



DATA FOR THE UN OCEAN DECADE

A EUROPEAN FOCUS

**How to Access EMODnet Chemistry *in situ* datasets
using Python notebooks - Matteo Mikos, EMODnet Secretariat**



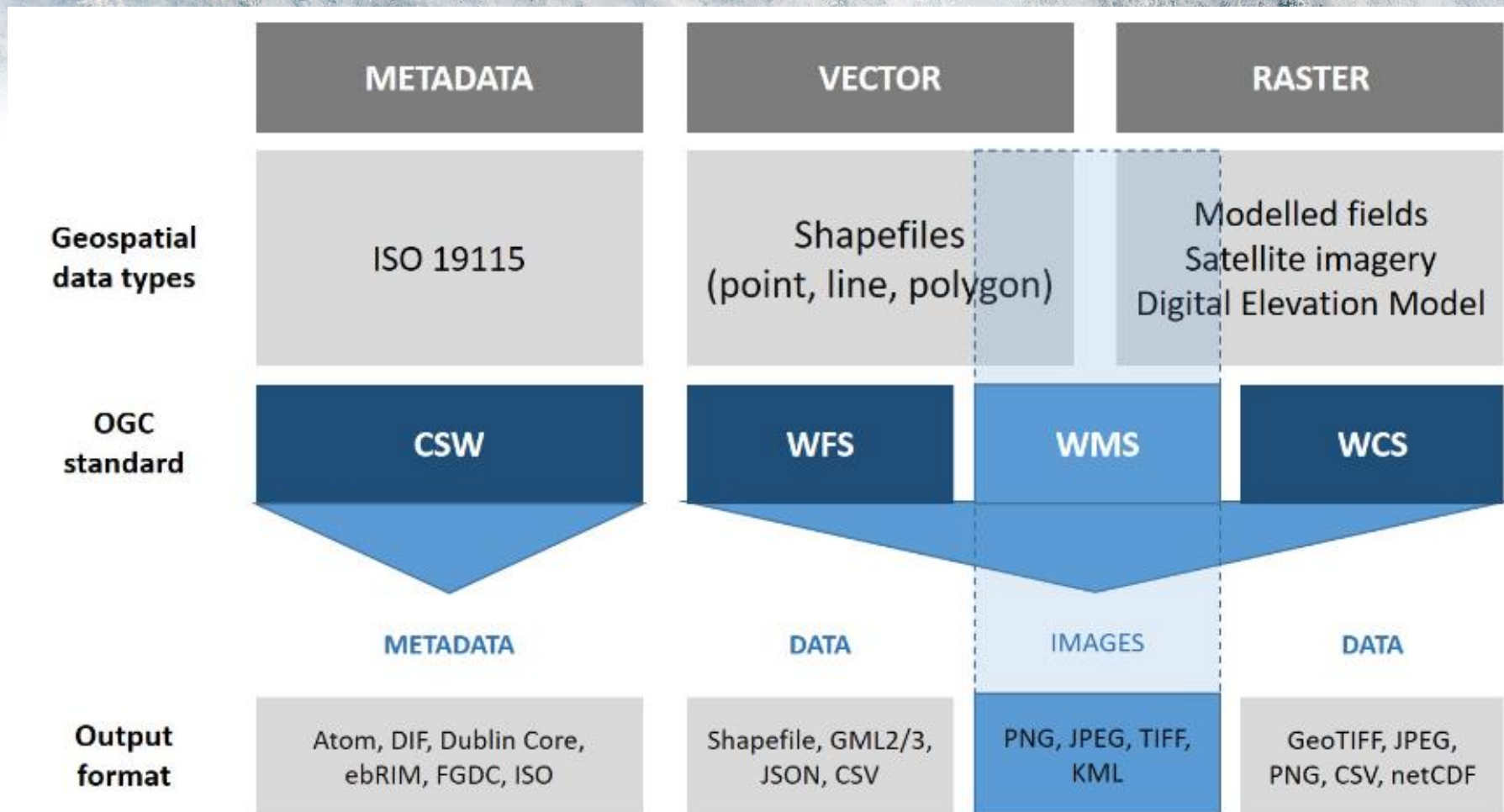
PROGRAMME OF THE
EUROPEAN UNION



In collaboration with
the UN OD Data
Coordination Office



What are OGC Webservices ?



