesticides	13560	1556	66
Total no. of Radionuclides	1597	41	no data

Black Sea Harmonized Contaminants Collection v2021



Unrestricted part of the collection (20693 vertical profiles) available from:

Data Products SEXTANT Catalogue

https://www.emodnet-chemistry.eu/products/catalogue

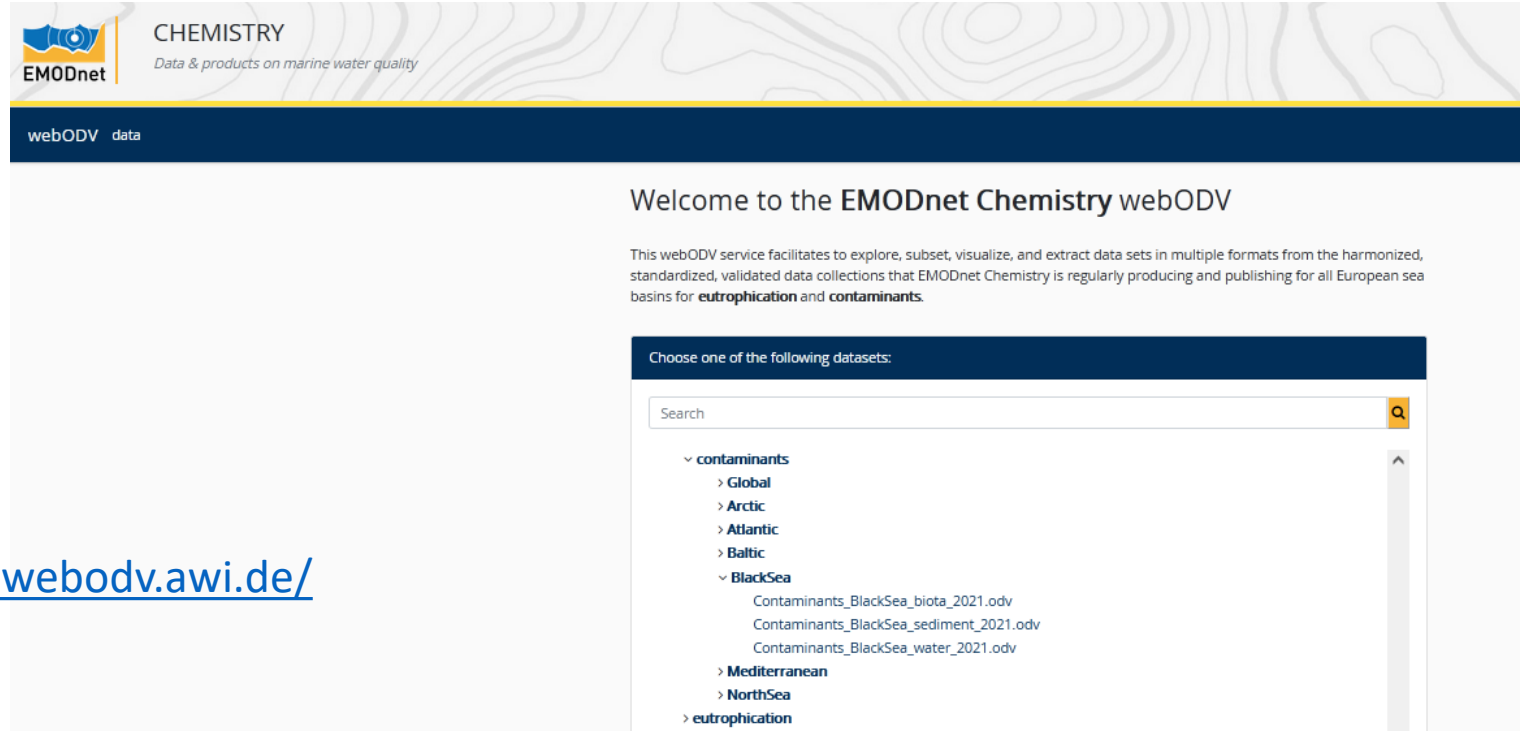
https://www.emodnet-chemistry.eu/products/catalogue#/metadata/5d2ad7f1-bed2-41c4-92b4-4b26bb5ba298

