

# Ferrybox data from ship to your Desktop

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Ifremer - SISMER

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*Copernicus Marine In Situ TAC Global*

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*GOSUD - IODE Program Leader*

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# IOC. (2003). Resolution XXII-6: IOC Oceanographic Data Exchange Policy. Intergovernmental Oceanographic Commission, UNESCO

*The timely, free and unrestricted international exchange of oceanographic data is essential for the efficient acquisition, integration and use of ocean observations gathered by the countries of the world for a wide variety of purposes including the prediction of weather and climate, the operational forecasting of the marine environment, the preservation of life, the mitigation of human-induced changes in the marine and coastal environment, as well as for the advancement of scientific understanding that makes this possible*

<https://unesdoc.unesco.org/ark:/48223/pf0000372654>



# Topics to be Covered

- In Situ TAC Organisation and Ferrybox dataflow
- Some examples
- Marine Data Store & use of copernicusmarine toolbox
- Some features that will come soon
- Acquisition in EEZ



# In Situ TAC Organisation

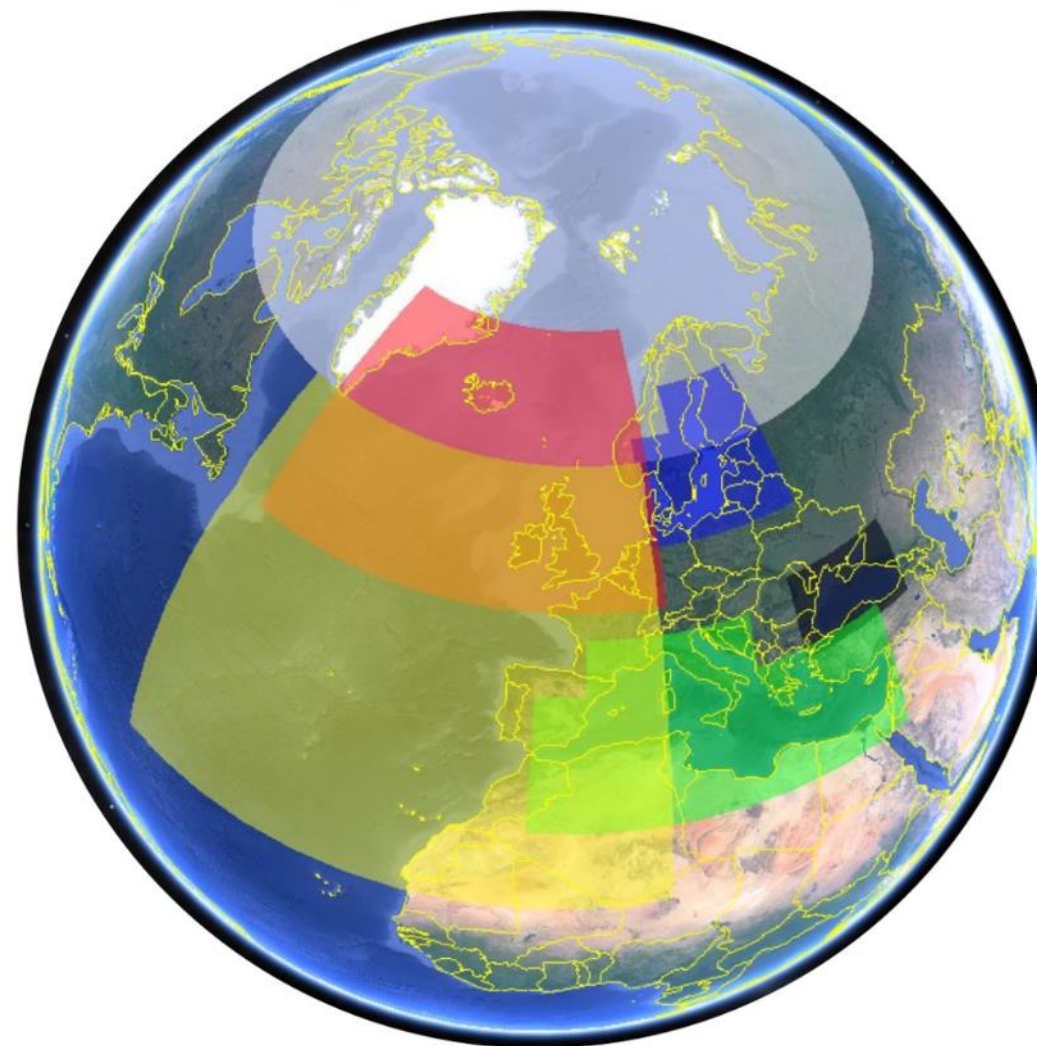
Copernicus Marine Service In Situ TAC portfolio

## NRT products

**Global:** Ifremer-Pokapok  
**Arctic Ocean:** IMR  
**Baltic Sea:** SMHI  
**North West Shelf:** BSH  
**Iberia-Biscay-Ireland:** PdE-Nologin  
**Mediterranean Sea:** HCMR  
**Black Sea:** IOBAS  
**T & S:** OceanScope  
**Currents (UV):** CLS-AZTI-Ifremer-CNR

## Multi Year products

**T & S:** OceanScope  
**Currents (UV):** CLS-AZTI-Ifremer-CNR-SOCIB  
**Waves:** PdE-Nologin  
**BGC:** IMR-Pokapok-HCMR-SYKE  
**Sea level:** PdE-Nologin  
**Carbon:** IMR  
**OMI:** PdE-Nologin



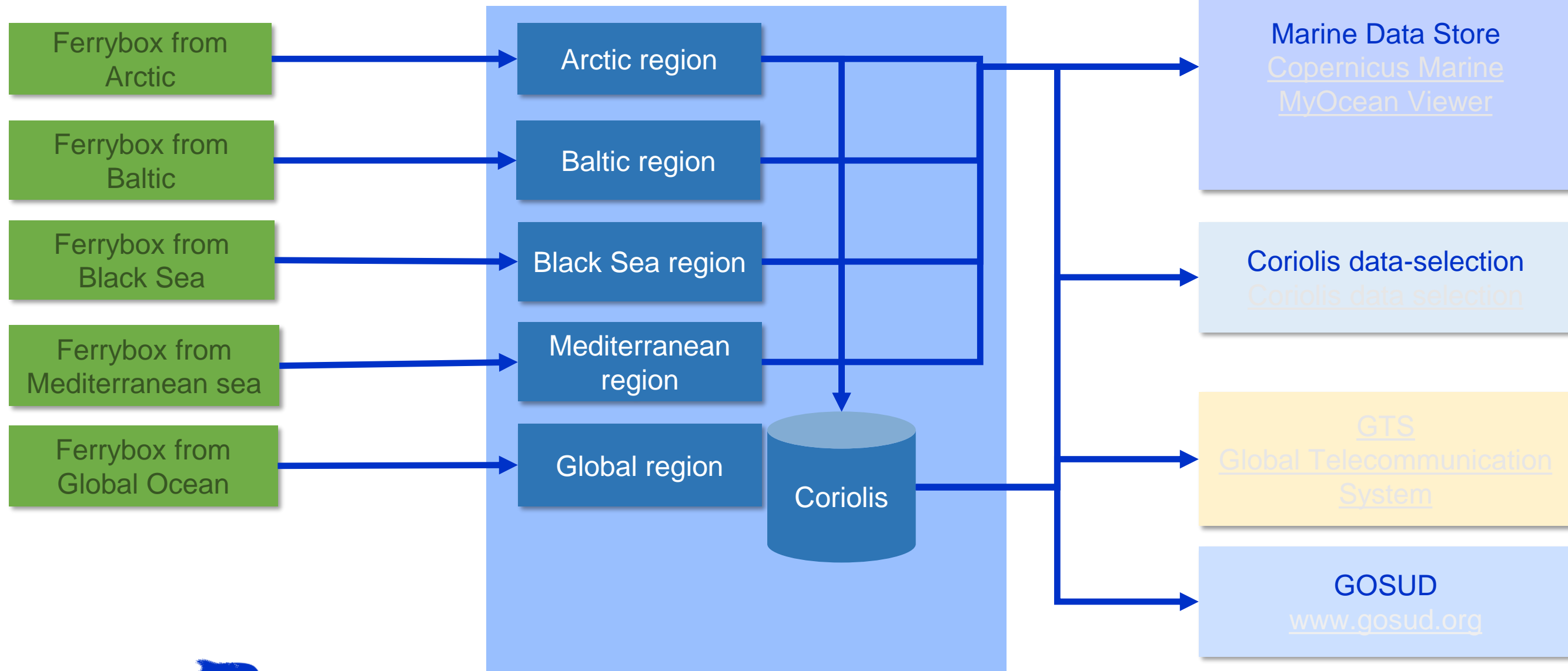
# In Situ TAC Organisation - Global Product

## INSITU\_GLO\_PHYBGCWAV\_DISCRETE\_MYNRT\_013\_030

- The global region : all the world's oceans and seas.  
It is hourly synchronised with regional products (Arctic, Baltic, Black Sea, North West Shelf, Mediterranean, Iberian-Biscay-Ireland)
- The data from other regions feeds Coriolis database (the French In situ database for operational oceanography)
- Data are made accessible through Coriolis data selection
- Data sent to Marine Data Store are accessible Global Ocean- In-Situ Near-Real-Time Observations | Copernicus Marine Service