- A variety of standard protocols that use the internet to view, access and retrieve data and metadata.
- The Open Geospatial Consortium (OGC) has defined various different protocols for geospatial data and metadata.

4-Part tutorial on EMODnet OGC Webservices Available on the EMODnet GitHub

Not Specific to a single thematic, Jupyter notebooks organised as follow:

- 1) Search through metadata using the OGC Catalogue Service (CSW)
- 2) Visualize data using OGC Web Mapping Service (WMS)
- 3) Subset and download data using OGC Web Feature and Coverage Services (WFS/WCS)
- 4) Create interactive maps using OGC Web Mapping Tiles Services (WMTS)

LINK: <https://github.com/EMODnet/EMODnet-OGC-Webservices-Python-Tutorial>



Accessing the EMODnet Chemistry Webservices

```
1 from owslib.wfs import WebFeatureService
2 from owslib.wms import WebMapService
3 import geopandas as gpd
4
5 import matplotlib.pyplot as plt
6 import cartopy.crs as ccrs
7 import cartopy
8 import requests
9
```

✓ 1.8s

Python Library For accessing OGC Webservices:
OWSLib - <https://owslib.readthedocs.io/en/latest/>

```
1 wfs_Contaminants = WebFeatureService('https://geoserver.hcmr.gr/geoserver/EMODNET_SHARED/wfs', version = '2.0.0')
2
3 wfs_Litter = WebFeatureService('https://sextant.ifremer.fr/services/wfs/emodnet_chemistry2', version = '2.0.0')
4
5 wfs_CDI = WebFeatureService('https://geo-service.maris.nl/emodnet_chemistry/wfs', version = '2.0.0')
6
```

✓ 3.4s

```
1 wms_Contaminants = WebMapService('https://geoserver.hcmr.gr/geoserver/EMODNET_SHARED/wms')
```

✓ 1.4s



Listing datasets and accessing the metadata

```
1 list(wfs_Contaminants.contents)
[10] ✓ 0.0s

... ['EMODNET_SHARED:tributyltin_concentration_median_values',
'EMODNET_SHARED:TBT_(measurementscount)_All_Years',
'EMODNET_SHARED:TBT(measurmentscount)',
'EMODNET_SHARED:TPT(measurmentscount)',
'EMODNET_SHARED:triphenyltin_concentration_median_values',
'EMODNET_SHARED:TPT_(measurementscount)_All_Years',
'EMODNET_SHARED:cadmium_concentration_median_values',
'EMODNET_SHARED:Cadmium_(measurementscount)_All_Years',
'EMODNET_SHARED:Cadmium(measurementscount)',
'EMODNET_SHARED:percentages_Cadmium_in_marine_organisms',
'EMODNET_SHARED:Lead(measurmentscount)',
'EMODNET_SHARED:lead_concentration_median_values',
'EMODNET_SHARED:Lead_(measurementscount)_All_Years',
'EMODNET_SHARED:percentages_Lead_in_marine_organisms',
'EMODNET_SHARED:Mercury(measurementscount)',
'EMODNET_SHARED:Mercury_(measurementscount)_All_Years',
'EMODNET_SHARED:percentages_Mercury_in_marine_organisms',
'EMODNET_SHARED:mercury_concentration_median_values',
'EMODNET_SHARED:Nickel(measurementscount)',
'EMODNET_SHARED:nickel_concentration_median_values',
'EMODNET_SHARED:Nickel_(measurementscount)_All_Years',
'EMODNET_SHARED:percentages_Nickel_in_marine_organisms',
'EMODNET_SHARED:Anthracene_(measurementscount)_All_Years',
'EMODNET_SHARED:Anthracene(measurementscount)',
'EMODNET_SHARED:anthracene_concentration_median_values',
'EMODNET_SHARED:Benzo_a_pyrene_(measurementscount)_All_Years',
'EMODNET_SHARED:Benzo(a)pyrene(measurementscount)',
'EMODNET_SHARED:percentages_benzo_a_pyrene_in_marine_organisms',
'EMODNET_SHARED:benzo_a_pyrene_concentration_median_values',
'EMODNET_SHARED:Fluoranthene_measurements_count',
```

```
1 # Access the metadata URLs of the dataset
2 metadata_urls = wfs_Contaminants.contents[dataset].metadataUrls
3
4 # Print the metadata URLs
5 if metadata_urls:
6     for url in metadata_urls:
7         print(f"Metadata URL: {url['url']}")
8 else:
9     print(f"No metadata URLs found for dataset {dataset}")
[17] ✓ 0.0s

... Metadata URL: https://emodnet.ec.europa.eu/geonetwork/srv/eng/catalog.se
Metadata URL: https://sextant.ifremer.fr/geonetwork/srv/fre/csw?request=e10f7d14ab3b&OutputSchema=http://www.isotc211.org/2005/gmd
```