DOI page

https://doi.org/10.6092/JBGE-HY83

webODV

https://emodnet-chemistry.webodv.awi.de/



Strengths and weaknesses
Black Sea Contaminants Collection v2021

Strengths

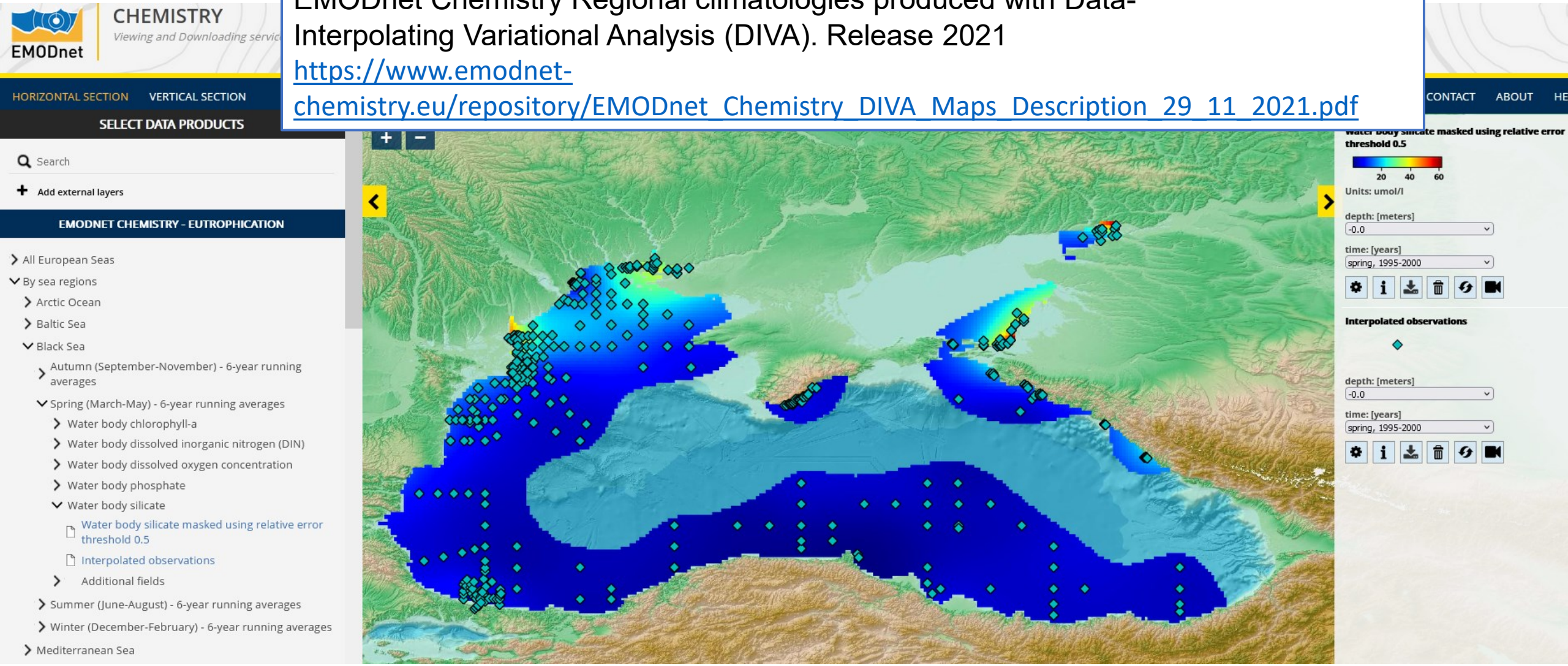
- High number of data in water matrix
- Good coverage (in space) for water matrix
- All P36 Parameter groups are present in water matrix
- Cooperativeness of data providers

Weaknesses

- Few data for biota matrix
- Almost no antifoulants data
- High number of restricted data (36% restricted vs 64% unrestricted data)

New DIVA* maps on Map viewer - Eutrophication

EMODnet Chemistry Regional climatologies produced with Data-Interpolating Variational Analysis (DIVA). Release 2021
https://www.emodnet-chemistry.eu/repository/EMODnet_Chemistry_DIVA_Maps_Description_29_11_2021.pdf

