

ESA BalticAIMS project

Presentation 1: Basics of user systems

See the last slide for contact info



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Contents

- BalticAIMS project has provided user interfaces for accessing EO, model and in situ data
 - Tarkka is a browser-based tool developed and operated by Syke since 2017. It is a versatile tool that can visualize many different dataset from Finland and the Baltic Sea area.
 - Xcube viewer is a browser-based tool developed and operated by Brockmann Consult.
- This presentation shows how to use the tools available in the interfaces for various applications
- More details are available in the deliverables published on the project website

Tarkka – Basic tools and navigation

- Open [Tarkka](#)
- Select ‘Map viewer’ in the top left menu. The other sections such as ‘Gallery’ may also include useful information. The ‘Analysis’ section is currently reserved for Finnish authorities.

Tarkka  syke

What's up

Map viewer

Analysis

Gallery

Images

More info

In the Map viewer you can:

The screenshot shows the Tarkka Syke web application interface. At the top, there are navigation tabs: 'What's up', 'Map viewer', 'Analysis', 'Gallery', 'Images', and 'More info'. The 'Map viewer' tab is active. On the left, a sidebar menu is open, showing a search bar with 'Water quality' and a list of data layers: 'True color images (2)', 'Water surface temperature', 'Turbidity', 'Blue-green algae', 'Chlorophyll-a', 'Satellite footprint', 'Regional boundaries', 'Time series', 'Alg@line', and 'Basemaps (1)'. The main map area displays a satellite image of a coastal region with greenish water. A coordinate box at the top left of the map shows 'ETRS-TM35FIN: 376145, 6659905' and 'WGS84: N 60.05756° E 24.77634°'. On the right, a calendar widget is open for August 2020, with the 17th highlighted. Below the calendar is a button for 'Latest true color image' and a 'Cloudless dates' toggle. At the bottom of the map, there is a scale bar showing 1km and 2km. A small text at the bottom right of the map reads 'Contains modified Copernicus Sentinel-2 Data, Syke, USGS/NASA Landiol Program, Syke, © ESRI World Light Grey Base'.

Activate materials from the menu

Use the calendar to change the date

Cloudless dates – tool helps the user to find non-cloudy days from the target area

Navigate the map with your mouse (pan & zoom)

MSP (BalticAIMS)

Turbidity (xcube) (1)

Syke 60m

2016-2024 Sentinel-2 MSI

HROC 100 m, daily

2020-2022 Sentinel-2 MSI

HROC 100 m, monthly

2020-2022 Sentinel-2 MSI

Sea Surface Temperature (xcube)

Land cover

Time series (2)

Dredging dump areas (xcube)

Station sites

WFD water bodies (Finland)

Stations

River monitoring stations

Helsinki City automated stations

GIS data

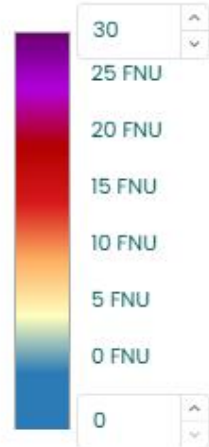
True color images (2)

Basemaps (1)

ETRS-TM35FIN: 376865, 6660737
WGS84: N 60.06524° E 24.78776°

2020-08-17

Turbidity



Regional boundaries and time series regions

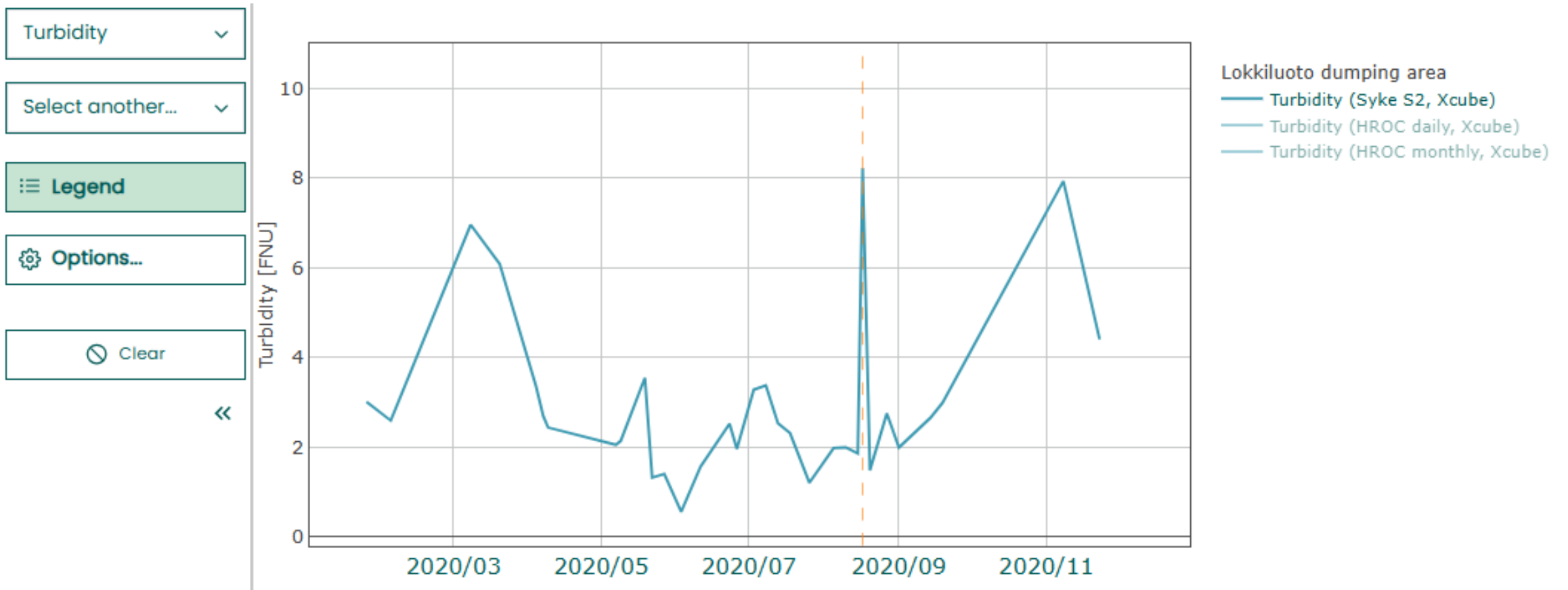
- Reference station areas
- Station sites