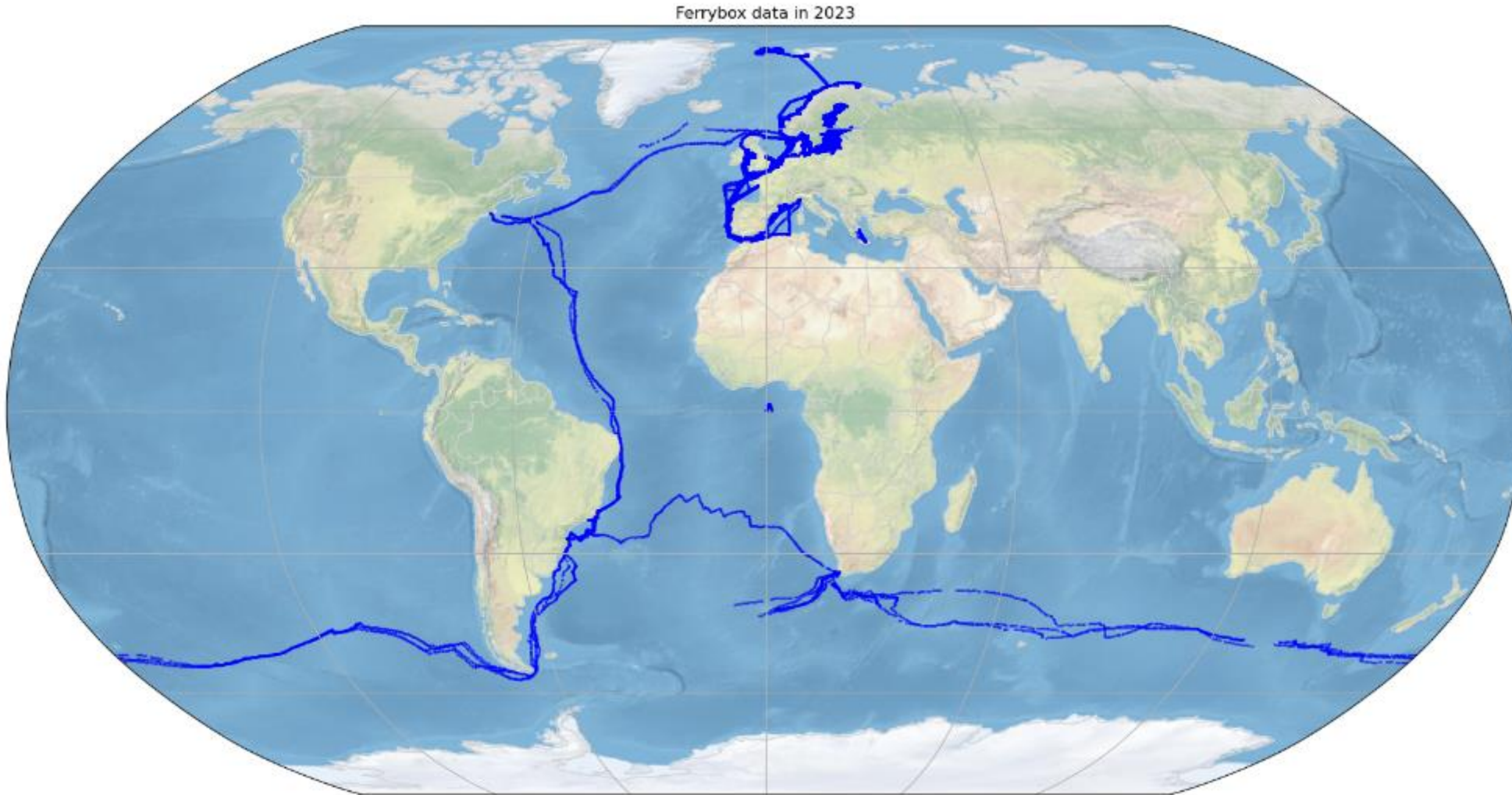


# Ferrybox dataflow in real-time

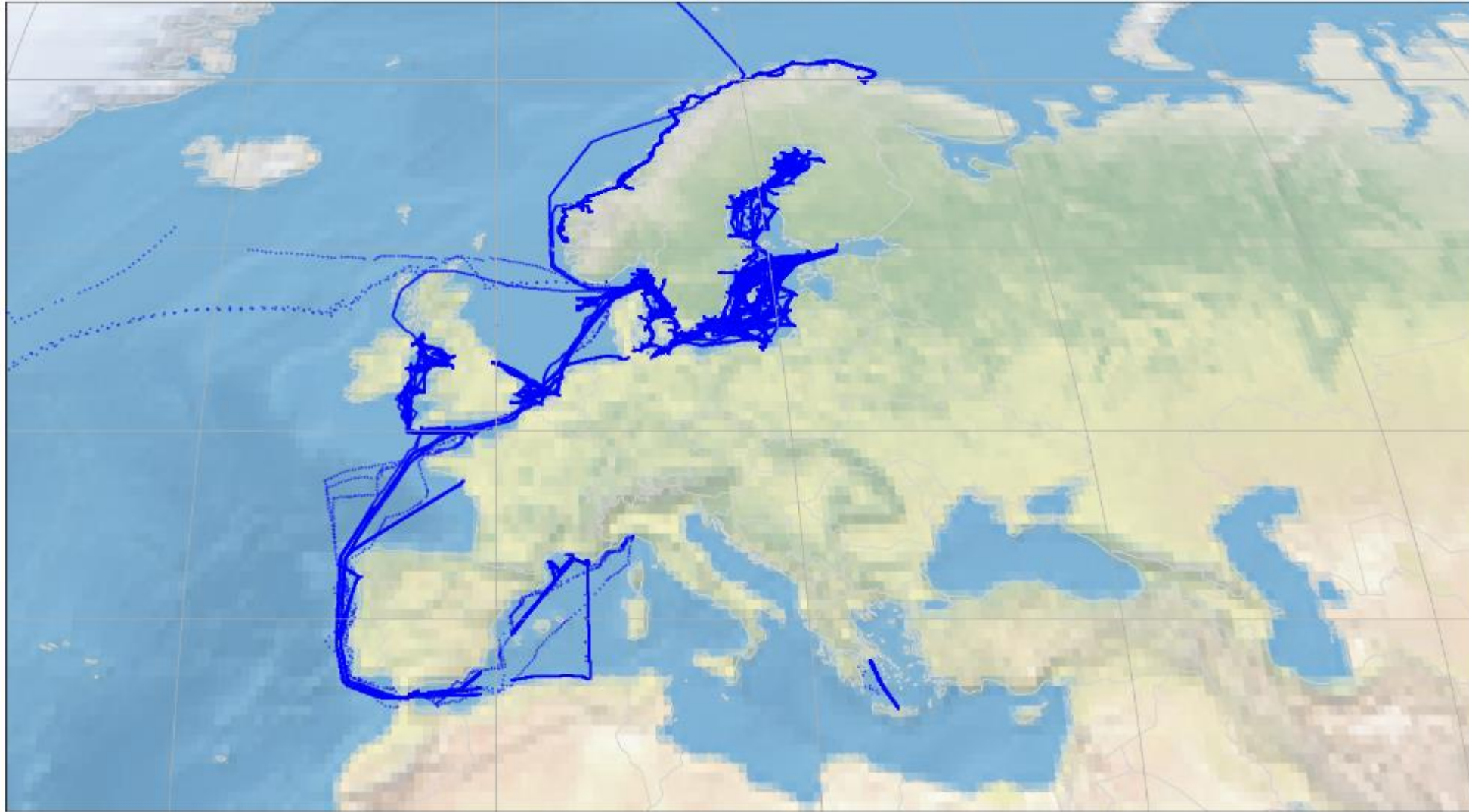




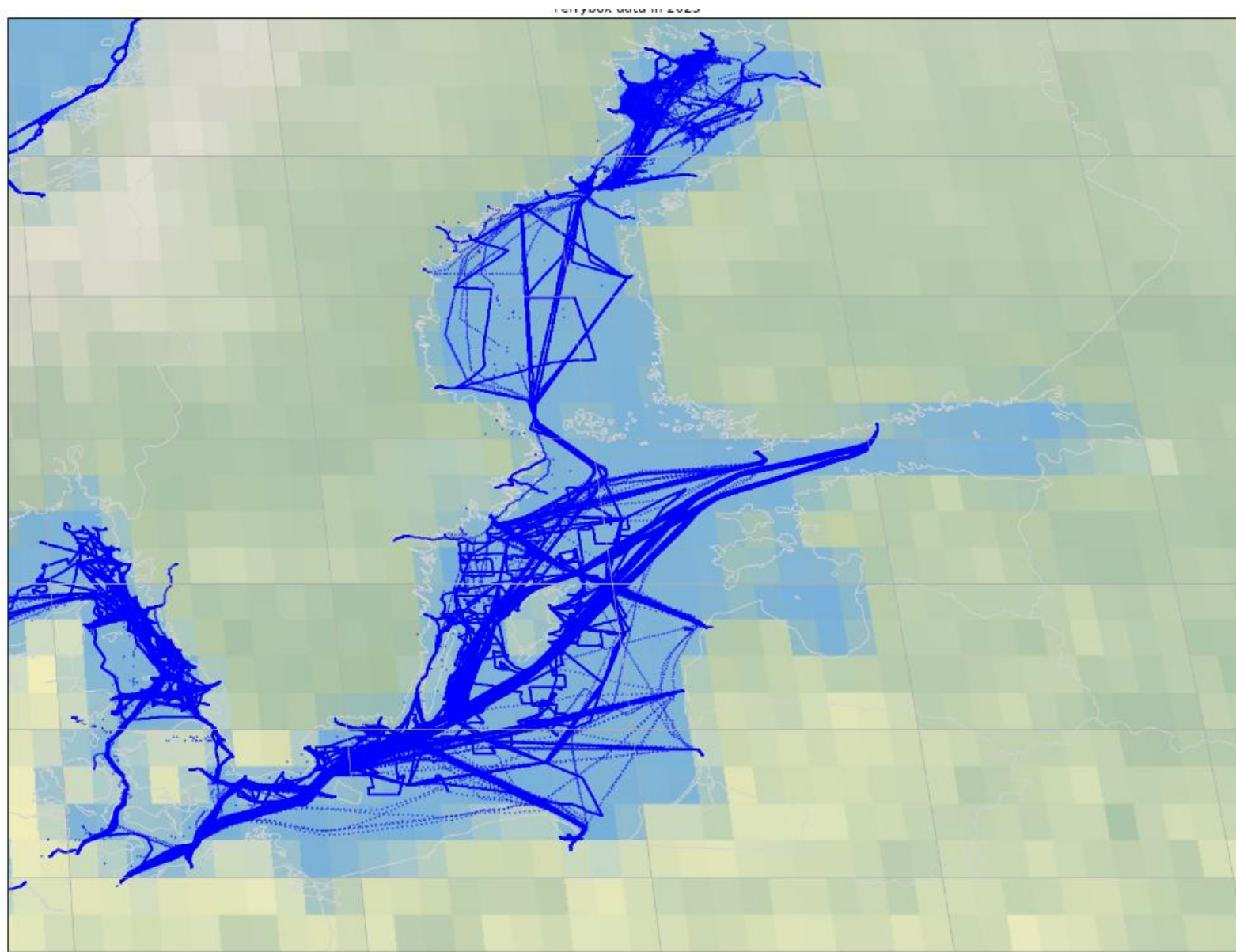
# Ferrybox data in Coriolis in 2023



Ferrybox data in 2023







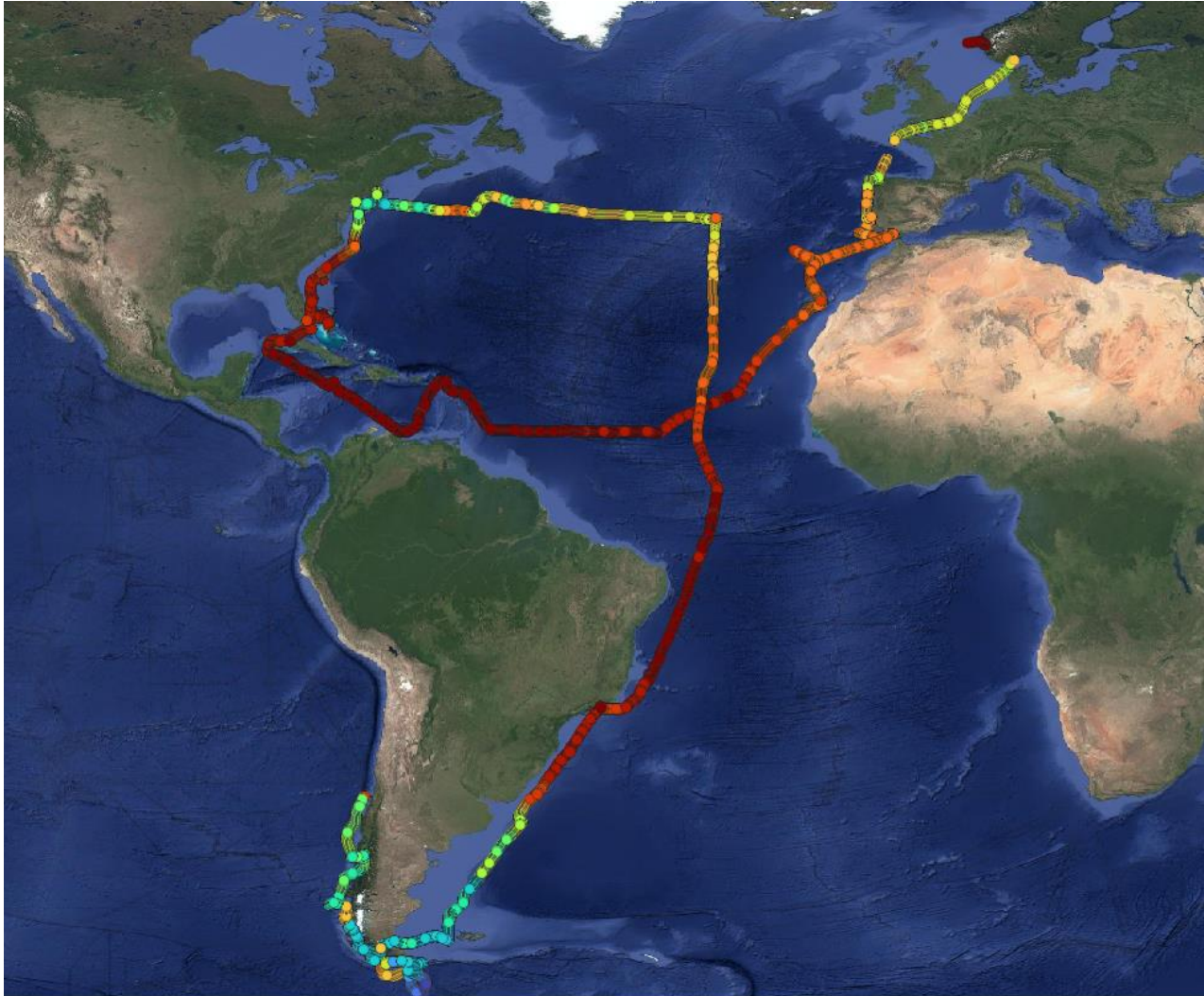
# Topics to be Covered

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- **Some examples**
- Marine Data Store & use of copernicusmarine toolbox
- Some features that will come soon
- Acquisition in EEZ