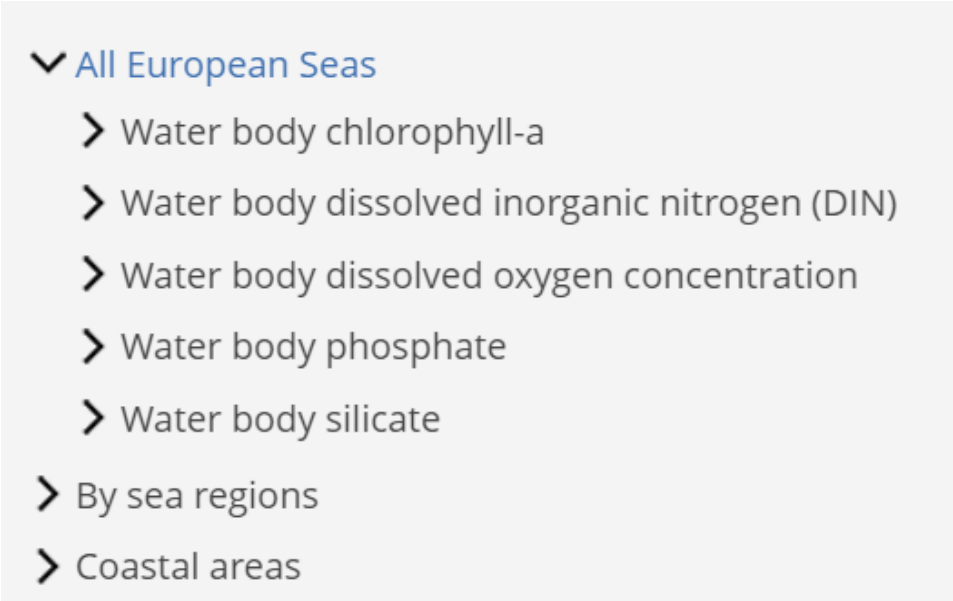


*Data Interpolating Variational Analysis (DIVA)

New DIVA maps on Map viewer - Eutrophication

https://ec.oceanbrowser.net/emodnet/

All European Seas



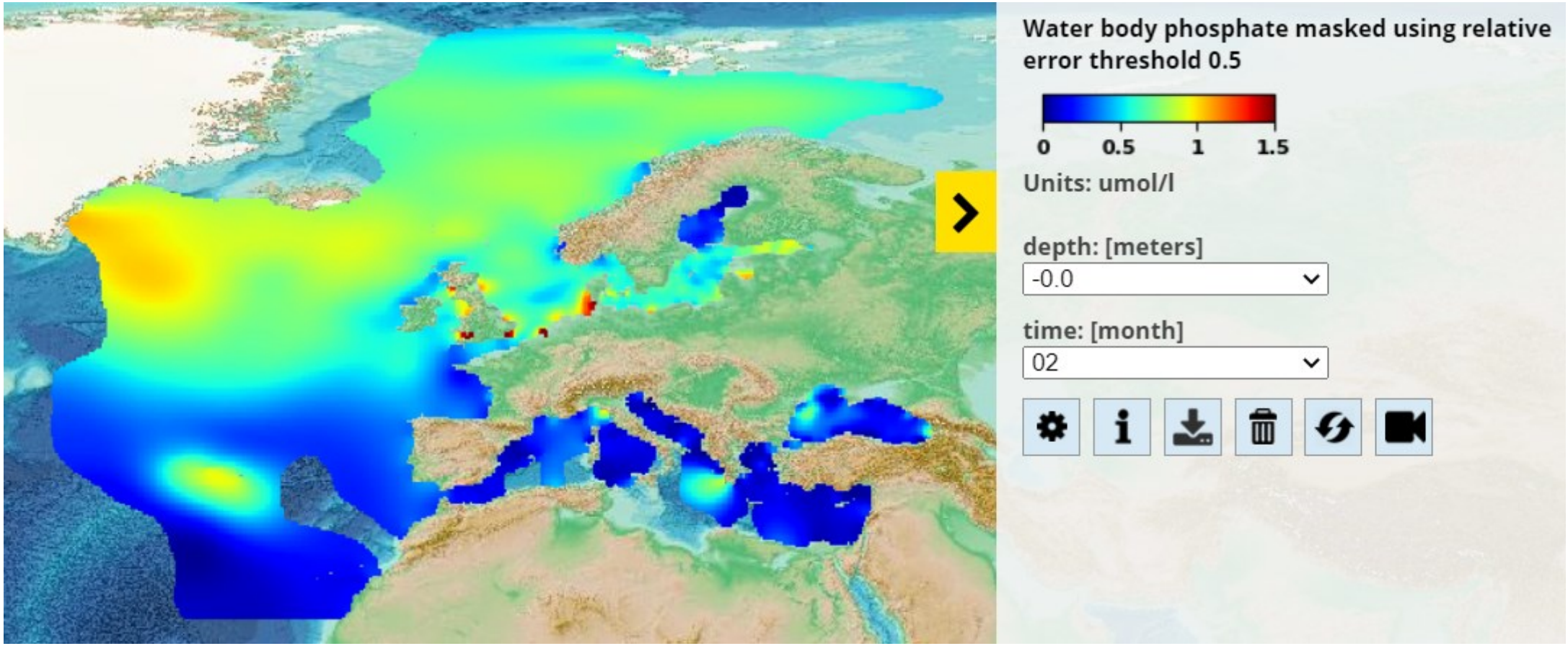
Input: aggregated data collections for 5 variables: chlorophyll-a, dissolved inorganic nitrogen, oxygen phosphate, silicate