If you have activated a biogeophysical parameter you can adjust the color scale

You can activate time series locations (station, areas, waterbodies) to get access to time series plots (next slide)

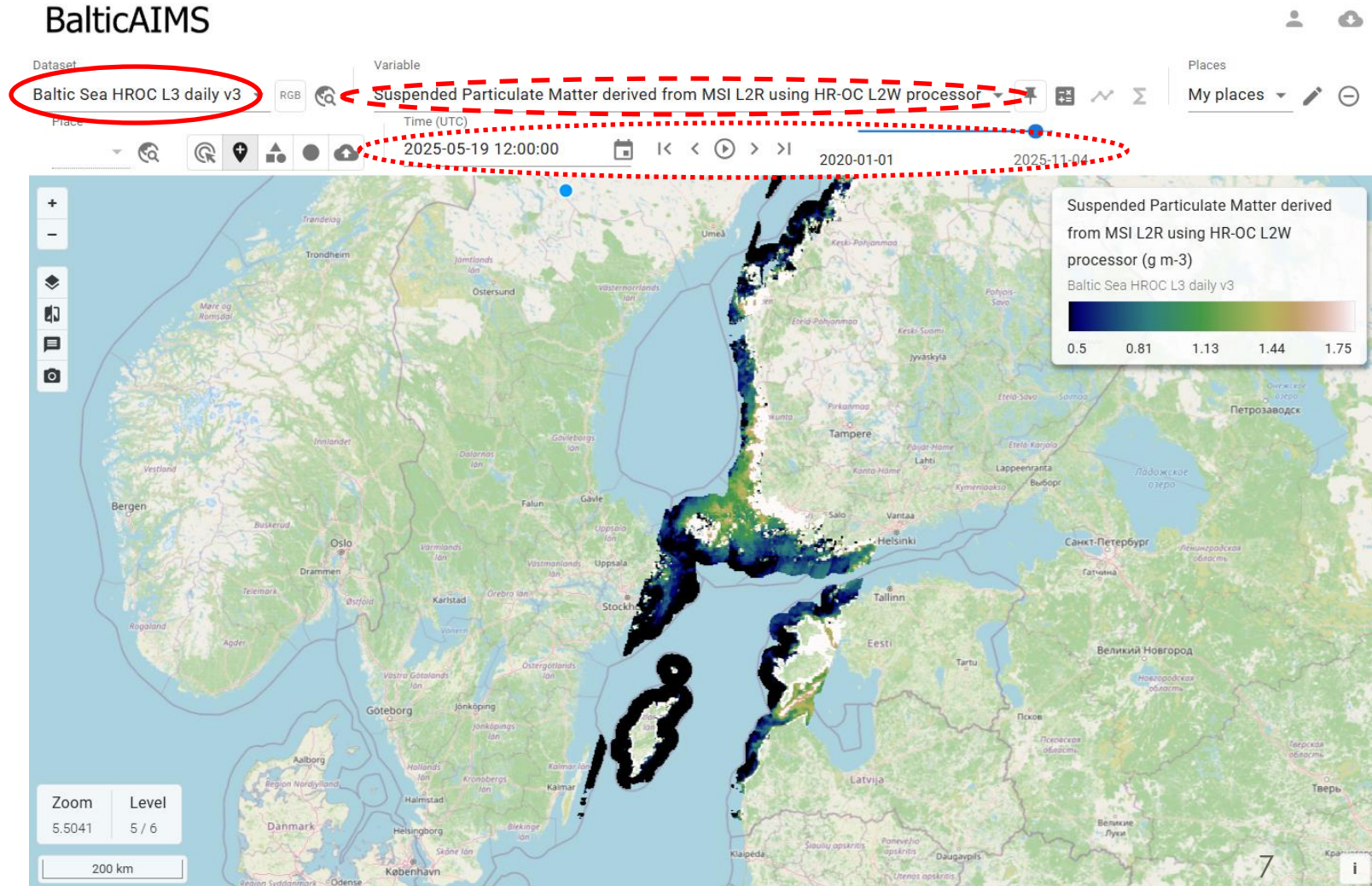


In the time series menu, you can select one or more parameters (e.g. Turbidity) and adjust the axes (time, value). The August 2020 peak of high values in the plot is caused by dumping of dredging material. The high values in spring and fall are caused by river loading.