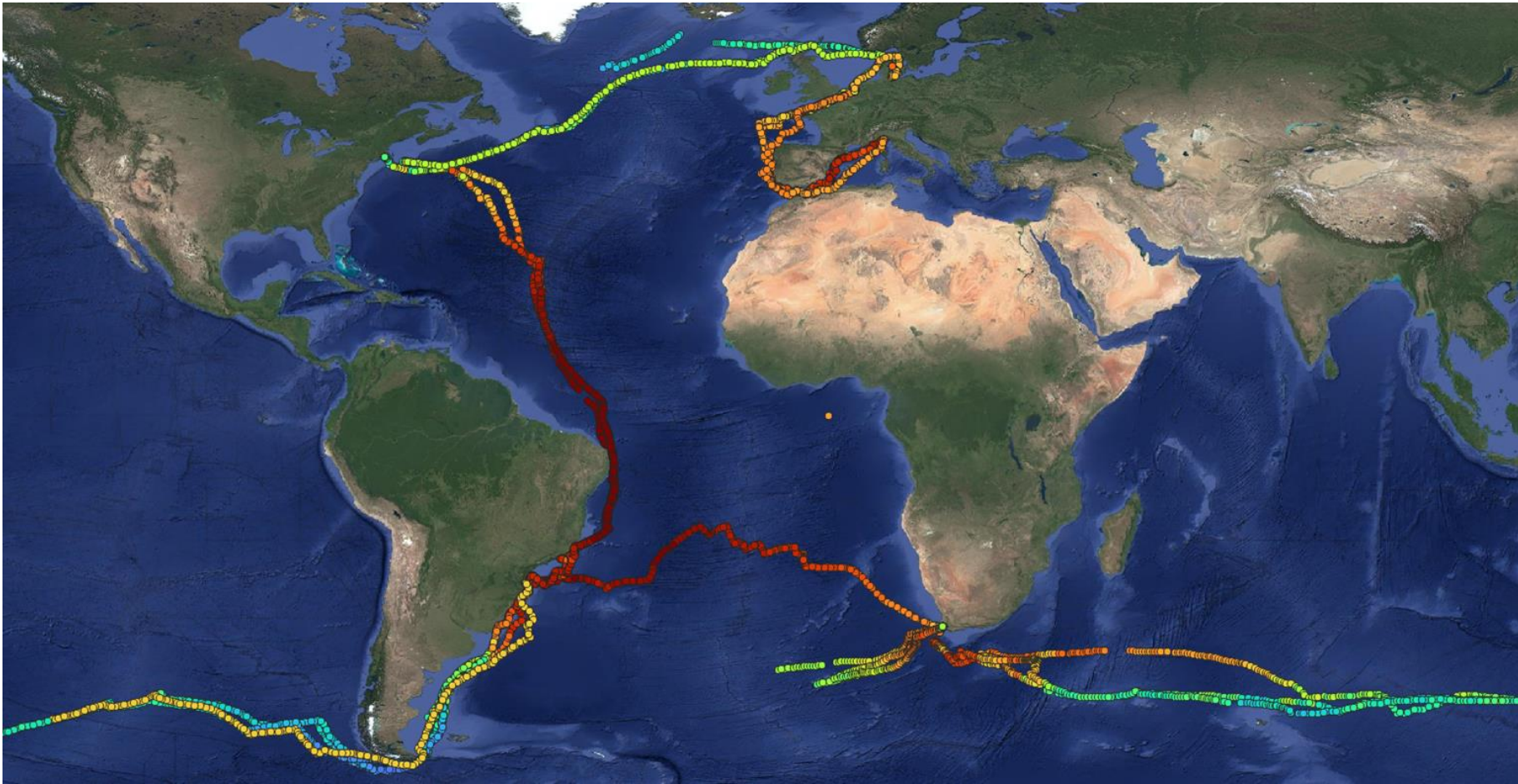


# Statsraad lehmkuhl 2021-2022





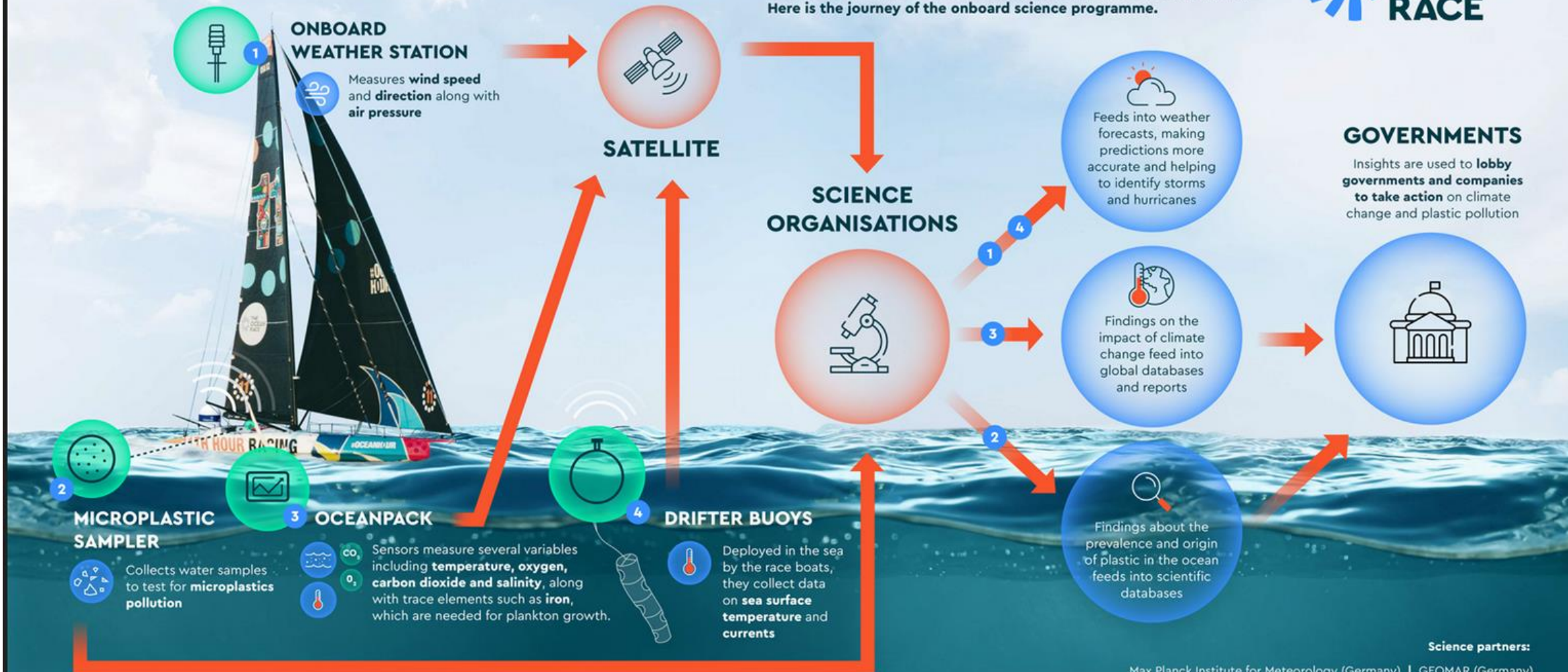
# The Ocean Race





# A RACE TO SAVE THE OCEAN

Using cutting edge equipment and technology, teams in The Ocean Race collect more data about the environment than any other sporting event in the world. The insights gleaned feed into reports that inform and influence decisions by governments across the world. Here is the journey of the onboard science programme.