Grid: - 0.25° × 0.25° horizontally

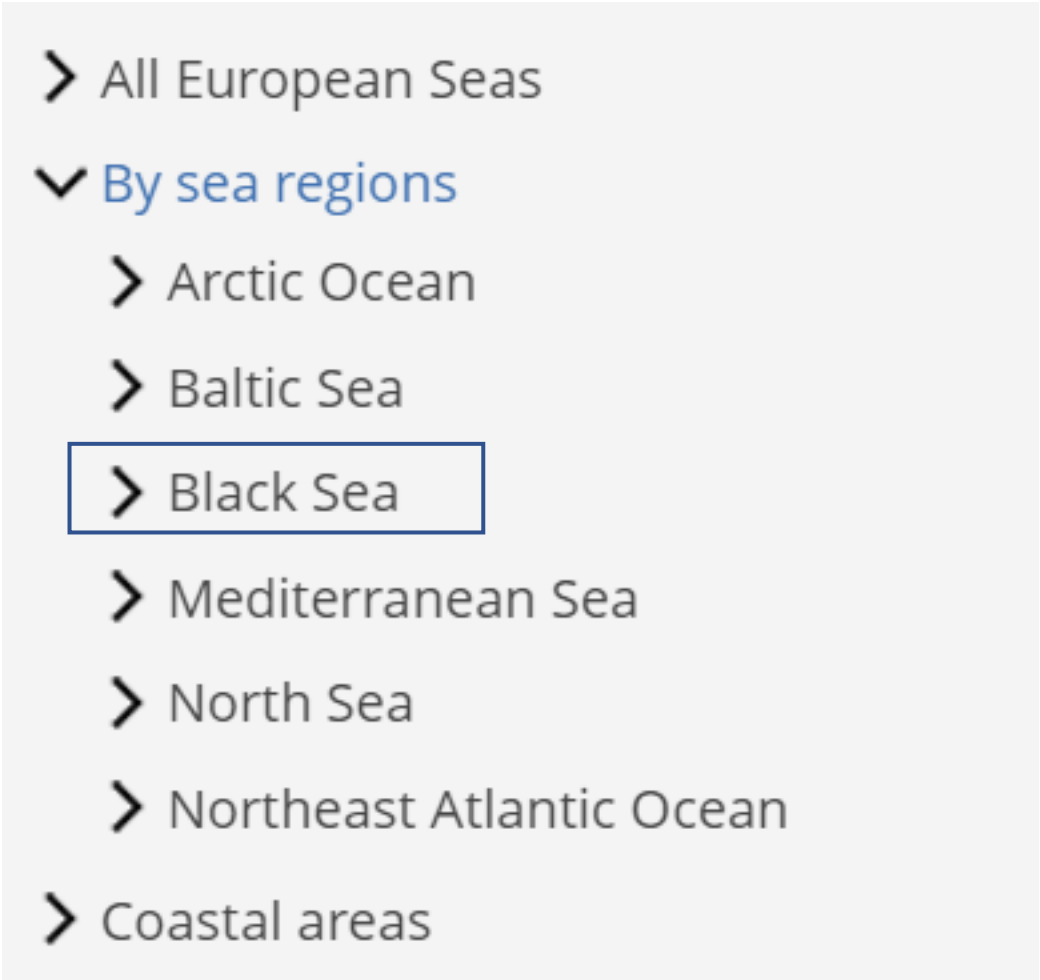
- 102 depth levels from surface down to 5500 m