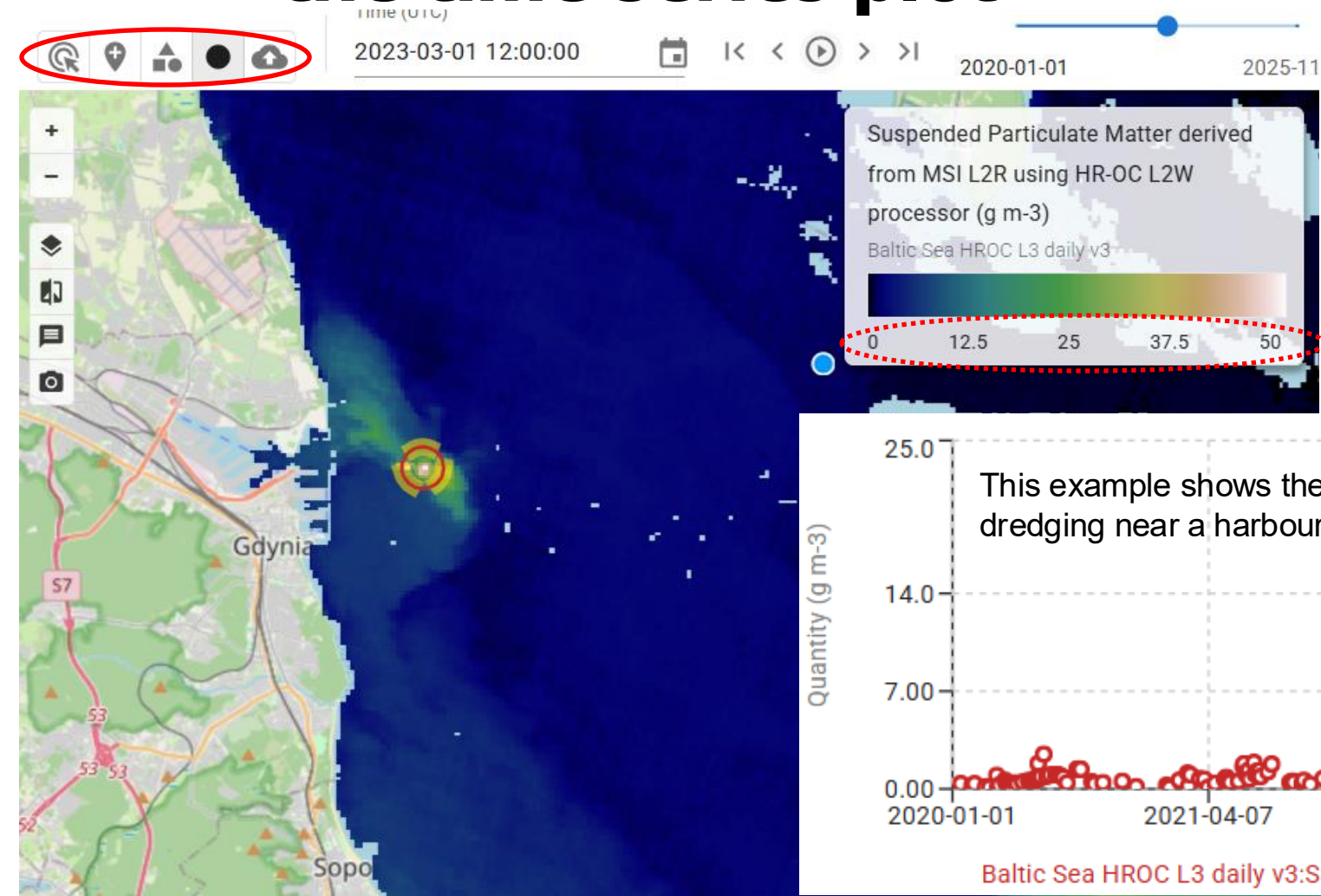
Xcube viewer – Basic tools and navigation

- Open the [Viewer](#)
- Select a 'Dataset' and a 'Variable' in the top left menu.
- The map can be navigated with the mouse (zoom & pan)
- The date can be changed from the calendar, time step tools and the slider



Xcube viewer – Dredging on the map and in the time series plot

- The colour scale of the map can be adjusted
- The user can place a point or draw an area into the map
- The viewer then plots a time series from the data in the area



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Presentation 2: Examples from user stories



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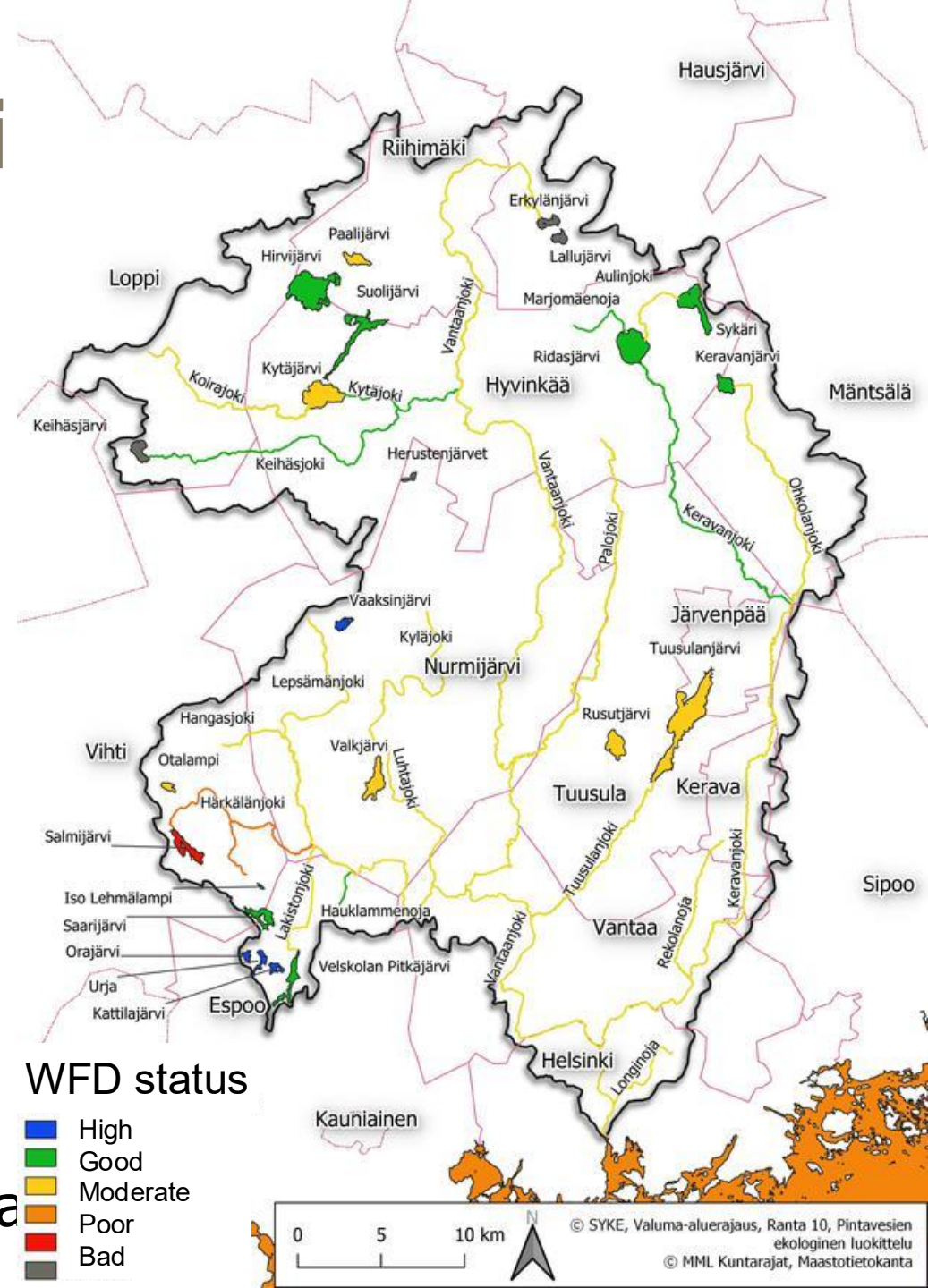
- Based on user needs the BalticAIMS project developed user stories where EO based information is used for various purposes
- The topics include dredging, eutrophication, sediment transport and heatwaves
- The following slides contain examples. Full descriptions are available in
 - [D4.1 Service Operations and Service Chain Performance Report](#)
 - [D4.2 Service Operations and Service Chain Performance Report Update](#)