**Science partners:**  
 Max Planck Institute for Meteorology (Germany) | GEOMAR (Germany)  
 National Oceanography Centre (UK) | Ifremer (France) | NOAA (USA) | CNRS (France)  
 University of Rhode Island (USA) | Universitat de Lleida (Spain)

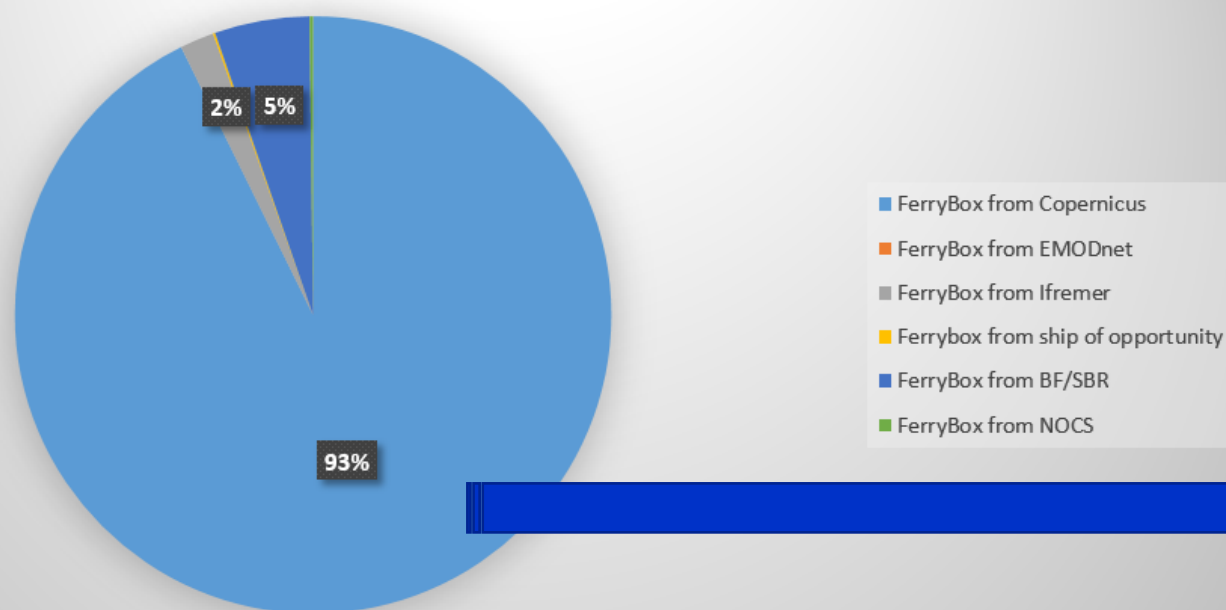
Inmarsat is the Satellite Communications Partner