- 12 monthly periods

All European Seas - Results



By sea region



Regional maps: moving 6 year periods per season and per parameter

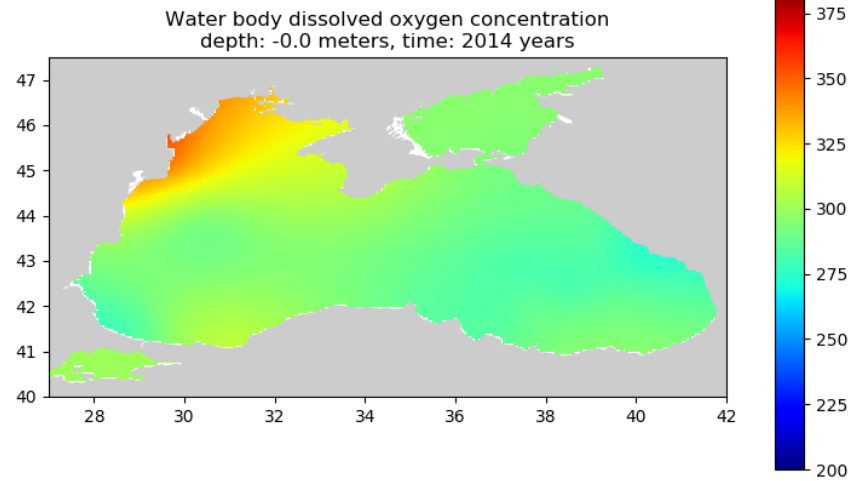
- Grid resolution around 0.05°
- Time period are dependent on data availabilty per parameters

The parameters:

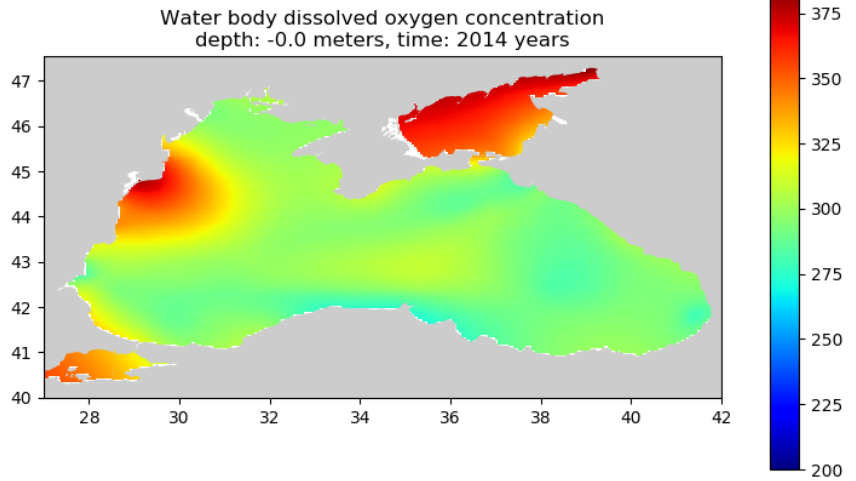
- ✓ chlorophyll-a,
- ✓ dissolved inorganic nitrogen,
- ✓ oxygen,
- ✓ phosphate,
- ✓ silicate

