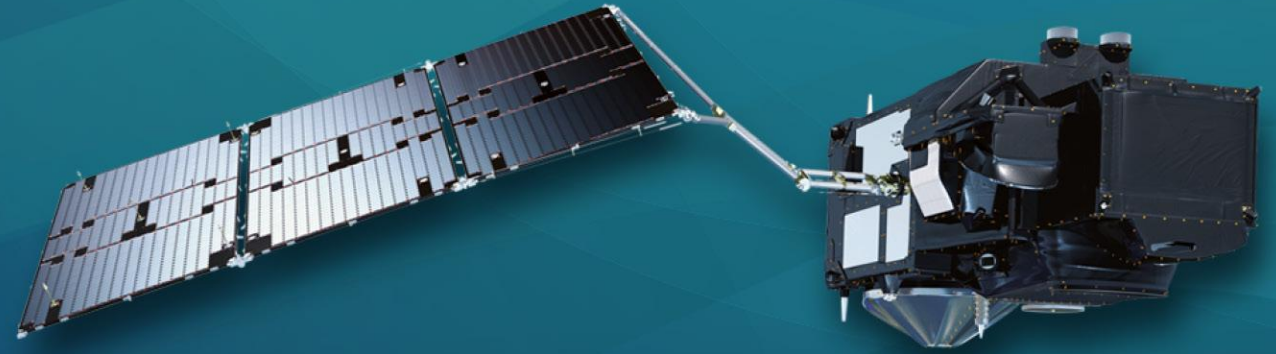




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9th Sentinel-3 Validation Team meeting 2026

30 March–01 April 2026 | ESA–ESRIN | Frascati (Rome), Italy

Development and enhancement of monitoring and Cal/Val tools within the Sci4MaST project

*C. Ribere¹, E. Bodéré², B. Delaveau¹, D. Briand², M. El Hajj¹, J-F. Piollé², J. Sarrau¹, A. Zafiamy¹, N. Lalloué¹, G. Corlett³,
A. Reed³, I. Tomazic³, S. Kabir³*

1. NOVELTIS, France – 2. Ifremer, France – 3. EUMETSAT, Germany

Context & Motivation

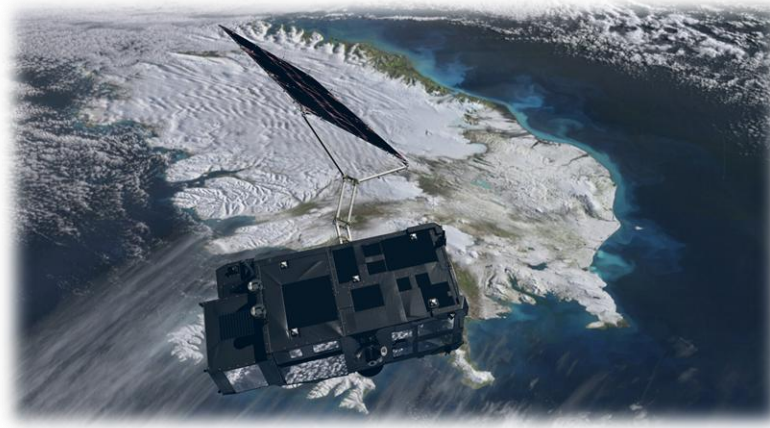
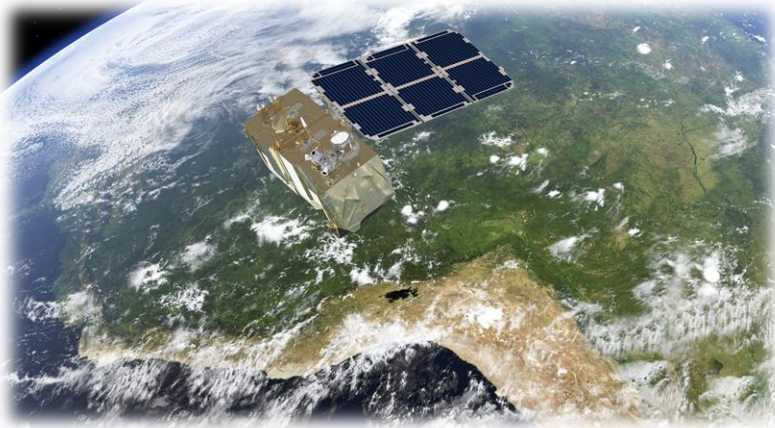