Tarkka – Analysis part

- The Analysis part of Tarkka contains additional tools for visualizing EO and in situ data: Histograms, time series plots with trend lines (Mann-Kendall trend test) and tables
- It is currently reserved for Finnish environmental authorities and requires a login
- In the following slides we present a user story where monitoring the loading caused by River Vantaanjoki is demonstrated

Use case - River Vantaanjoki

- Discharges into the Gulf of Finland in Helsinki
- Watershed area 1 685 km². Densely populated
- Frequently monitored supersite of [DIWA](#) (Digital Waters) project
- Users want to know if and how the loading from the river is affecting coastal water quality
- Available datasets
 - EO
 - Catchment model
 - In situ (manual sampling and automated stations)



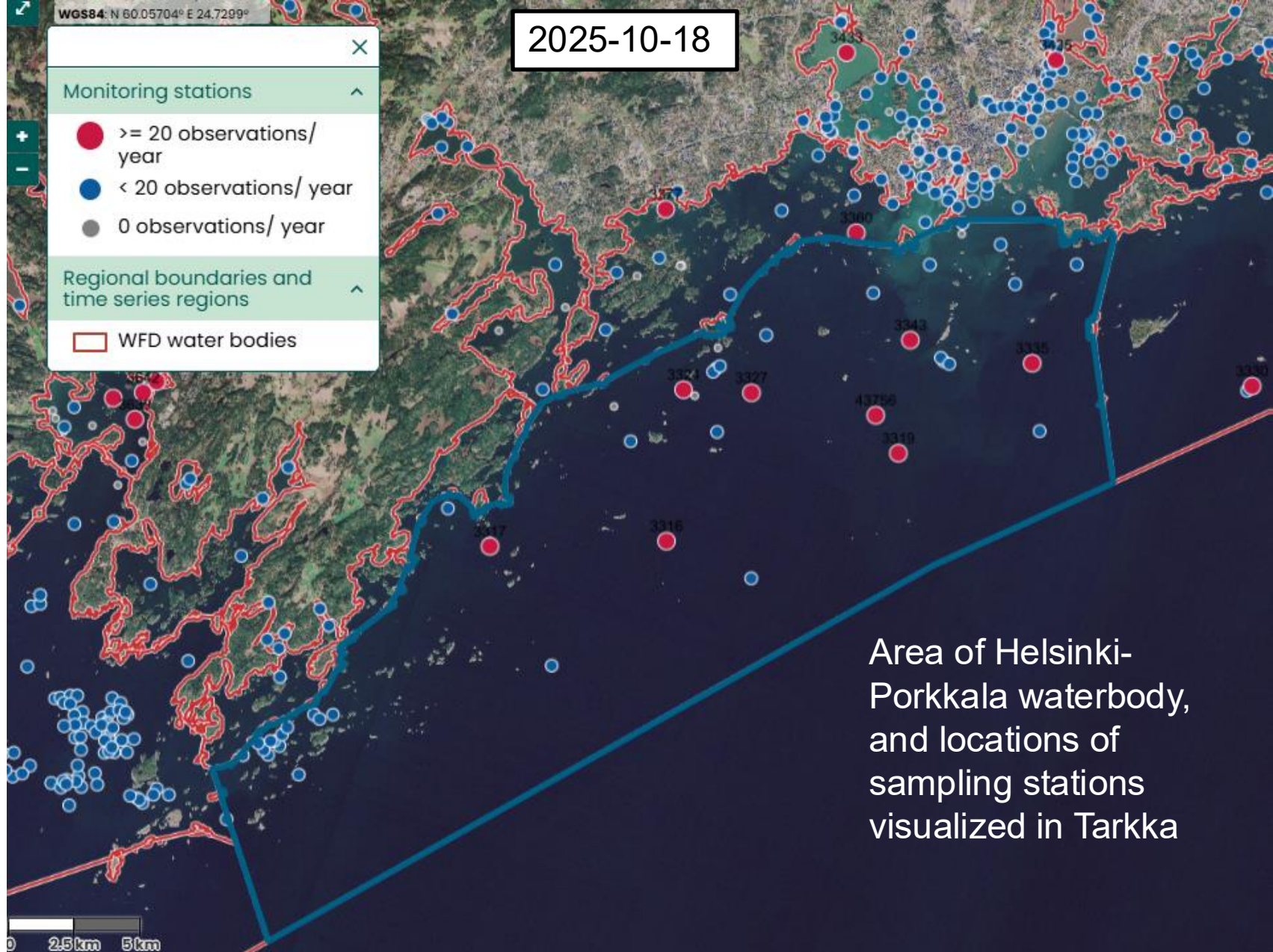
EO – Syke's materials

- HR missions (Sentinel 2 and Landsat 8&9) are used due to the fragmented nature of Finnish coastline
- Processing with C2RCC (turbidity) and C2X (Chl-a, S2 only)
- All valid pixels from the water body are extracted
 - Clouds & shadow, shallow areas etc. are masked
- Results stored in a database
- Linked to Tarkka