By sea region - Black Sea, Dissolved oxygen, 0m, 2011-2016

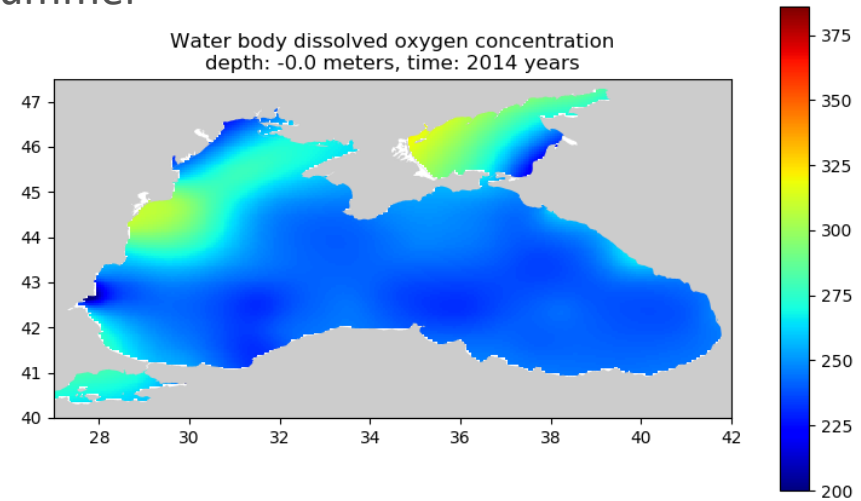
Winter



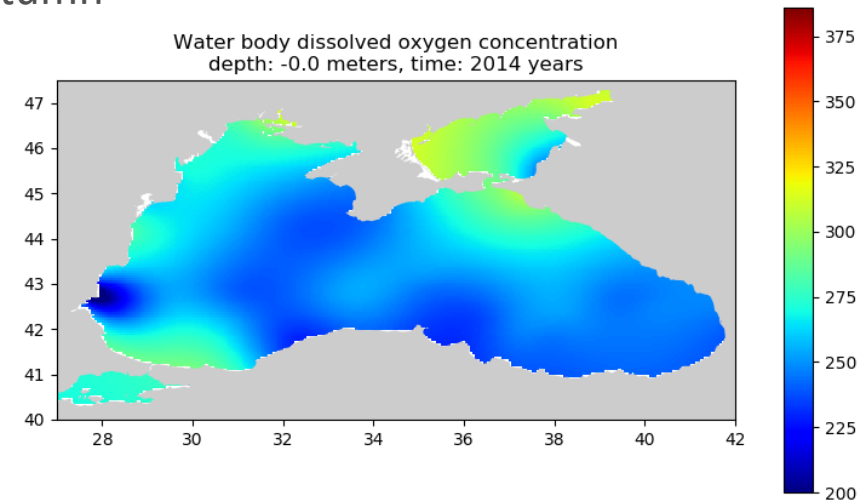
Spring



Summer



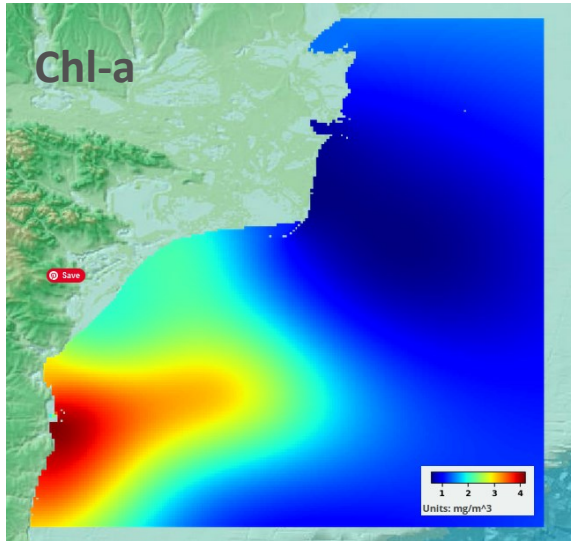
Autumn

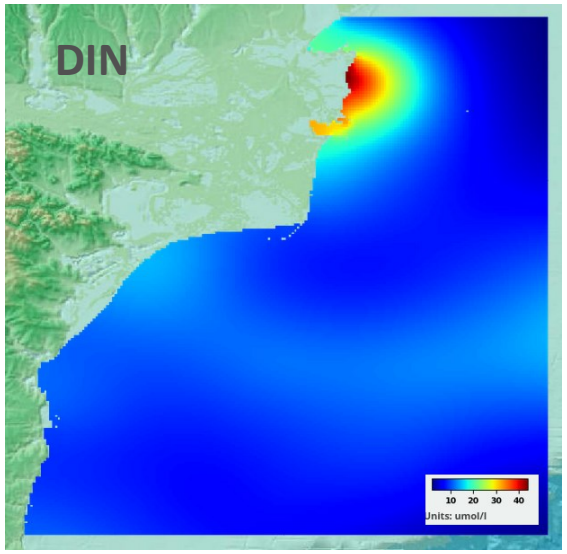


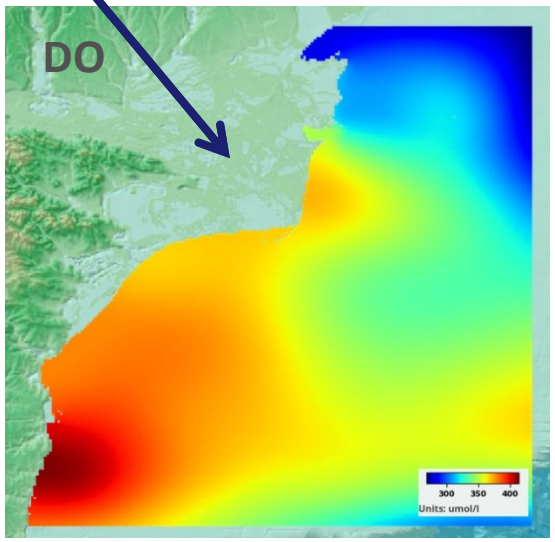
Coastal areas

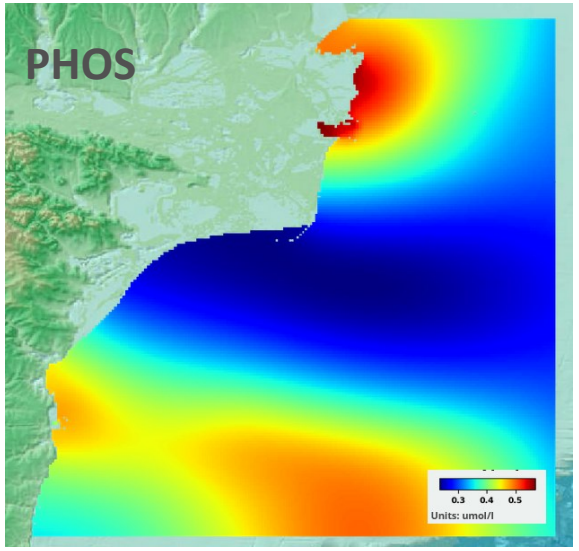
- Grid resolution around 0.01°
- Depth resolution finer near the surface
- DIVAnd
- Seasonal for the entire period
- Time period are dependent on data availabilty and varies with regions and parameters