EMODNET_SHARED:nickel_concentration_median_values:

- Aggregated Dataset.
- Median values of Nickel concentrations.
- POINT dataset of all sampling stations across European seas.
- Metadata accessible through the EMODnet catalogue.

Loading the data in a GeoDataFrame

```
1 # Subset data with a bounding box  
2 response = wfs_Contaminants.getfeature(typoname=dataset,  
3 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  
4 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  
5 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  
6 # Write it to a GeoJson file  
7 with open(f'data/{dataset.replace(":", "_")}.json', 'wb') as outfile:  
8     outfile.write(response.read())  
9 response.close()  
10  
11 # Read the GeoJson file using GeoPandas  
12 import geopandas as gpd  
13 gdf = gpd.read_file(f'data/{dataset.replace(":", "_")}.json')  
14 gdf  
15
```

[15] ✓ 2.4s

		id	Longitude	Latitude	Median	matrix	geometry
0	nickel_concentration_median_values.1	-8.936	41.745	0.270	Water	POINT (-8.93600 41.74500)	
1	nickel_concentration_median_values.2	-9.021	41.746	0.317	Water	POINT (-9.02100 41.74600)	
2	nickel_concentration_median_values.3	-9.052	41.642	0.389	Water	POINT (-9.05200 41.64200)	
3	nickel_concentration_median_values.4	-8.966	41.644	0.362	Water	POINT (-8.96600 41.64400)	
4	nickel_concentration_median_values.5	-8.890	41.646	0.445	Water	POINT (-8.89000 41.64600)	
...	...	...	...	...	...	...	
3473	nickel_concentration_median_values.3474	3.554	51.423	18500.000	Sediment	POINT (3.55400 51.42300)	
3474	nickel_concentration_median_values.3475	3.901	51.373	22100.000	Sediment	POINT (3.90100 51.37300)	