Manual in situ samples

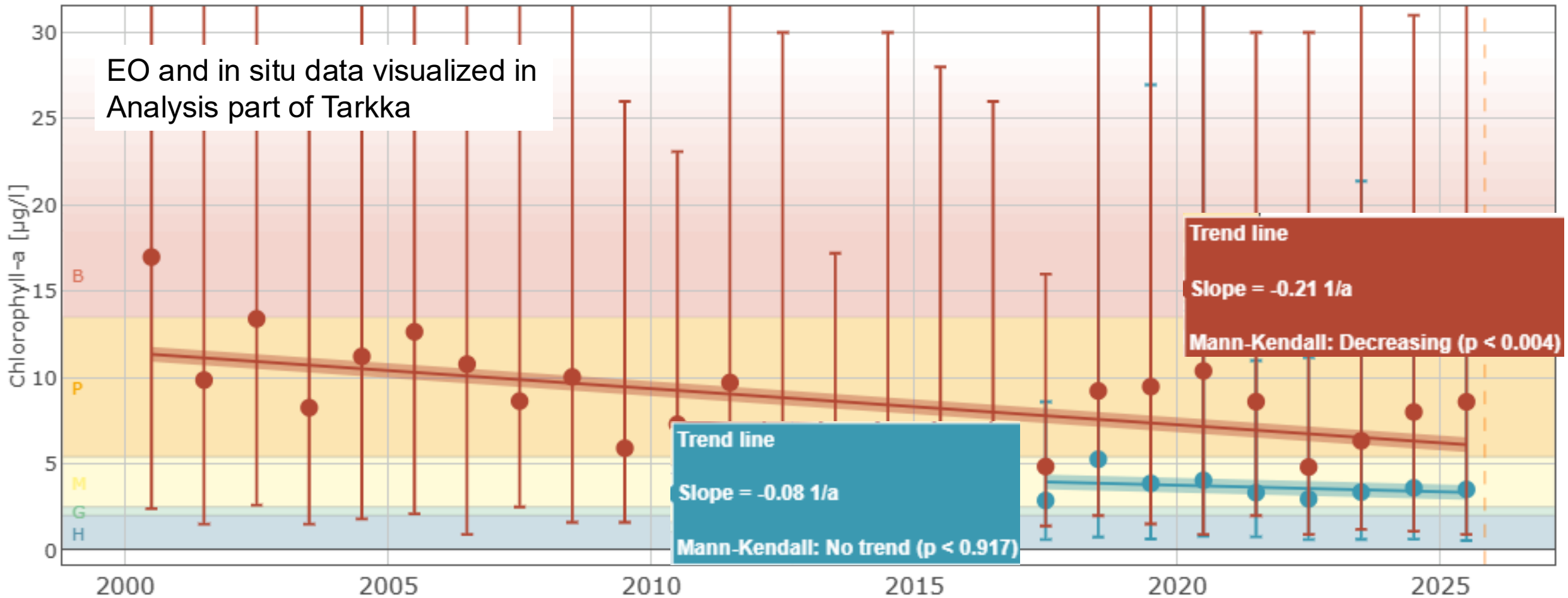
- Monitoring programme data
- Chl-a, turbidity, Secchi disk depth and others
- Many stations within the waterbody
- Observations with varying frequency
- National database VESLA
- Data linked to Tarkka



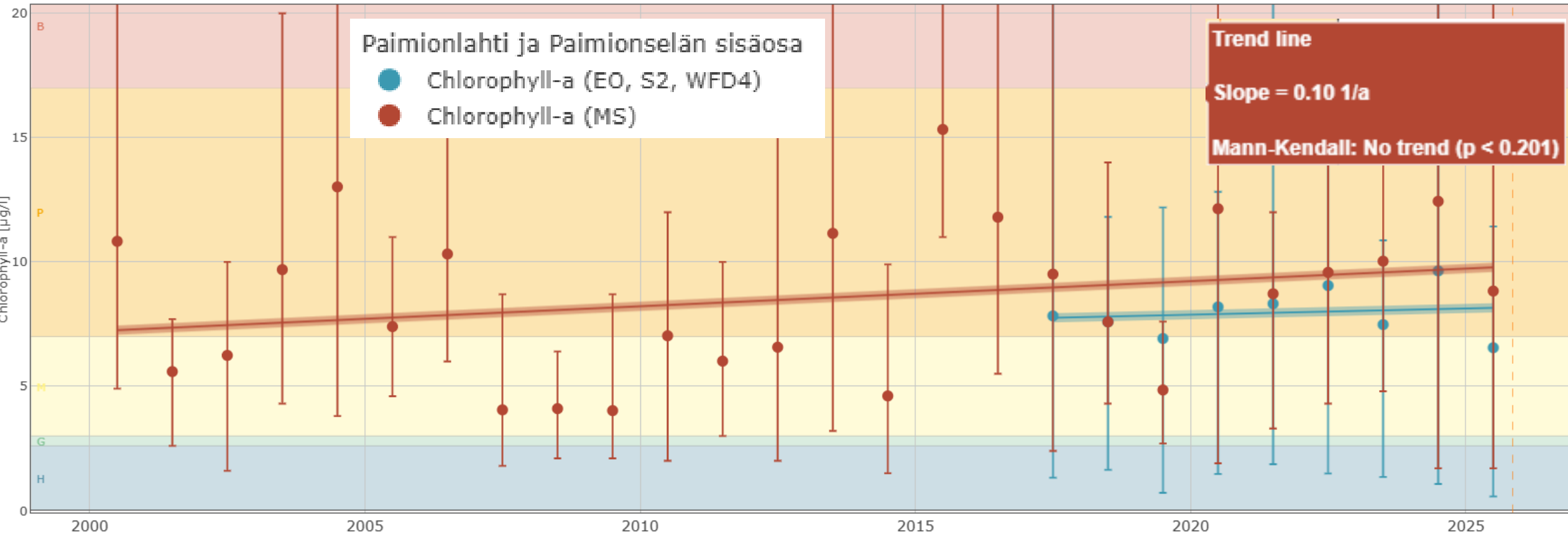
Annual Chl-a averages in the Helsinki-Porkkala waterbody