- Parameters: chlorophyll-a, dissolved inorganic nitrogen, oxygen phosphate, silicate

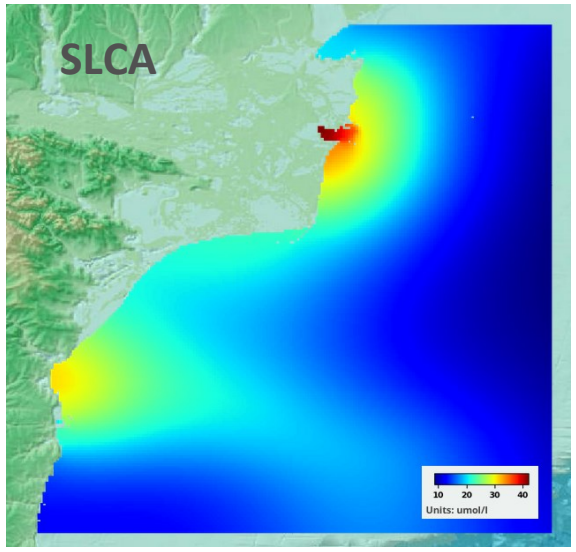
Coastal areas - Spatial distributions, Winter, surface (0 m)
Danube Delta











- ***Influence of Danube River***:
  - higher values of nutrients and silicates in front of Danube Delta,
  - low value of Chl-a (due to colder waters)
- ***Influence of anthropogenic pressures*** (Constanta city and port):
  - Higher values of Chl-a and Dissolved Oxygen but also high values for phosphates and silicates