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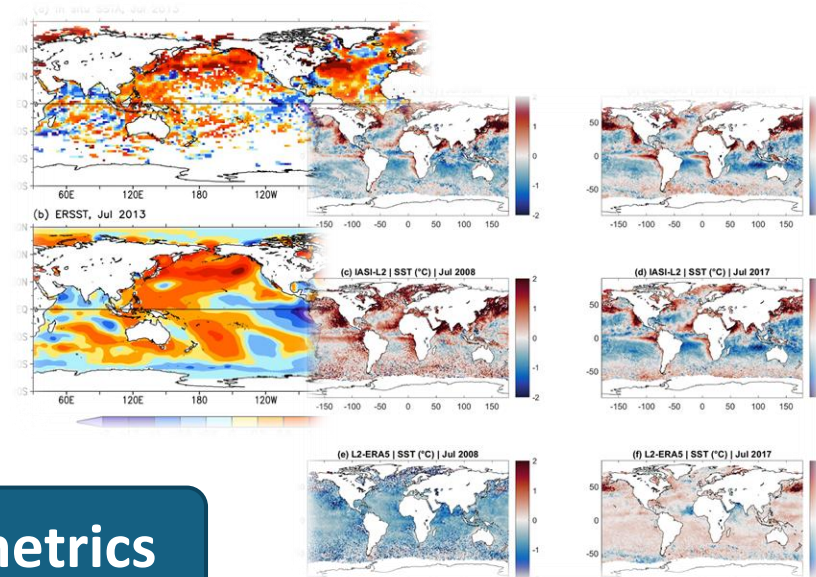


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- Increasing **volume** of satellite and in-situ datasets
- Large volumes of **heterogeneous** datasets
- Continuous **validation** required against in-situ observations
- Need for **operational and reproducible** validation workflows



Transforming large data streams into actionable validation metrics

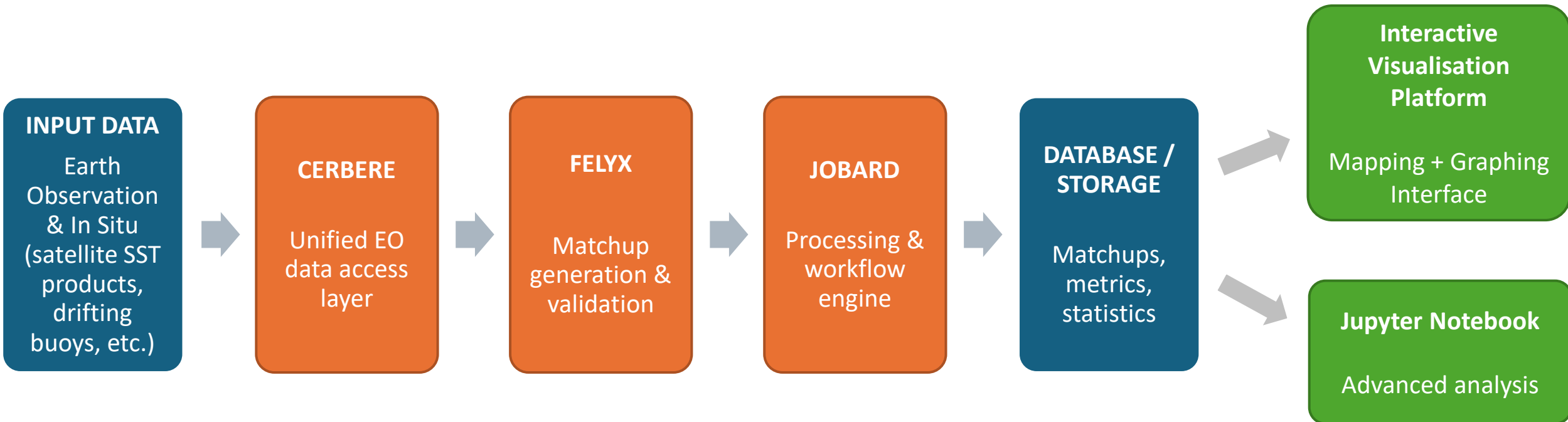
Science for Marine Surface Temperature (**Sci4MaST**)

→ Develop an **integrated ecosystem of tools** to improve Sentinel-3 **SST and IST** products.

1. Improvement to Sentinel-3 SLSTR sea and sea-ice surface temperature **product quality**
2. Improvement to sea and sea-ice surface temperature monitoring and **Cal/Val capability and tools**
3. Coordination and management of the international science team through the **Project Office** of the Group for High Resolution Sea-Surface Temperature



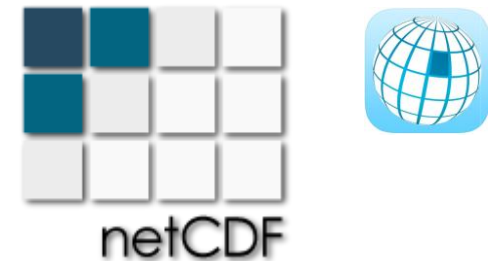
A modular pipeline from data ingestion to scientific exploration



Cerberus – Data accessing

Provides a consistent **interface to access Earth Observation datasets** across different formats