Helsinki-Porkkala
 ● Chlorophyll-a (EO, S2, WFD4)
 ● Chlorophyll-a (MS)

EO and in situ data visualized in Analysis part of Tarkka



An example from the Analysis part of Tarkka showing trend analysis of Chl-a values in River Paimionjoki in Finland



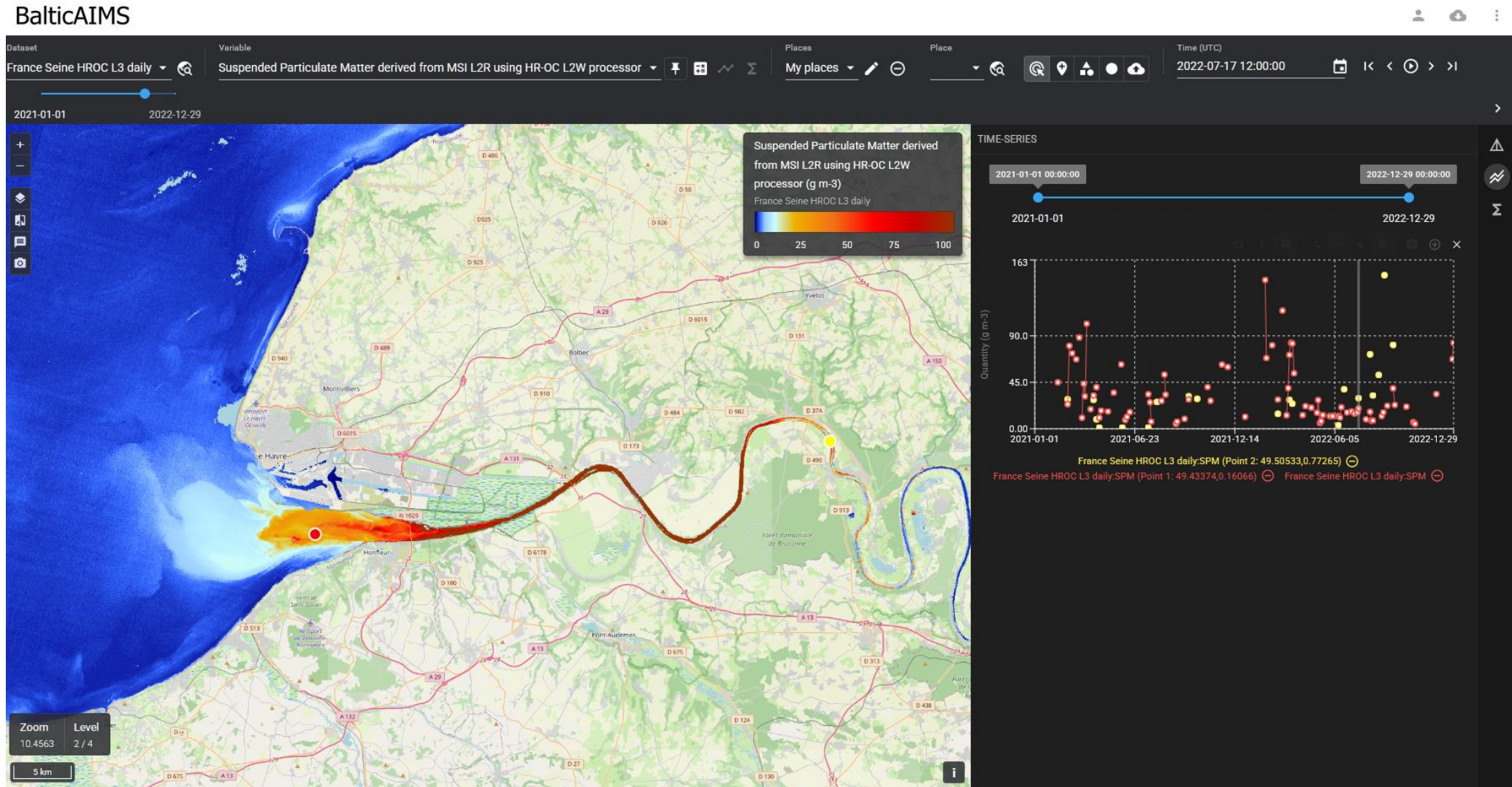
Summary of analysis

- Combining EO and in situ observations allows convenient visualization and analysis of data
- EO values are lower than in situ values. In situ stations are located closer to shore where concentrations tend to be higher, while EO images cover larger areas leading to lower overall values
- A decreasing trend is visible in both datasets, but it is statistically significant only in the in situ data
- The EO time series is still quite short, so this is more a methodology demonstration than a rigorous scientific result