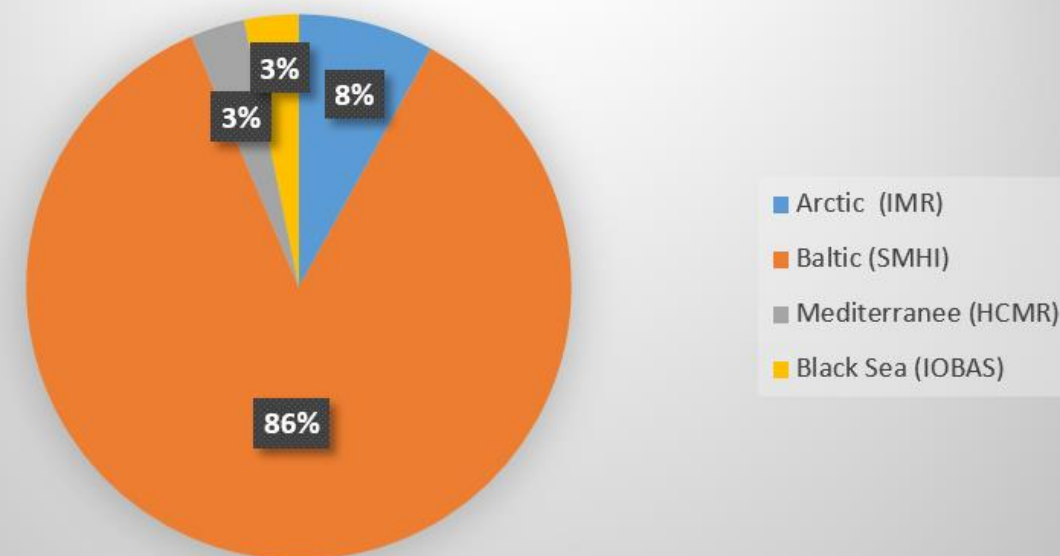
Ifremer

# Ferrybox data since ever

Ferrybox dataflow

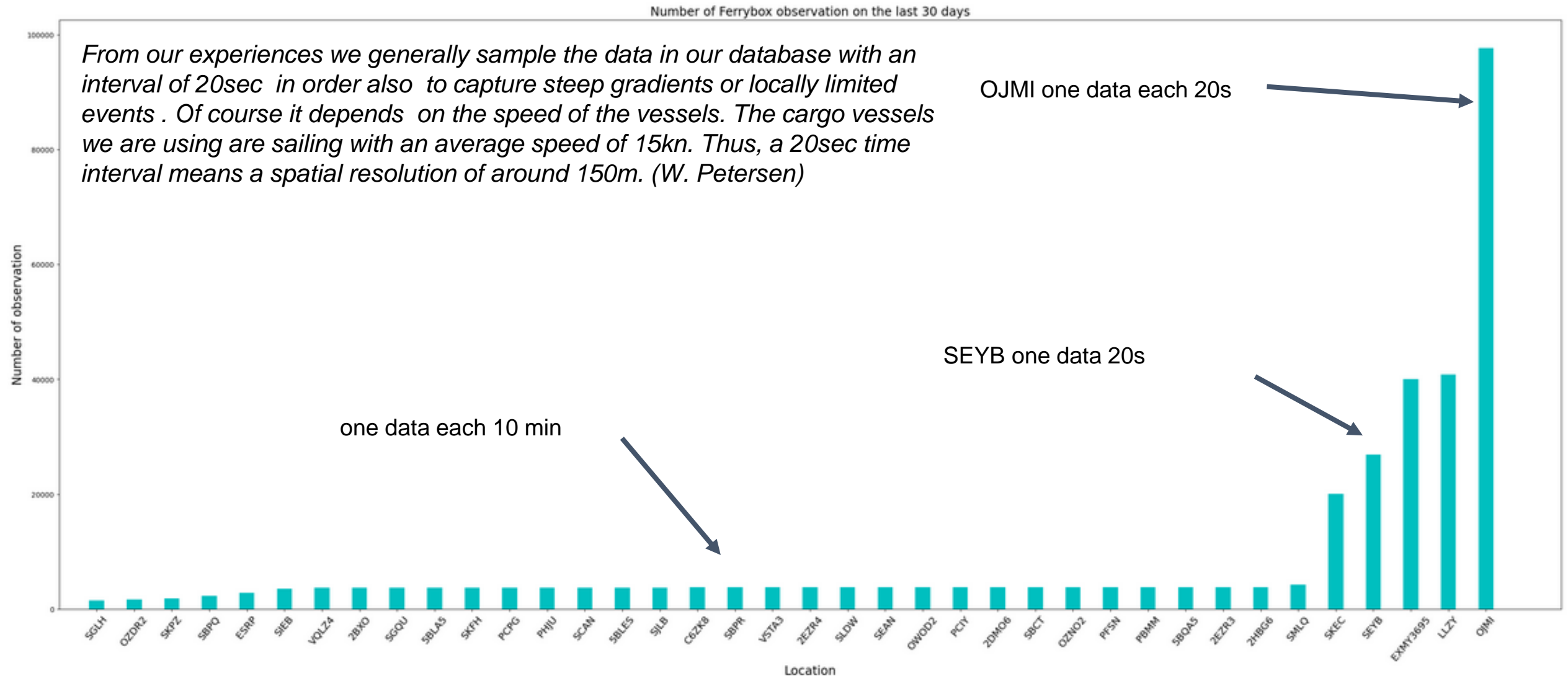


Ferrybox platforms from other regions

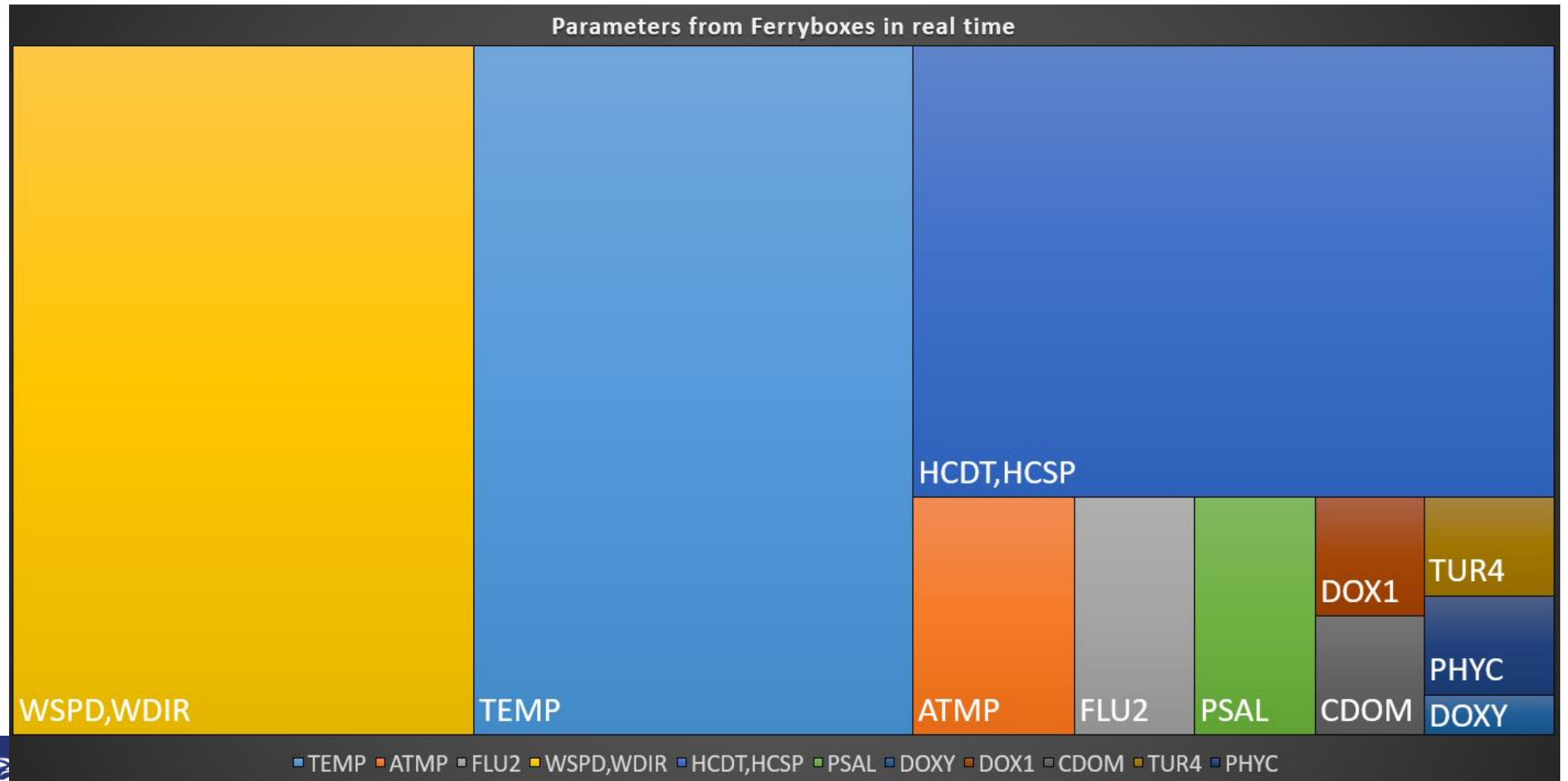




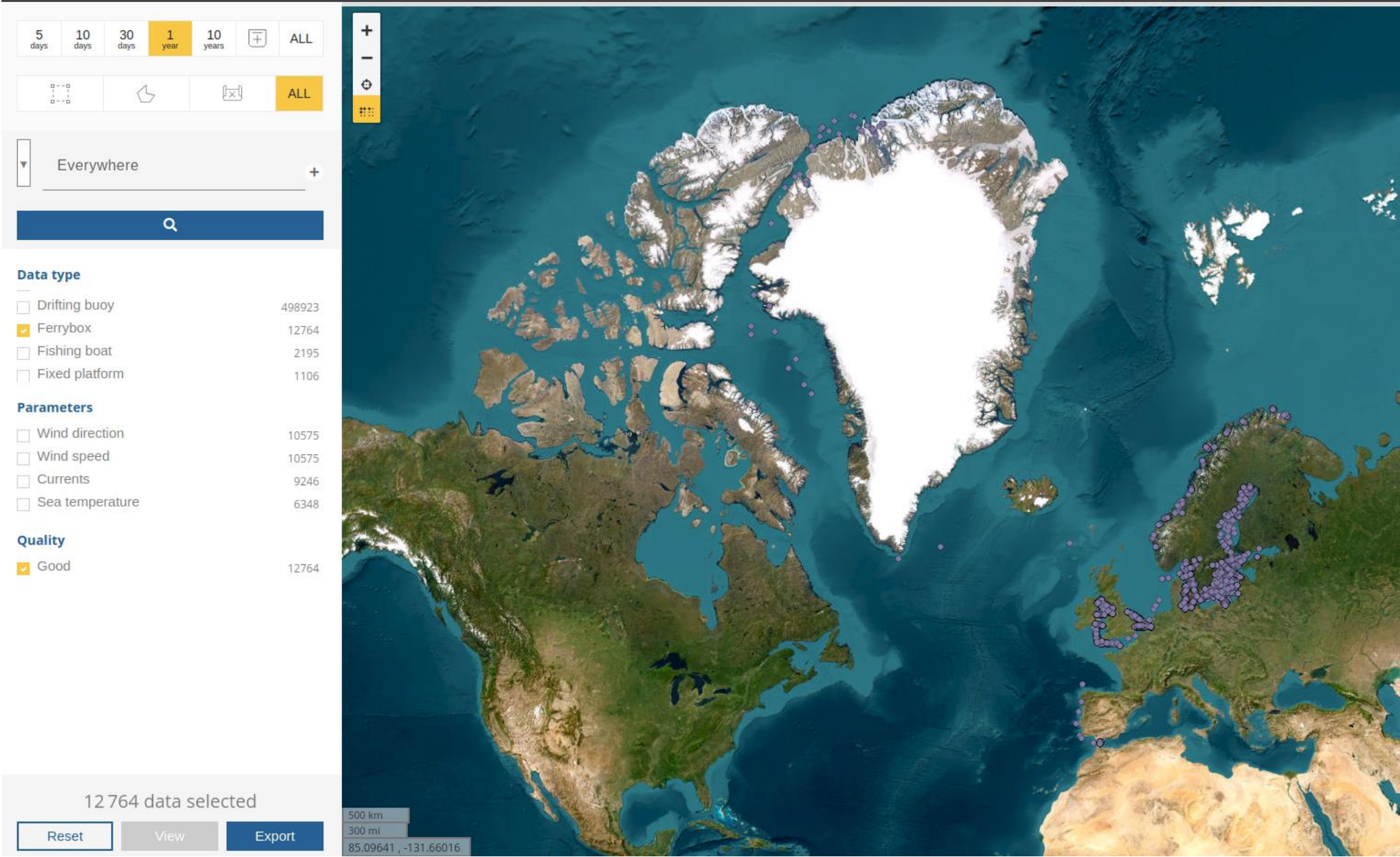
# Ferrybox observations over the last 30 days



# Parameters from Ferryboxes



# Ferrybox data in data selection

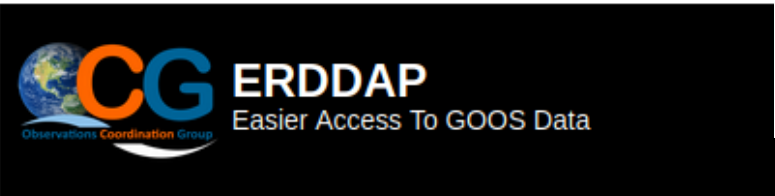




# GTS data: Example with FinMaid (OJMI)

Extraction date: 2024-09-26 17:30:00

last date of observation in OSMC ERDDAP: 2024-09-25T04:06:00



6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T04:02:00Z	59.41	24.15	0.0										16.8	6.34		
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T04:04:00Z	59.41	24.14	0.0										16.9	6.37		
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T04:05:00Z	59.41	24.15	0.0										16.9	6.37		
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T04:06:00Z	59.41	24.16	0.0										16.9	6.36		

platform_id	platform_code	platform_type	country	time	latitude	longitude	observation_depth	sst	atmp	precip	sss	ztmp	zsal	slp	windspd	winddir
				UTC	degrees_north	degrees_east		Deg C	Deg C	mm	1	Deg C		hPa	m/s	Deg true
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T00:00:00Z	59.02	21.46	0.0					17.5	6.63			
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T00:01:00Z	59.03	21.46	0.0					17.5	6.62			
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T00:02:00Z	59.03	21.47	0.0					17.5	6.62			
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T00:03:00Z	59.03	21.47	0.0					17.4	6.62			
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T00:04:00Z	59.03	21.48	0.0					17.4	6.62			
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T00:05:00Z	59.04	21.48	0.0					17.3	6.64			
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T00:06:00Z	59.04	21.48	0.0					17.3	6.63			
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T00:07:00Z	59.04	21.49	0.0					17.3	6.64			
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T00:08:00Z	59.05	21.49	0.0					17.3	6.64			
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T00:09:00Z	59.05	21.5	0.0					17.2	6.64			
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T00:10:00Z	59.05	21.5	0.0					17.2	6.64			
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T00:11:00Z	59.05	21.51	0.0					17.1	6.64			
6.635693855E9	OJMI	SHIPS (GENERIC)	UNKNOWN	2024-09-25T00:12:00Z	59.05	21.51	0.0					17.1	6.64			

# GTS: Some topics to follow

There is no metadata in OceanOPS regarding Ferrybox

OceanOPS need to create a program group (related to SOOP ?)

Discussion should be tackle at Bologna (SOOP-DATAMEQ)

The use of SOTID should be generalised instead of the CALLSIGN.

A SOTID is related to an instrument contrary to the call-sign



# Topics to be Covered

- In Situ TAC Organisation and Ferrybox dataflow
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- **Marine Data Store & use of copernicusmarine toolbox**
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# Copernicus Marine In Situ TAC

The screenshot shows the website <https://marine.copernicus.eu/fi/access-data> in a browser. The header includes links for Resurssit, Uutiset, Paina, Tapahtumat, Ota yhteyttä, and a REKISTERÖI button. The main banner displays 'Pääsy tiedot' over a background image of ocean waves. Below the banner, the breadcrumb 'Home > Pääsy tiedot' is visible. The main content area is titled 'Tutustu teratavuihin valtameridataa kaikilla eri käyttäjätasolla.' and contains eight tiles:

TIEDOT	SUUNTAUKSET	ASIAINTUNTEMUS	SEURAA
<b>OCEAN TUOTTEET</b> Ocean-tuoteluettelo, josta voi ladata tai visualisoida tietoja lähes 15 muuttujasta, mukaan lukien hindcast-, virta- ja ennustetiedot.	<b>OCEAN ILMASTOTRENDIT</b> Meren terveyden seuranta. <a href="#">Valtamerten seuraintindikaattorit</a> <a href="#">Ocean Climate Portal</a>	<b>OCEAN VALTION RAPORTTI</b> Laaja vuosittainen analyysi valtameren tilasta lähes 20 vuoden ajalta ja vakavista/huomattavista vuosittaisista tapahtumista.	<b>OCEAN IN SITU</b> Seuraa meressä käytettävää in situ -teknologiaa In Situ TAC Dashboard -taulukon avulla.
EXPLORATION	LAATU	POLITIIKKA	INFOGRAPHICS
<b>OCEAN VISUALISOINTI</b> Sukella 4D-digitaalisiin valtameriin 3 visualisointityökalun avulla aloittelijoille, keskitasoisille ja edistyneille käyttäjille.	<b>TUOTTEEN LAATU DASHBOARD</b> Tutustu kuukausittaisiin päivityksiin tieteellisen suorituskyvyn ja tuotteiden laatutietojen osalta.	<b>OCEAN-TUOTTEET MSFD:LLE</b> Yhdessä EMODnetin kanssa tarjoamme meristrategian puitteiden (MSFD) kannalta olennaisia tietoja.	<b>DATA IN A NUTSHELL</b> Dive into our data offer for the Blue (physical), White (sea ice), and Green (biogeochemical) ocean



# Access to In Situ TAC products

The screenshot displays the Copernicus Marine Data Store interface. The browser address bar shows the URL <https://data.marine.copernicus.eu/products>. The page title is "Copernicus Marine Data Store". Below the title, there is a navigation bar with "Home" and "Marine Data Store" links. The main content area is divided into two columns. The left column contains a "Filters" section with the following options: "FREE-TEXT SEARCH" (with a search box), "FAVOURITES" (with a star icon and count of 1), "TIME RANGE" (with a date picker set to "jj / mm / aaaa" and a "Covering full interval" checkbox), "WITH DEPTH" (with a count of 36), "DEPTH RANGE" (with a range selector), "UNIVERSE" (with a dropdown arrow and counts for "Blue Ocean" (199), "White Ocean" (40), and "Green Ocean" (78)), "MAIN VARIABLES" (with a dropdown arrow and counts for "Carbonate system" (18), "Mixed layer thickness" (16), "Nekton" (1), "Nutrients" (14), "Optics" (41), "Organic carbon" (2), "Oxygen" (24), "Plankton" (73), "Salinity" (37), "Sea ice" (38), "Sea surface height" (51), "Surface density" (2), "Temperature" (91), "Velocity" (53), "Wave" (39), and "Wind" (11)), and "AREA" (with a dropdown arrow and a count of 1/12). The right column displays "Products 284\*" and is divided into two sections: "MOST POPULAR" and "RECENTLY VIEWED". The "MOST POPULAR" section lists four products: "Global Ocean Physics Analysis and Forecast" (GLOBAL\_ANALYSISFORECAST\_P... 001\_024 Models, Global, 0.083° × 0.083° × 50 levels, 1 Jan 2019 to 6 Oct 2024, hourly, daily, ...), "Global Ocean Biogeochemistry Analysis and Forecast" (GLOBAL\_ANALYSISFORECAST\_B... 001\_028 Models, Global, 0.25° × 0.25° × 50 levels, 1 Oct 2021 to 4 Oct 2024, daily, monthly), "Global Ocean Physics Reanalysis" (GLOBAL\_MULTIYEAR\_PHY\_001\_030 Models, Global, 0.083° × 0.083° × 50 levels, 1 Jan 1993 to 25 Jun 2024, daily, monthly), and "Global Ocean Biogeochemistry Analysis and Forecast" (GLOBAL\_ANALYSISFORECAST\_B... 001\_028 Models, Global, 0.25° × 0.25° × 50 levels, 1 Oct 2021 to 4 Oct 2024, daily, monthly). The "RECENTLY VIEWED" section lists two products: "Global Ocean- In-Situ Near-Real-Time Observations" (INSITU\_GLO\_PHYBGCWAV\_DISC... 013\_030 In-situ, Global) and "Global Ocean Biogeochemistry Analysis and Forecast" (GLOBAL\_ANALYSISFORECAST\_B... 001\_028 Models, Global, 0.25° × 0.25° × 50 levels, 1 Oct 2021 to 4 Oct 2024, daily, monthly). Each product listing includes a thumbnail image showing a global map with color-coded data.