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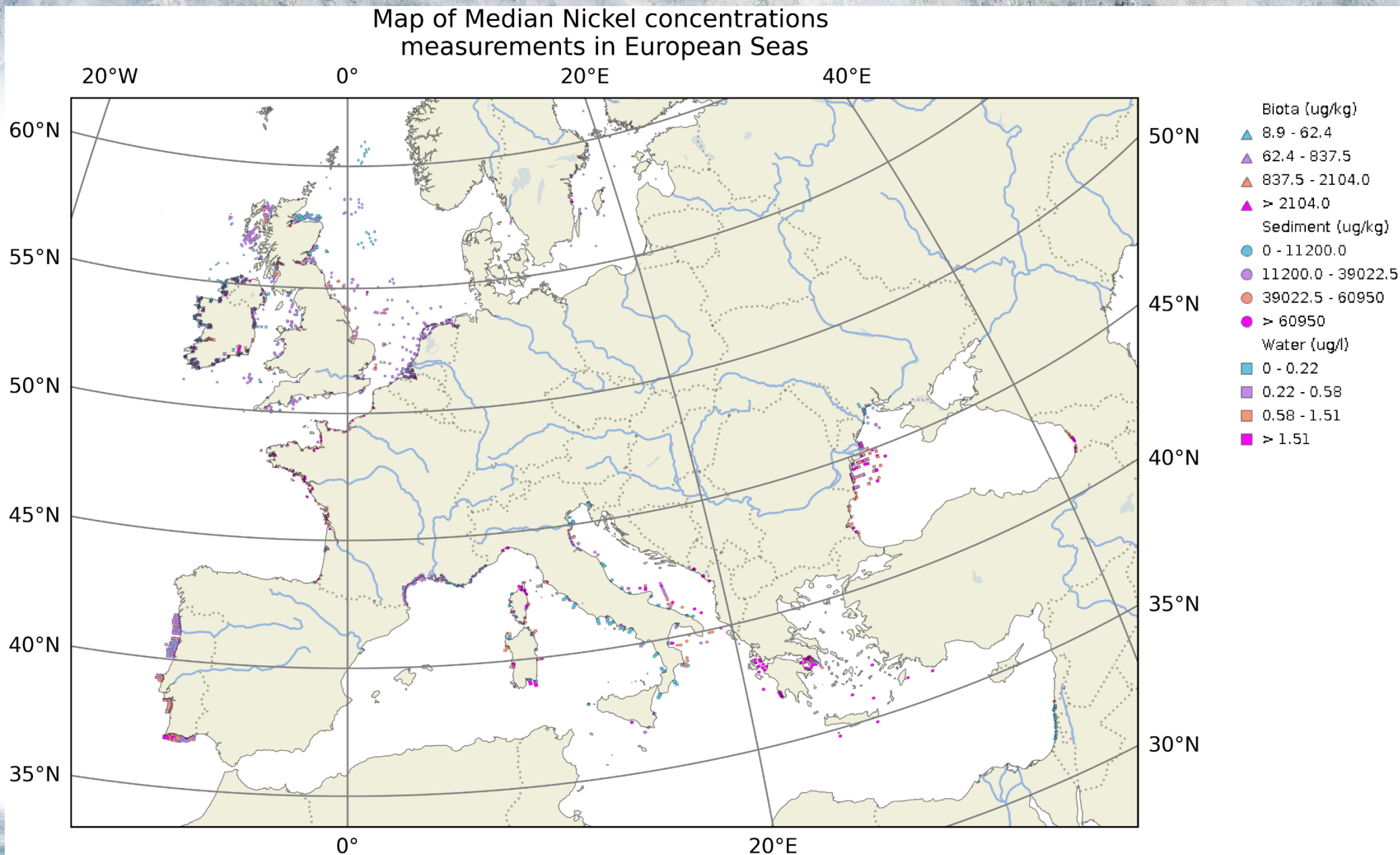
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[15] ✓ 2.4s