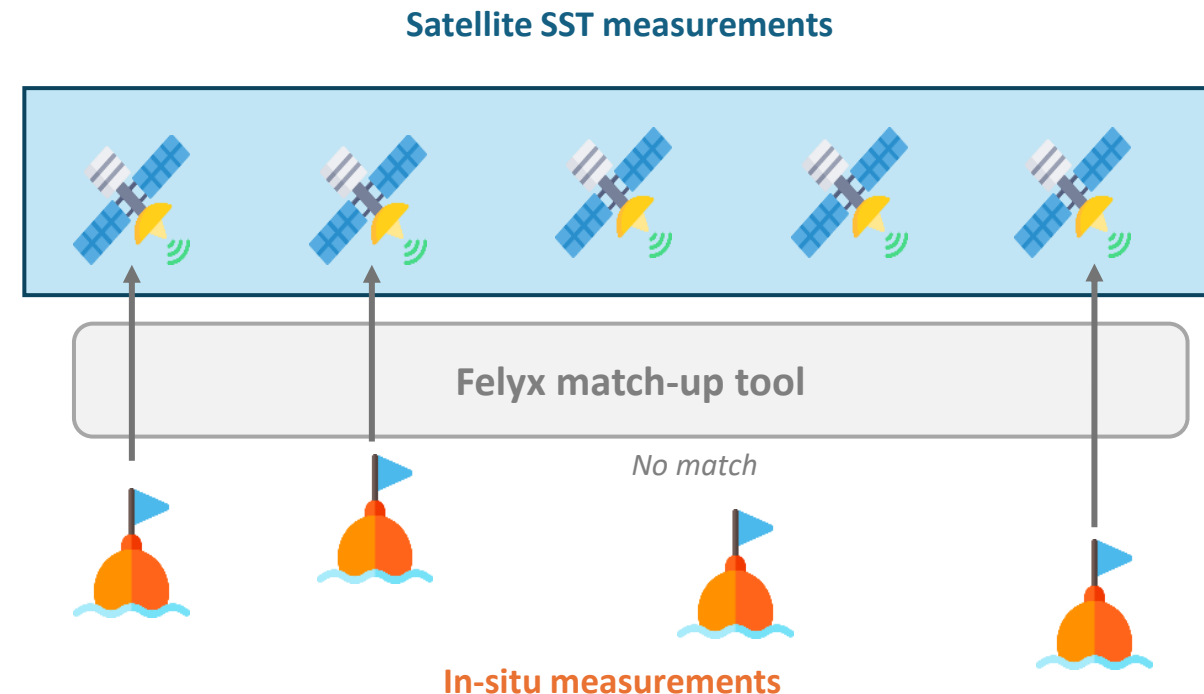
- ✓ Handles Earth Observation datasets in multiple formats
- ✓ Provides consistent access to satellite and in-situ data
- ✓ Returns CF compliant harmonised data structures
- ✓ Typology of observation patterns (grid, swath, time series, trajectory, ...)
- ✓ Simplifies dataset ingestion and manipulation



Felyx – matchup generation and validation

Generate **satellite to in-situ** (moving platforms or calibration sites) **matchups**

- ✓ Used also to find crossovers with moving features such as hurricanes
- ✓ Distributed processing with jobard, input data access with cerbere
- ✓ Compute metrics over extracted matchups
- ✓ Support monitoring of SST products – used in more than 20 projects
- ✓ Full python

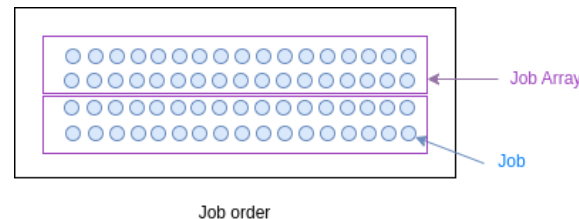


Jobard – data processing framework

Enables **automated and distributed job-array** processing

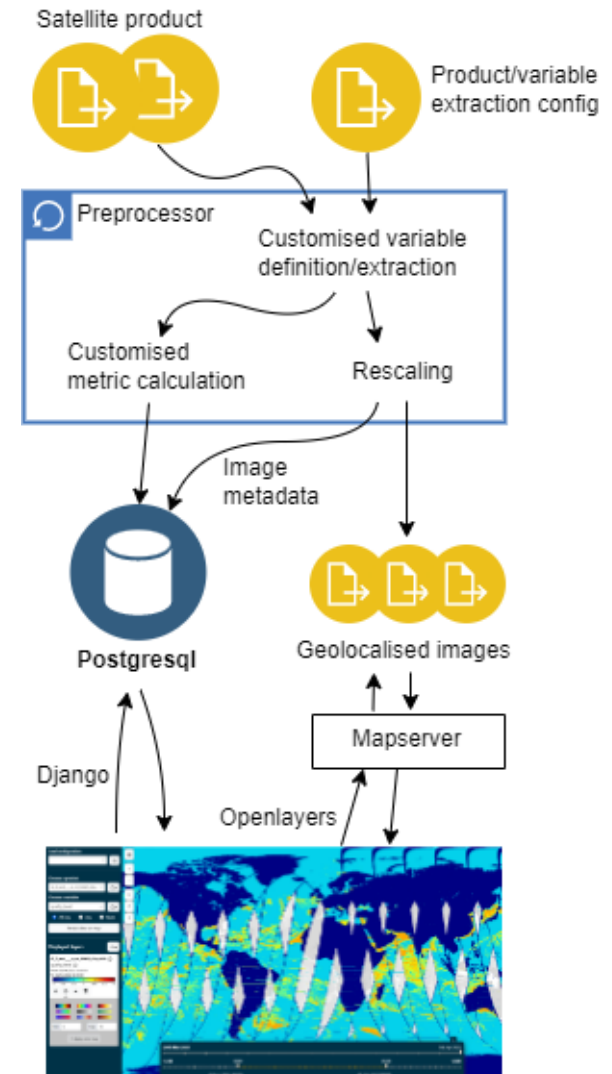
- ✓ Framework for parallel processing (same processor on multiple input)
- ✓ Used for massive reprocessing: distribution of processing tasks over multiple processing nodes, report and monitor
- ✓ Scalable and deployable on many different HPCs and cloud infrastructures through connectors (HTCondor, PBS, SLURM, ...)