# Access to the Marine Data Store

The screenshot displays the web interface of the Marine Data Store. The browser address bar shows the URL: [https://data.marine.copernicus.eu/product/INSITU\\_GLO\\_PHYBGCWAV\\_DISCRETE\\_MYNRT\\_013\\_030/description](https://data.marine.copernicus.eu/product/INSITU_GLO_PHYBGCWAV_DISCRETE_MYNRT_013_030/description). The page has a blue header with navigation links: Home > Marine Data Store > Product.

**Left Sidebar:**

- Description
- Notifications
- Data access
- Contact
- DOCUMENTATION
  - User Manual
  - Quality Information Document
  - Synthesis Quality Overview
  - Licence
  - How to cite
- DOI
  - 10.48670/moi-00036

**Overview Section:**

**Overview**

Global Ocean - near real-time (NRT) in situ quality controlled observations, hourly updated and distributed by INSTAC within 24-48 hours from acquisition in average. Data are collected mainly through global networks (Argo, OceanSites, GOSUD, EGO) and through the GTS

**DOI (product):**  
<https://doi.org/10.48670/moi-00036>

**Sea water temperature visualization:**

The visualization shows a global map of sea water temperature. A color scale at the top ranges from -20 to 20°C. The map displays data points from various sources: CTD, Drifter, Ferrybox, Glider, Mooring, Profiler, Sea mammal, Tide gauge, Thermosalinometer, and XBT. A vertical slider on the right allows filtering data by depth, ranging from -5,000 to +10,000 meters. A horizontal timeline at the bottom shows the period from June 2024 to November. A 'Settings' icon is visible on the map.

**Bottom Bar:** Explore in MyOcean Pro

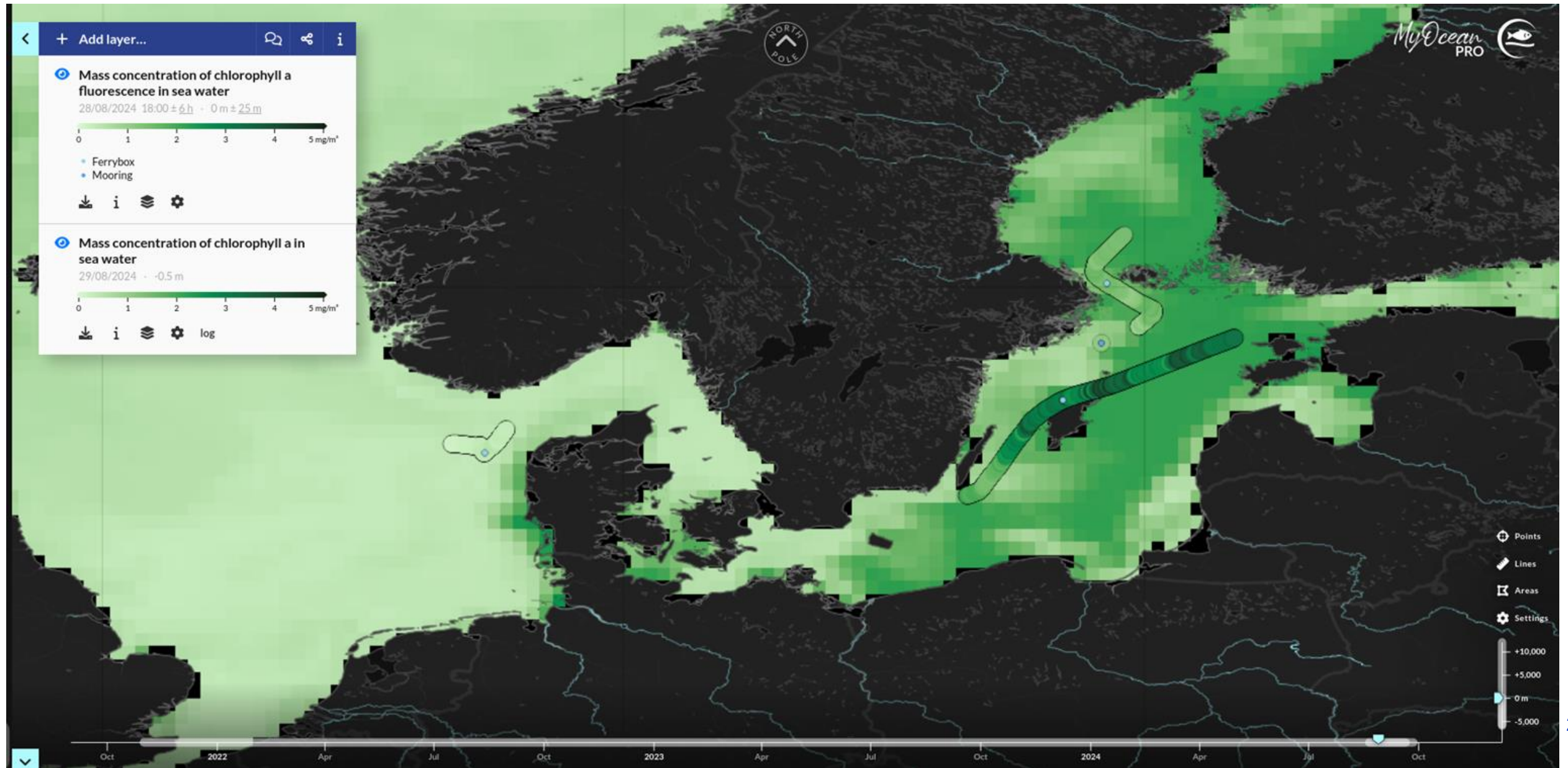


# Browse Ferrybox files

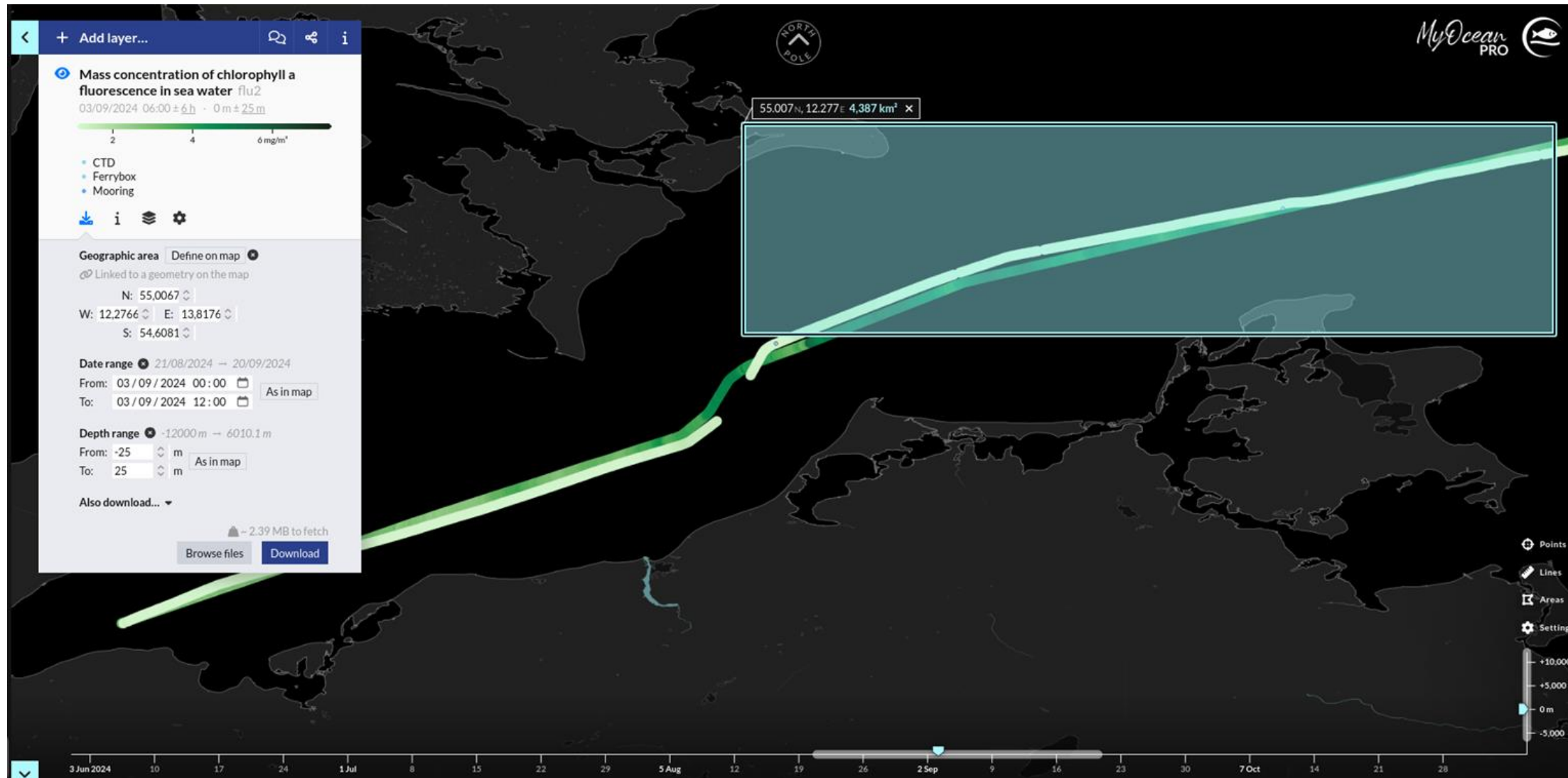
🏠 / INSITU\_GLO\_PHYBGCWAV\_DISCRETE\_MYNRT\_013\_030 / cmems\_obs-ins\_glo\_phybgcwav\_mynrt\_na\_irr / history / **FB**