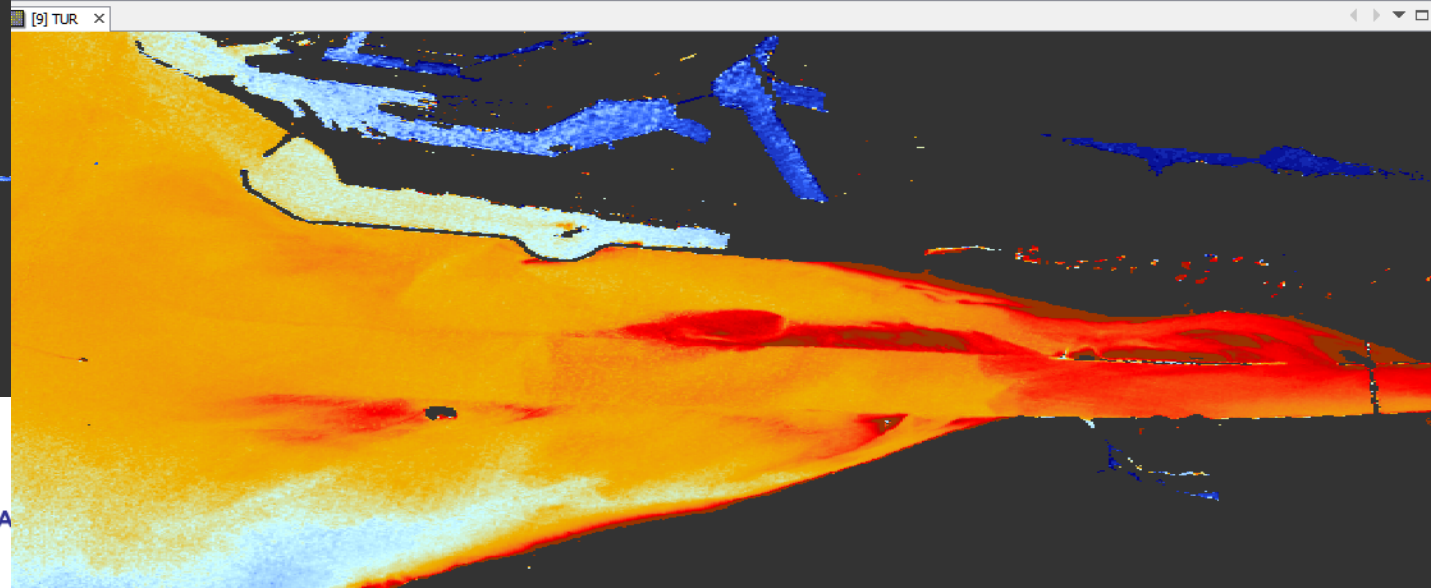
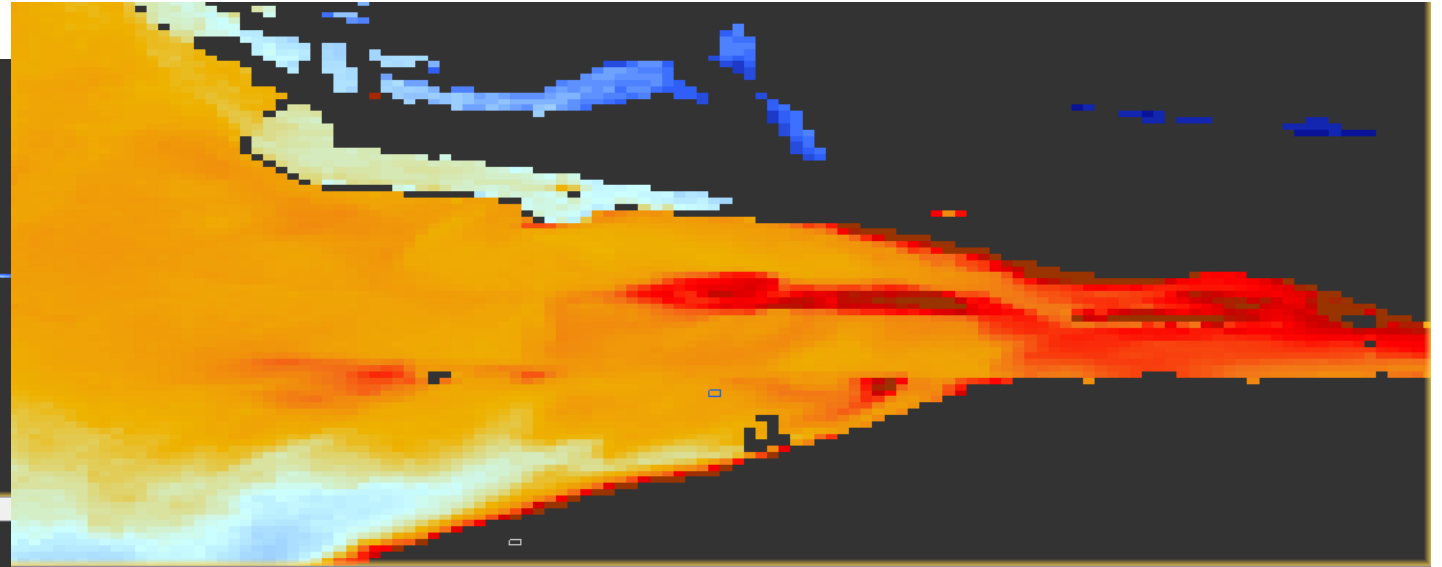
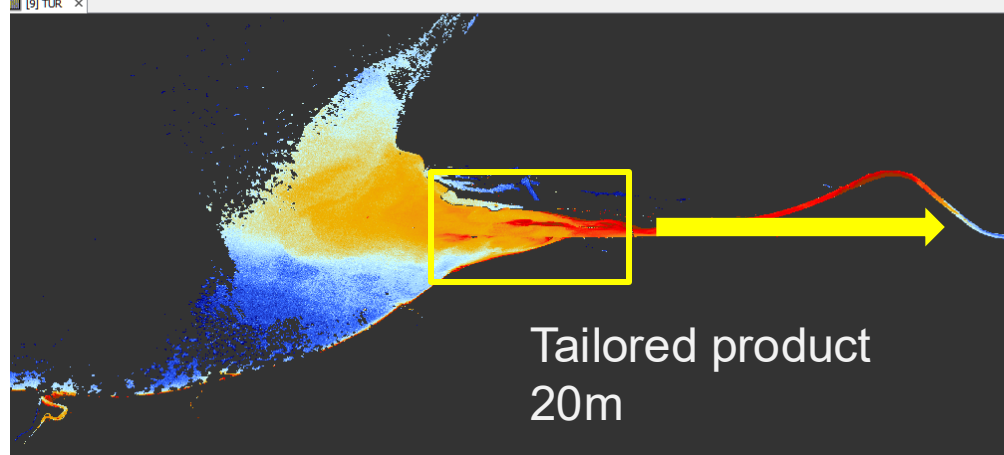
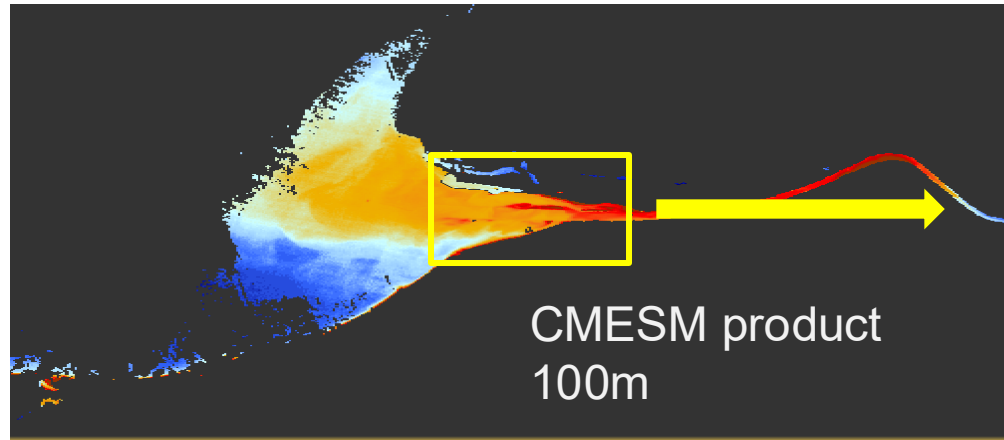
Estuary of River Seine – Visualization of CMEMS HROC data