- ✓ Full python



Pre-processor

- Generic (not only for SST/IST and/or S3 and/or L2)
 - (L1/L2/L3/L4 + in-situ/matchups + model + tracks)
- Configurable mapping and time series analysis (yaml)
 - Product extraction configuration, differences, filtering
 - Customized variable definition and metrics calculation
- Plugin functionality (add custom code)
- Distributed processing (Jobard + HTCondor/Swarm)



From processing to user tools

Interactive spatial exploration



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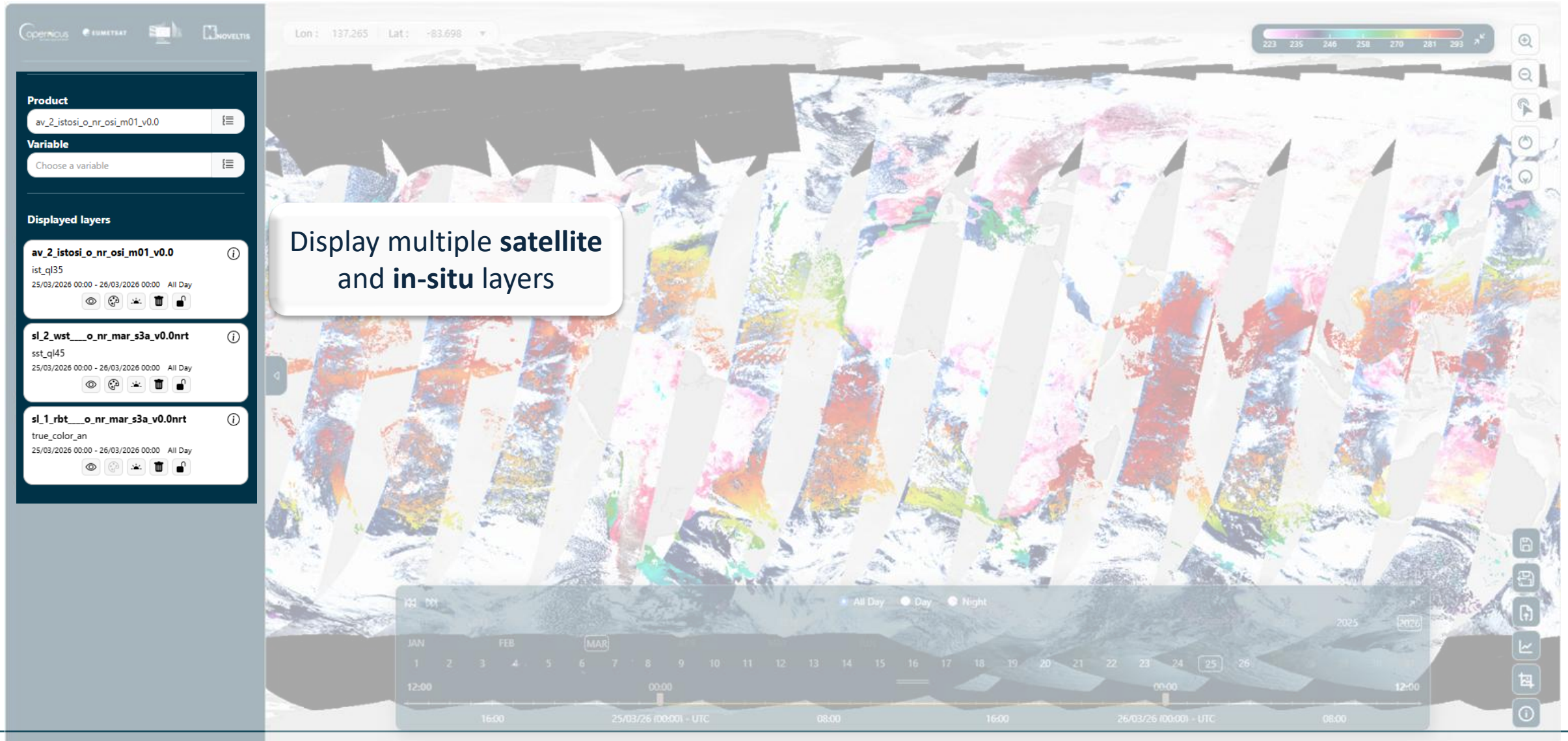
Interactive spatial exploration