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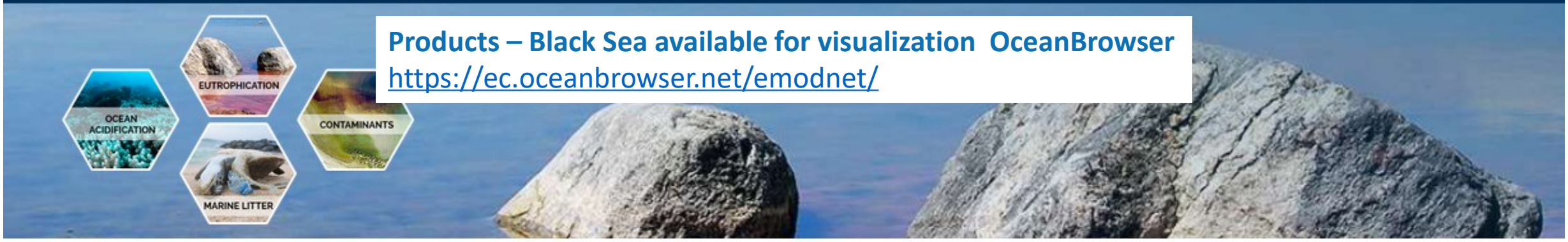

Products – Black Sea available for visualization OceanBrowser
https://ec.oceanbrowser.net/emodnet/

Home > Data Products

- Map Viewer
- Data Products Catalogue
- How are products generated
- River Data Inventory
- Web Services
- Acknowledgement in publications

Data Products

EMODnet Chemistry provides access to data products based on harmonized, standardized, validated datasets coming from all EU sea basins. Data products concern **eutrophication**, **ocean acidification**, **contaminants** and **marine litter**.

EMODnet Chemistry data products can be synthesized as follows:

Eutrophication

Gridded climatologies

They are spatially interpolated maps that display the depth variability over time of 5 variables: Dissolved inorganic nitrogen (DIN), Phosphate, Silicate, Chlorophyll - a, and Dissolved oxygen concentration. The tools used are the 2 dimensional DIVA version (Data Interpolating Variational Analysis) and its implemented version DIVAnd, that is the generalisation in n dimensions of the method (long, lat, depth, time, etc.). All maps can be customized selecting both depth and time ranges. An animation of the evolution over time of the parameters is also available. They are available to download as NetCDF, PNG, PDF, EPS, SVG, WebM (animation), MP4 (animation), KML. The maps can be also visualized by using OGC WMS and OPeNDAP

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Data & products on marine water quality

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Products – Black Sea available for download on Sextant Catalogue
https://www.emodnet-chemistry.eu/products/catalogue

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EMODnet Chemistry data products can be synthesized …

Eutrophication

Gridded climatologies

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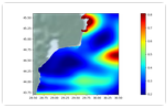
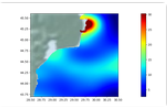
Black Sea - Danube Delta - DIVAnd 4D seasonal analysis of Water body phosphate 1970/2018 v2021



Water body phosphate - Seasonal Climatology for Danube Delta (NW Black Sea) for the period 1970-2018 on the domain: Lon E28.5-30.5°E, Lat N43.7-45.6°N. (winter: December-February, - spring: March-May, - summer: June-August, - autumn: September- …

Source: EMODnet Chemistry

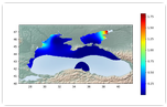
Black Sea - Danube Delta - DIVAnd 4D seasonal analysis of Water body dissolved inorganic nitrogen (DIN)…



Water body dissolved inorganic nitrogen (DIN) - - Seasonal Climatology for Danube Delta (NW Black Sea) for the period 1980-2018 on the domain: Lon E28.5-30.5°E, Lat N43.7-45.6°N. (winter: December-February, - spring: March-May, - summer: June-August, - autumn: September- …

Source: EMODnet Chemistry

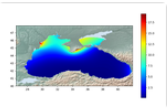
Black Sea - DIVA 4D 6-year seasonal analysis of Water body phosphate 1970/2018 v2021



Moving 6-year analysis of Water_body_phosphate in the Black Sea for each season: spring (March-May), summer (June-August), autumn (September-November), winter (December-February). Every year of the time dimension corresponds to the …

Source: EMODnet Chemistry

Black Sea - DIVA 4D 6-year seasonal analysis of Water body dissolved inorganic nitrogen (DIN) 1990/2018…



Moving 6-year analysis of Water_body_dissolved_inorganic_nitrogen_([in the Black Sea.for each season: spring (March-May), summer (June-August), autumn (September-November), winter (December-February). Every year of the time dimension corresponds to the 6-years..

Source: EMODnet Chemistry

https://www.emodnet-chemistry.eu/