- Sediment information in the Seine Estuary is needed to investigate the sediment transport in the Land-Sea Interface
- The HROC (coastal products) from the Copernicus Marine Service are too coarse and cover not enough of the Seine river (upstream)
- HROC production but in 20m instead of 100m spatial resolution
- The work is performed in cooperation with the [LandSeaLot](#) project

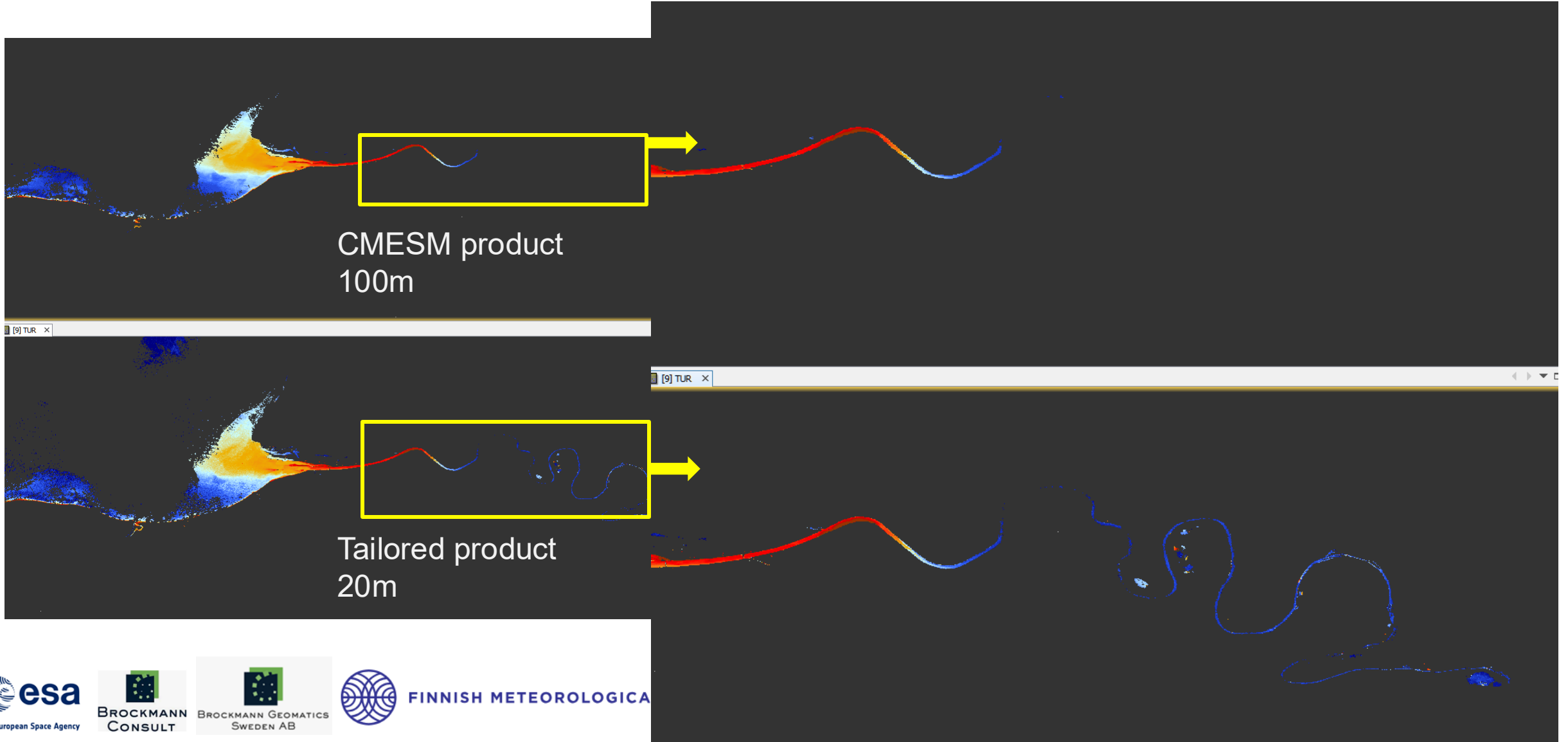
Seine Estuary – in the xcube Viewer



Seine Estuary – spatial resolution



Seine Estuary – spatial extension



Contact info

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