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From processing to user tools

Interactive spatial exploration



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From processing to user tools

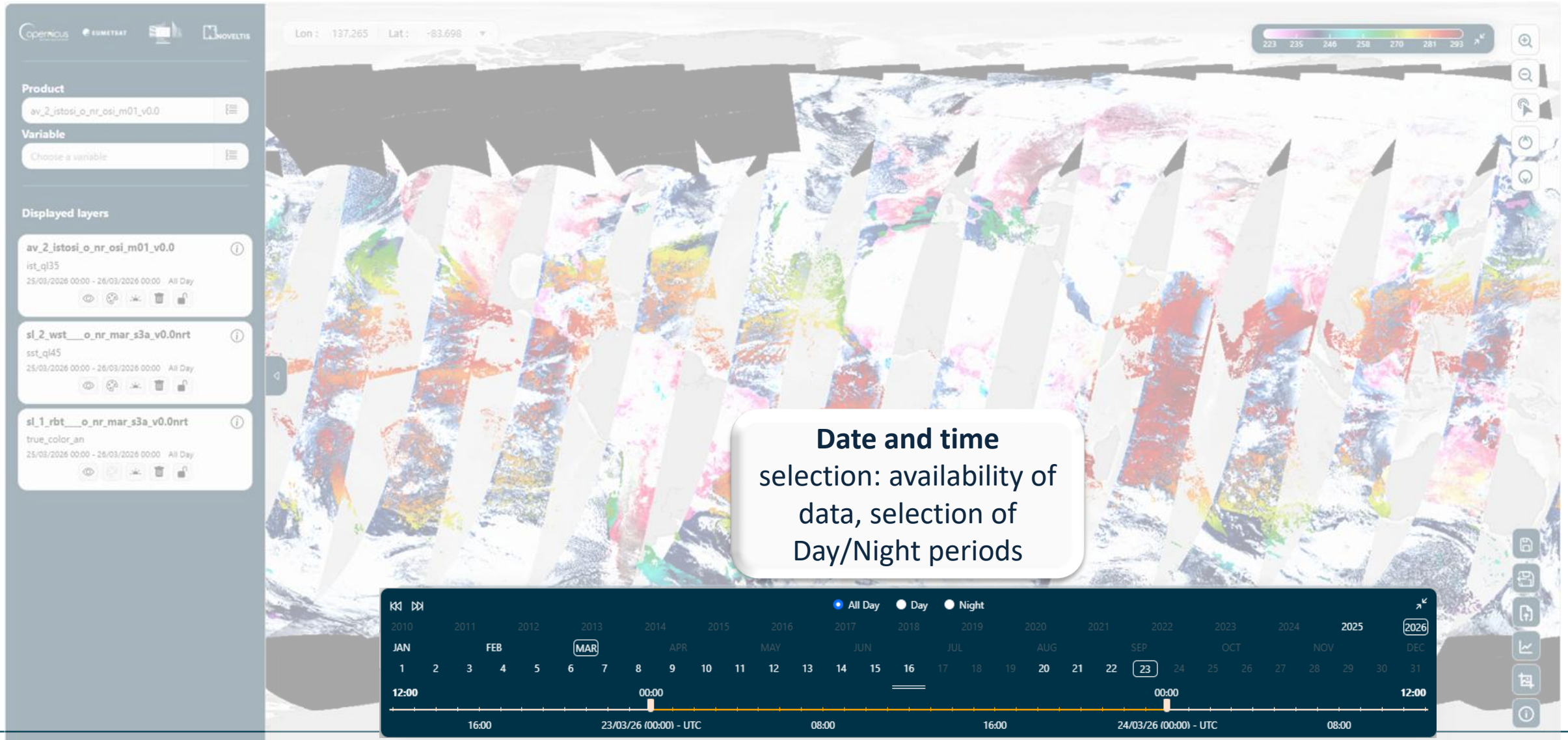
Interactive spatial exploration



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From processing to user tools