Select all	Clear all		Download
<input type="checkbox"/>		AR_TS_FB_58S5.nc	13.53 MB 03/09/2024
<input type="checkbox"/>		AR_TS_FB_LAOU7.nc	2.91 MB 07/07/2024
<input type="checkbox"/>		AR_TS_FB_LLVT.nc	12.81 MB 07/07/2024
<input type="checkbox"/>		AR_TS_FB_LMSD.nc	28.43 MB 07/07/2024
<input type="checkbox"/>		AR_TS_FB_Statsraad-Lehmkuhl.nc	1.56 MB 07/07/2024
<input type="checkbox"/>		BO_TS_FB_Ale_2019.nc	618.25 kB 18/06/2024
<input type="checkbox"/>		BO_TS_FB_Ale_2020.nc	325.54 kB 18/06/2024
<input type="checkbox"/>		BO_TS_FB_Ale_2021.nc	583.81 kB 18/06/2024
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<input type="checkbox"/>		BO_TS_FB_Atle_2020.nc	216.92 kB 18/06/2024
<input type="checkbox"/>		BO_TS_FB_Atle_2021.nc	735.04 kB 18/06/2024
<input type="checkbox"/>		BO_TS_FB_Atle_2022.nc	664.65 kB 18/06/2024
<input type="checkbox"/>		BO_TS_FB_Atle_2023.nc	893 kB 18/06/2024
<input type="checkbox"/>		BO_TS_FB_Atle_2024.nc	727.34 kB 20/09/2024
<input type="checkbox"/>		BO_TS_FB_BalticQueen_2015.nc	786.87 kB 18/06/2024
<input type="checkbox"/>		BO_TS_FB_BalticQueen_2017.nc	266.83 kB 18/06/2024
<input type="checkbox"/>		BO_TS_FB_BalticQueen_2018.nc	219.24 kB 18/06/2024

# View data in the MyOcean Viewer

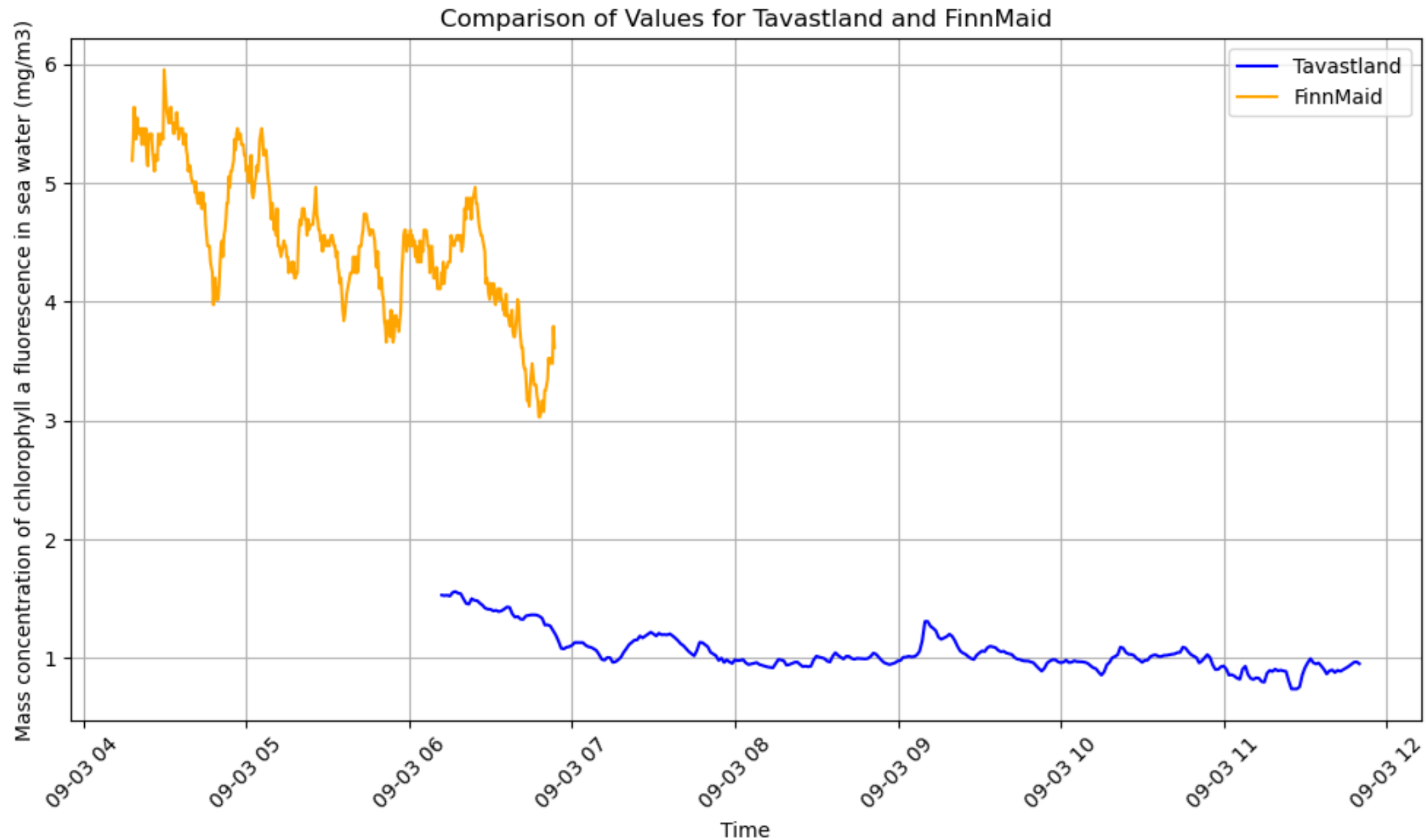


# Download and compare data





# Download and compare data





# Download data using copernicus toolbox

```
copernicusmarine get --request-file request-ferrybox.json
```

```
{
  "dataset_id": "cmems_obs-ins_glo_phybgcwav_mynrt_na_irr",
  "dataset_version": null,
  "dataset_part": "latest",
  "no_directories": false,
  "filter": "*TS_FB*",
  "regex": null,
  "output_directory": "copernicusmarine_data",
  "show_outputnames": true,
  "service": "files",
  "force_download": false,
  "file_list": null,
  "sync": false,
  "sync_delete": false,
  "index_parts": false,
  "disable_progress_bar": false,
  "overwrite_output_data": false,
  "overwrite_metadata_cache": false,
  "no_metadata_cache": false,
  "log_level": "INFO"
}
```

Request only Ferrybox files of the last 30 days





# Download data using copernicus toolbox

```
copernicusmarine get --request-file request-ferrybox.json
```

```
{
  "dataset_id": "cmems_obs-ins_glo_phybgcwav_mynrt_na_irr",
  "dataset_version": null,
  "dataset_part": "history",
  "no_directories": false,
  "filter": "*TS_FB_FinnMaid_*",
  "regex": null,
  "output_directory": "copernicusmarine_data",
  "show_outputnames": true,
  "service": "files",
  "force_download": false,
  "file_list": null,
  "sync": false,
  "sync_delete": false,
  "index_parts": false,
  "disable_progress_bar": false,
  "overwrite_output_data": false,
  "overwrite_metadata_cache": false,
  "no_metadata_cache": false,
  "log_level": "INFO"
}
```

Request all Ferrybox files for FinnMaid ferry



# Plot Sea Water Temperature

```
import xarray as xr
import matplotlib.pyplot as plt

plt.style.use('ggplot')
plt.close()
# Create a figure and axis
plt.figure(figsize=(12, 10))

# Path to the NetCDF files
file_pattern = '/home/ldrouine/Data/Ferrybox/B0_TS_FB_FinnMaid_*.nc'

# Open multiple NetCDF files as a single dataset
ds = xr.open_mfdataset(file_pattern, combine='by_coords', chunks=None)

temp = ds['TEMP']

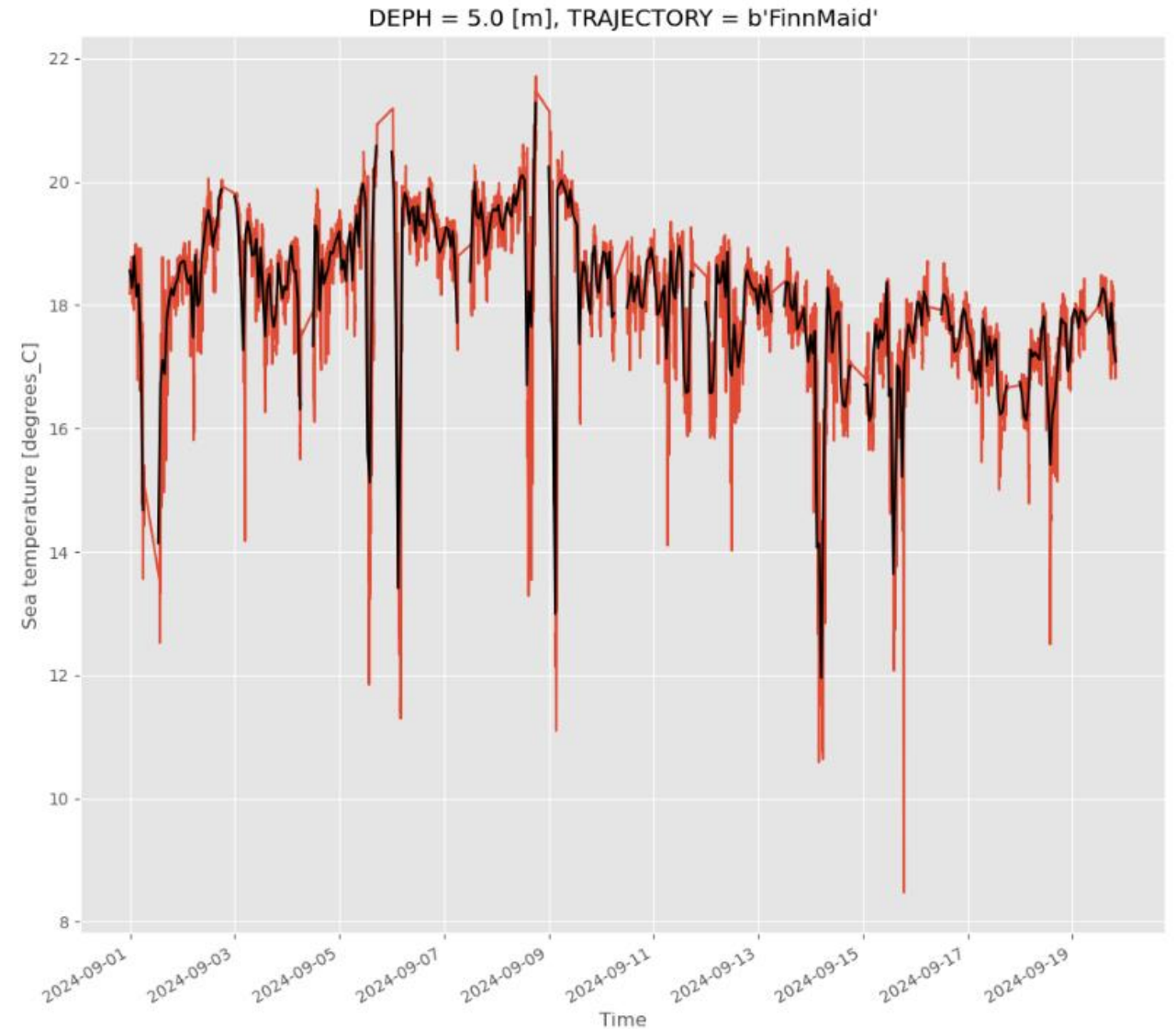
temp_filtered = temp.sel(TIME=slice('2024-09-01', '2024-09-22'))

# Plot TEMP over TIME
#temp.plot()
temp_filtered.plot()
# Calculate and plot the mean temperature over the time range
# Resample the data by hour and compute the mean for each hour
temp_hourly_mean = temp_filtered.resample(TIME='1H').mean()

temp_hourly_std = temp_filtered.resample(TIME='1H').std()

# Plot the hourly mean temperature
plt.plot(temp_hourly_mean['TIME'], temp_hourly_mean, color='black',
         label='Hourly Mean Temperature')

# Show the plot
plt.show()
```