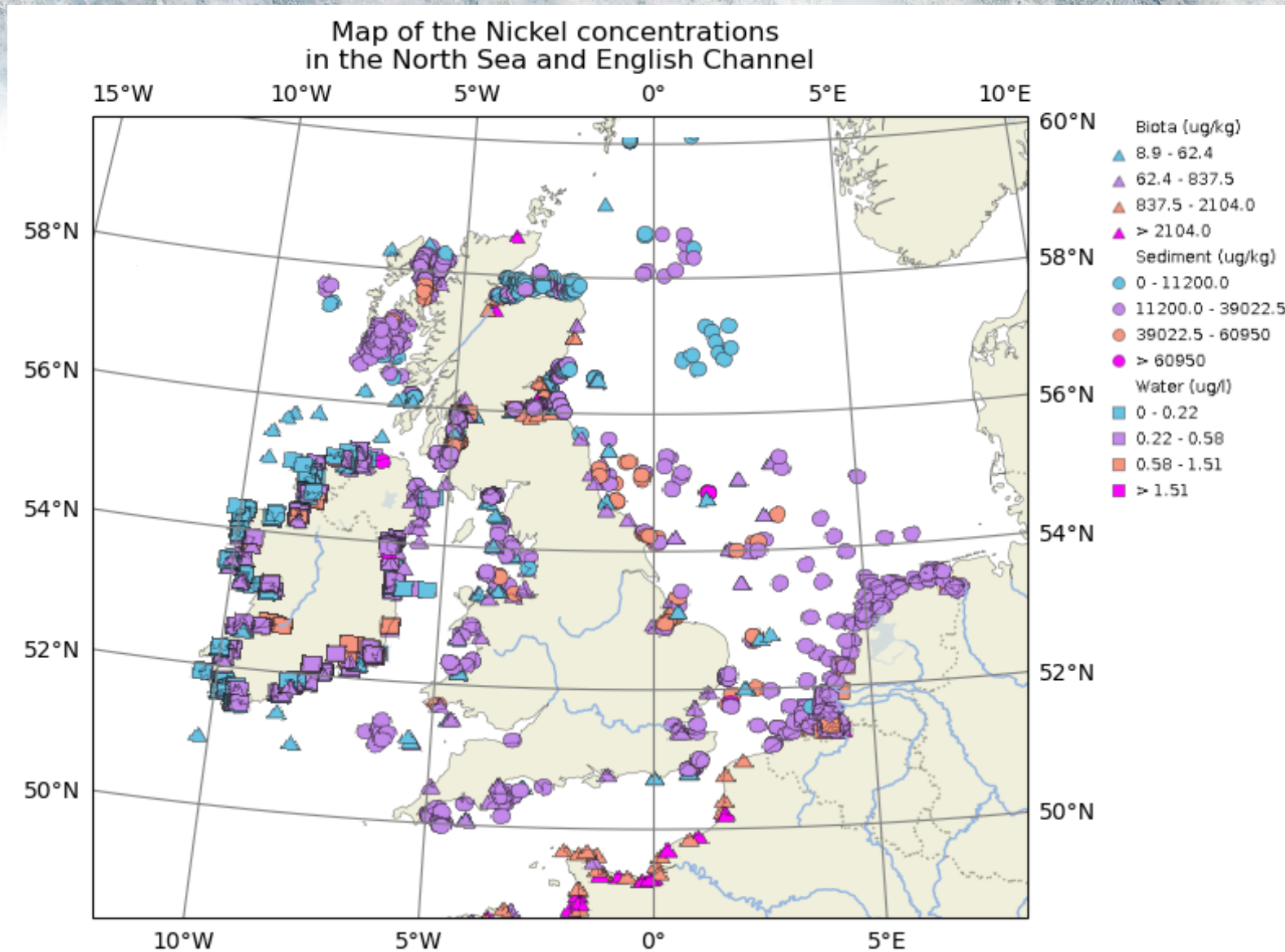
[15] ✓ 2.4s

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Dataset Visualisation – example of contaminants concentrations



Dataset Visualisation – zooming in on the North Sea



#EUdata4OceanDecade



A satellite with solar panels is shown in orbit over a turbulent ocean surface. The satellite is positioned on the left side of the frame, with its solar panels extended. The ocean below is characterized by large, white-capped waves, creating a high-contrast, textured appearance. The text "THANK YOU" is overlaid in the center of the image.

THANK YOU

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