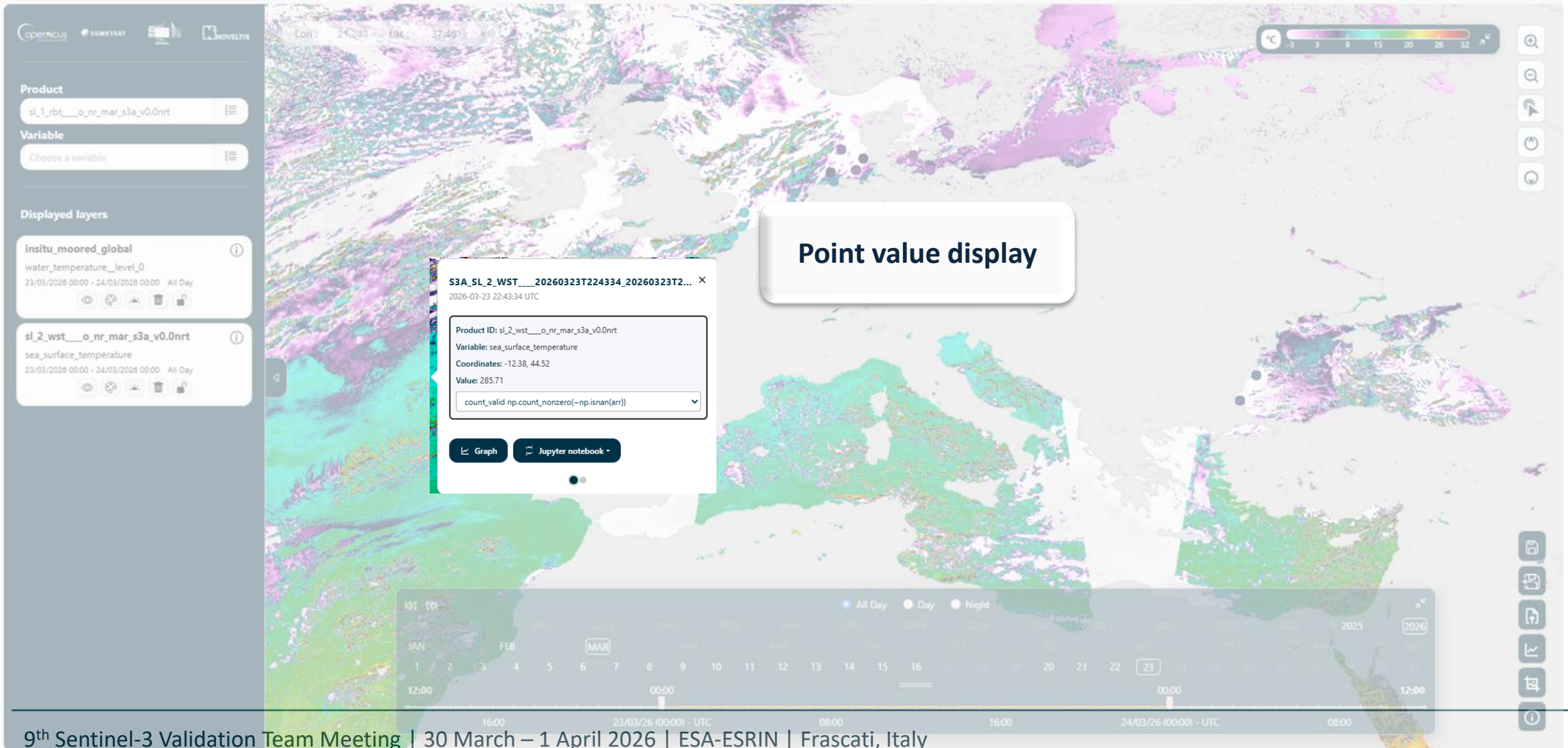
Interactive spatial exploration



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Interactive spatial exploration



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The screenshot displays a web-based interface for spatial data exploration. On the left, a sidebar contains controls for product selection (currently 'sl_1_rbt__o_nr_mar_s3a_v0.0nrt'), variable selection (currently 'Choose a variable'), and a list of displayed layers. Two layers are visible: 'insitu_moored_global' (water temperature) and 'sl_2_wst__o_nr_mar_s3a_v0.0nrt' (sea surface temperature). The main map area shows a color-coded temperature distribution over the Mediterranean and surrounding regions. A temperature scale legend at the top right ranges from -3 to 32 degrees Celsius. A central text box highlights the 'Creation of configurations storing layers and view parameters' feature. A dialog box on the right prompts the user to 'Give your configuration a name' with a 'Save' button, or to 'Or create a permalink' with a 'Permalink' button. The bottom of the interface features a time navigation bar with a calendar view for March 2026, a day/night cycle selector, and a timeline showing data from 12:00 on 23/03/26 to 12:00 on 24/03/26.

Creation of configurations storing layers and view parameters

Give your configuration a name

Configuration name Save

Or create a permalink

The permalink will be saved during 30 days.