# Plot Sea Water Temperature value on a map

```
import cartopy.crs as ccrs
import cartopy.feature as cfeature

# Select the temperature variable (TEMP) and the coordinates
temp = ds['TEMP']
lat = ds['LATITUDE']
lon = ds['LONGITUDE']

# Filter data between 2024-09-01 and 2024-09-22
start_date = '2024-09-01'
end_date = '2024-09-22'
temp_filtered = temp.sel(TIME=slice(start_date, end_date))
lat_filtered = lat.sel(TIME=slice(start_date, end_date))
lon_filtered = lon.sel(TIME=slice(start_date, end_date))

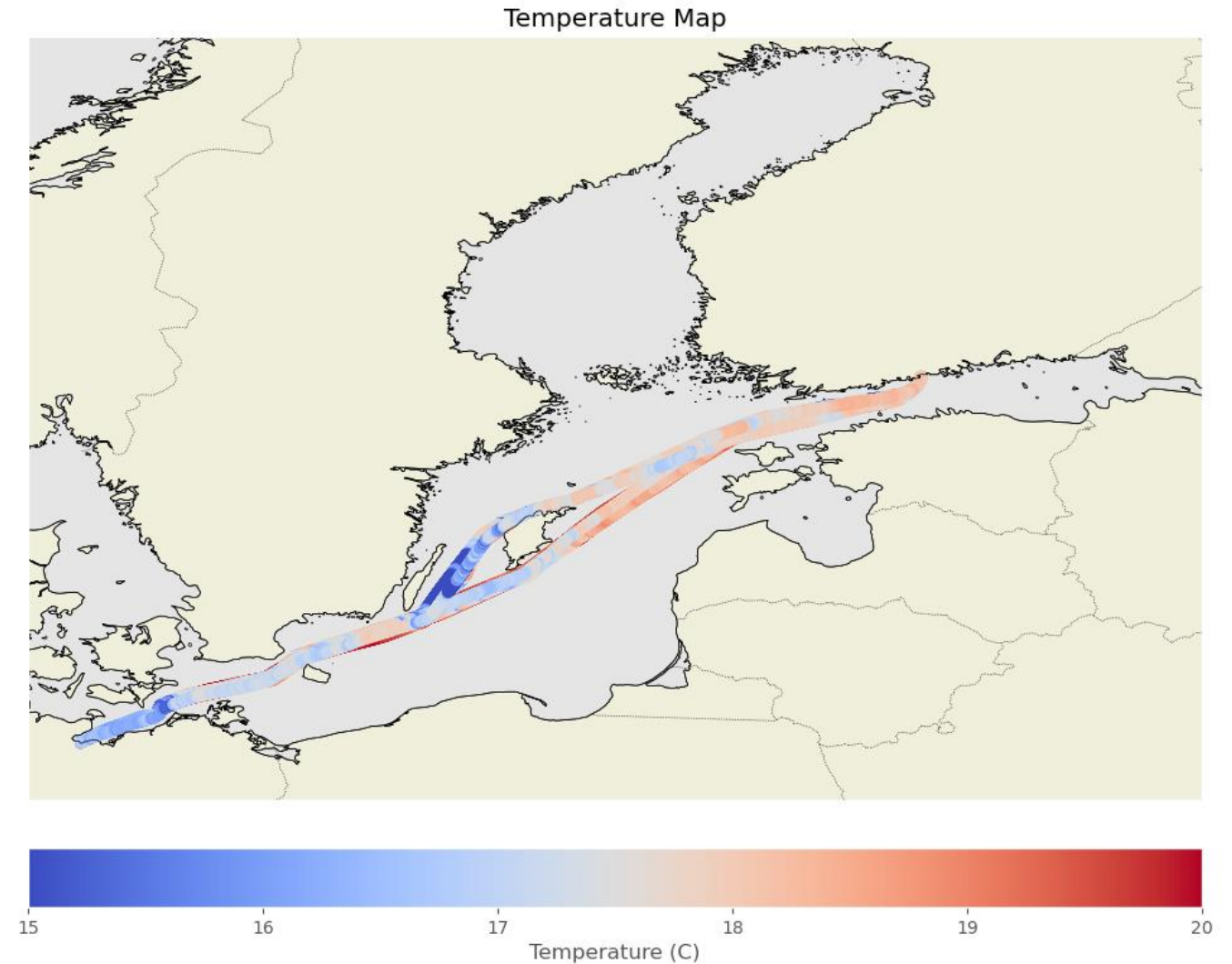
# Create a figure and axis
fig, ax = plt.subplots(figsize=(12, 10),
                        subplot_kw={'projection': ccrs.PlateCarree()})

# Scatter plot the temperature data on the map, using lat/lon as coordinates
sc = ax.scatter(lon_filtered, lat_filtered, c=temp_filtered, cmap='coolwarm',
                transform=ccrs.PlateCarree(), vmin=15, vmax=20)

# Add coastlines and other map features
ax.coastlines()
ax.add_feature(cfeature.BORDERS, linestyle=':')
ax.add_feature(cfeature.LAND, edgecolor='black')
ax.set_extent([10, 30, 53, 66], crs=ccrs.PlateCarree())

# Add a colorbar
cbar = plt.colorbar(sc, ax=ax, orientation='horizontal', pad=0.05)
cbar.set_label('Temperature (C)')

# Show plot
plt.title('Mean Temperature Map')
plt.show()
```





# Topics to be Covered

- In Situ TAC Organisation and Ferrybox dataflow
- Some examples
- Marine Data Store & use of copernicusmarine toolbox
- **Some features that will come soon**
- Acquisition in EEZ



# What is coming next ?

- Subsetting in time and geographic area
- part history (which contains the full time series)
- Possibility to select by platform type, geographical area, provider,...



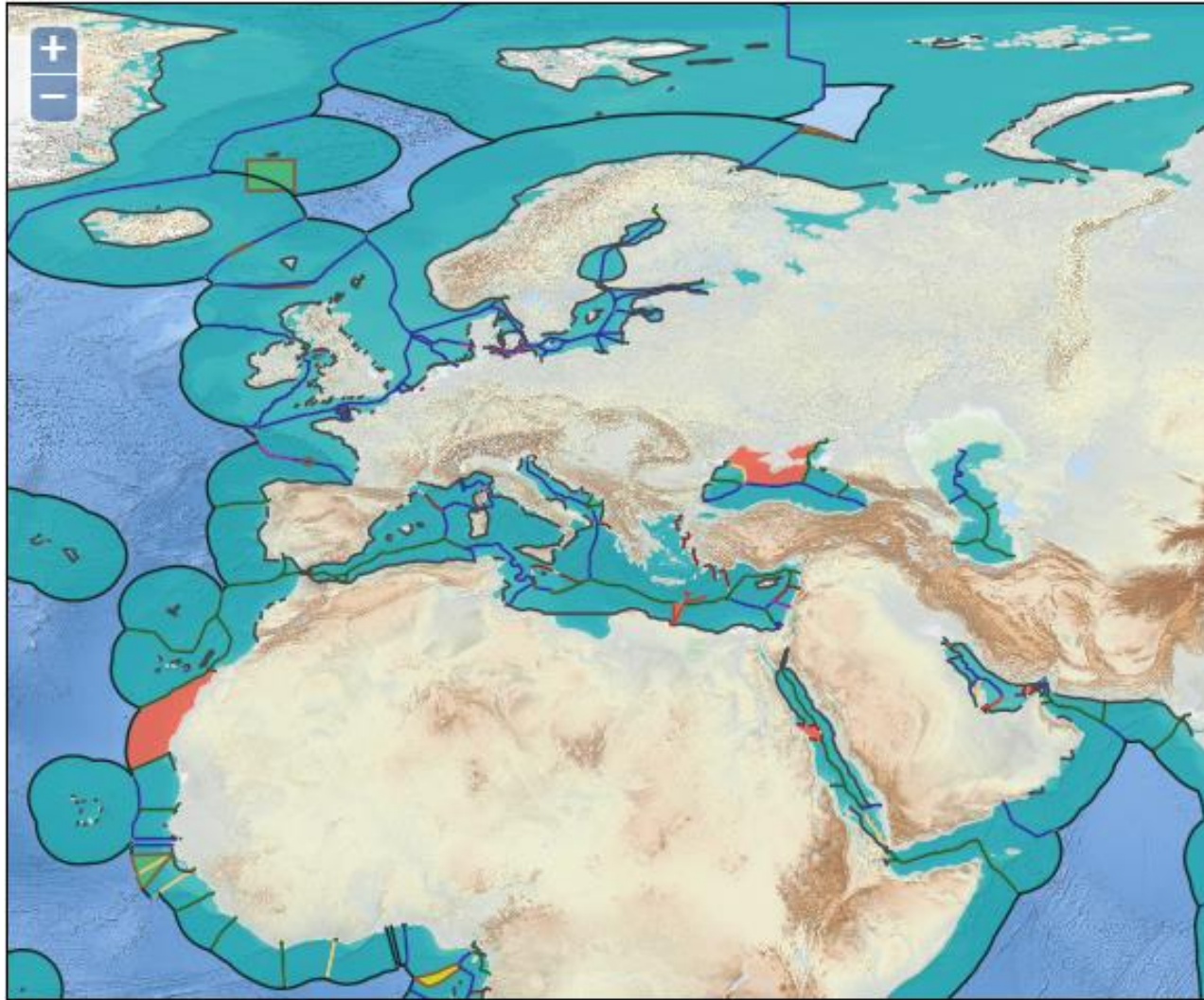
# Topics to be Covered

- In Situ TAC Organisation and Ferrybox dataflow
- Some examples
- Marine Data Store & use of copernicusmarine toolbox
- Some features that will come soon
- **Acquisition in EEZ**





# Acquisition in EEZ



French research vessels decide to stop acquisition of underway data during transits in EEZ



# Extra slide: Issue with acquisition in EEZ

The topic of taking observations in EEZs is being discussed under the Working Group on ocean observations in national jurisdiction under the IOC – which will make a report to Assembly next year (2025)

EC57 Progress

<https://oceanexpert.org/document/30476>

<https://oceanexpert.org/downloadFile/56422>