Permalink

From processing to user tools

Interactive data analysis



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opernicus EUMETSAT NOVELTIS

Product
sl_2_wstn__p_nr_eum_s3b_v0.0nrt

Variable
SST deviation from last analysis field

Metric
mean

Time interval
2026-02-03 - 2026-02-0

Aggregation
No aggregation

Panel

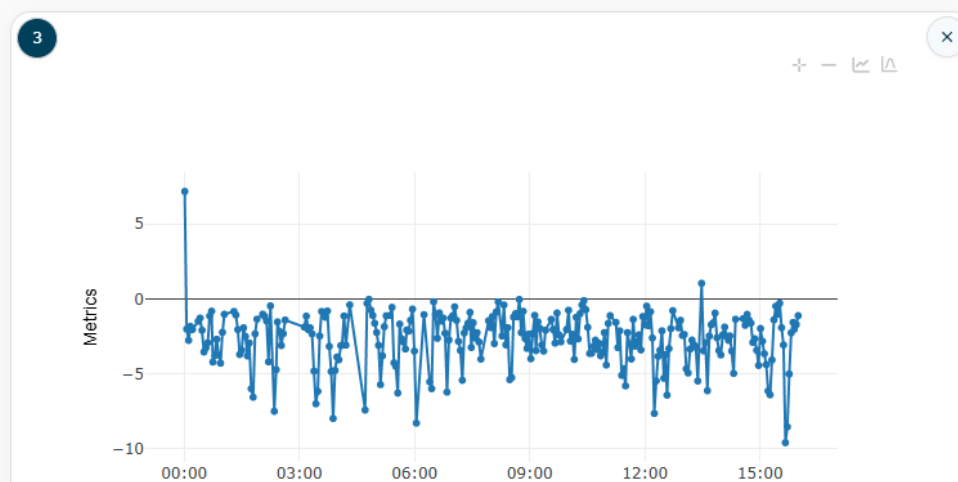
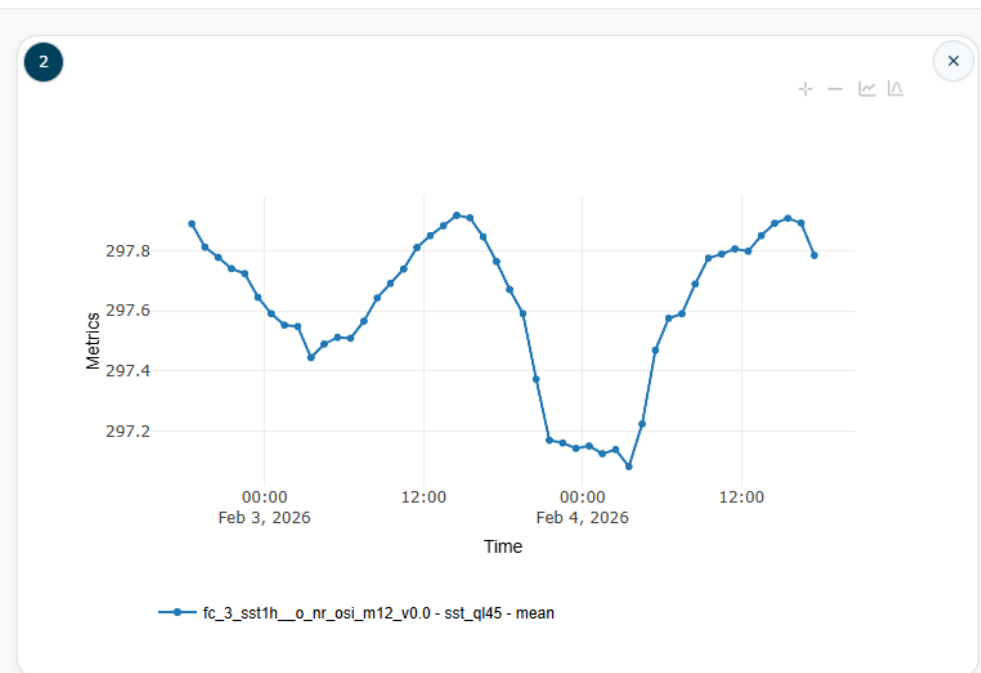
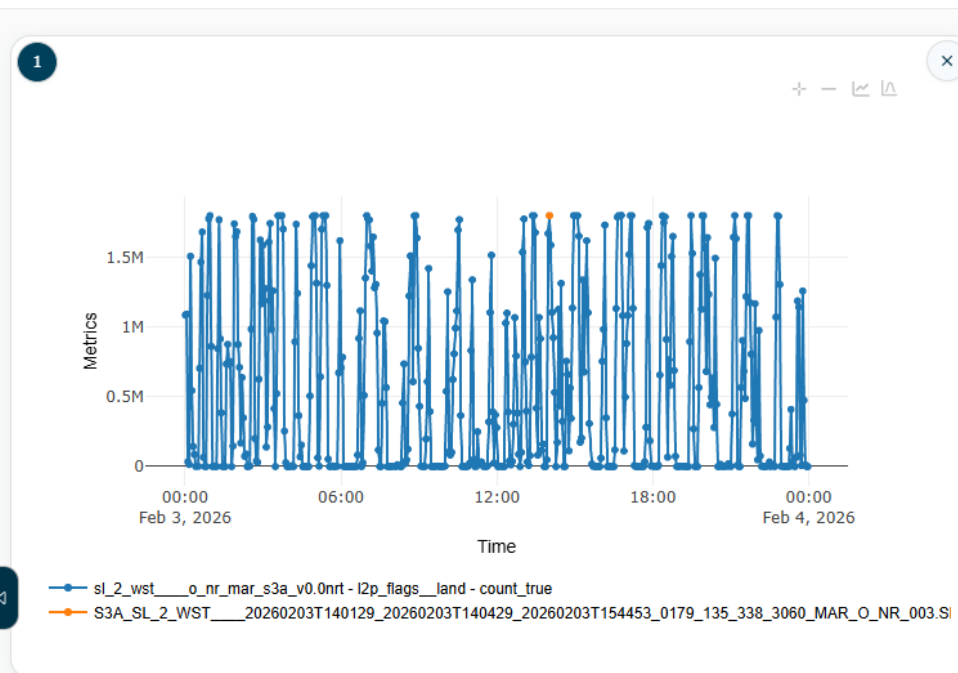
Add data

Synch graphs

2 450

Time interval
2026-03-09 - 2026-03-1

Update graphs to selected time period



From processing to user tools

Interactive data analysis



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Product
sl_2_wstn__p_nr_eum_s3b_v0.0nrt

Variable
SST deviation from last analysis field

Metric
mean

Time interval
2026-02-03 - 2026-02-0

Aggregation
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Panel

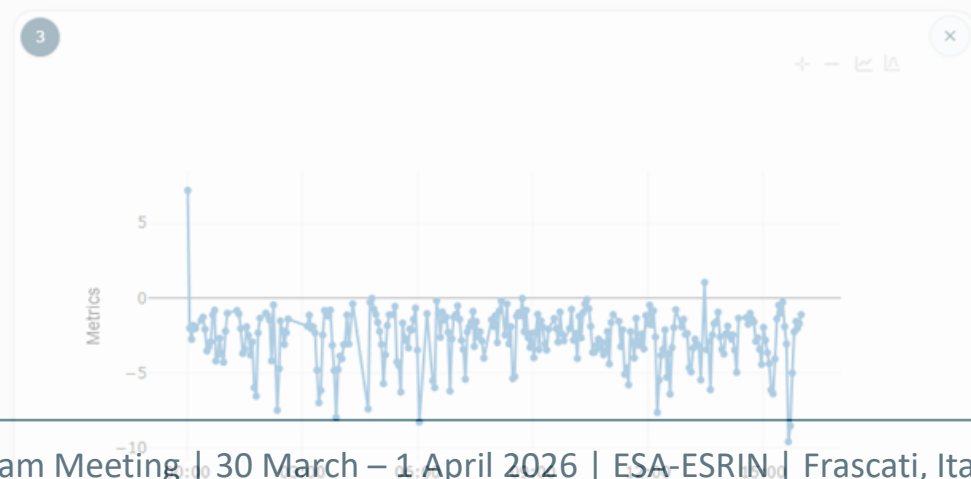
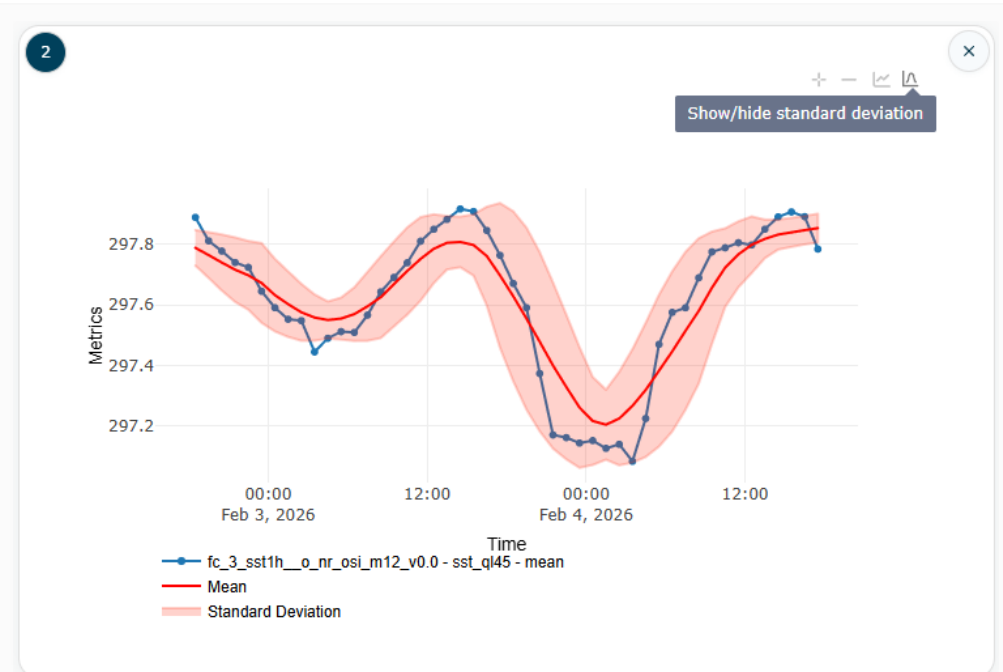
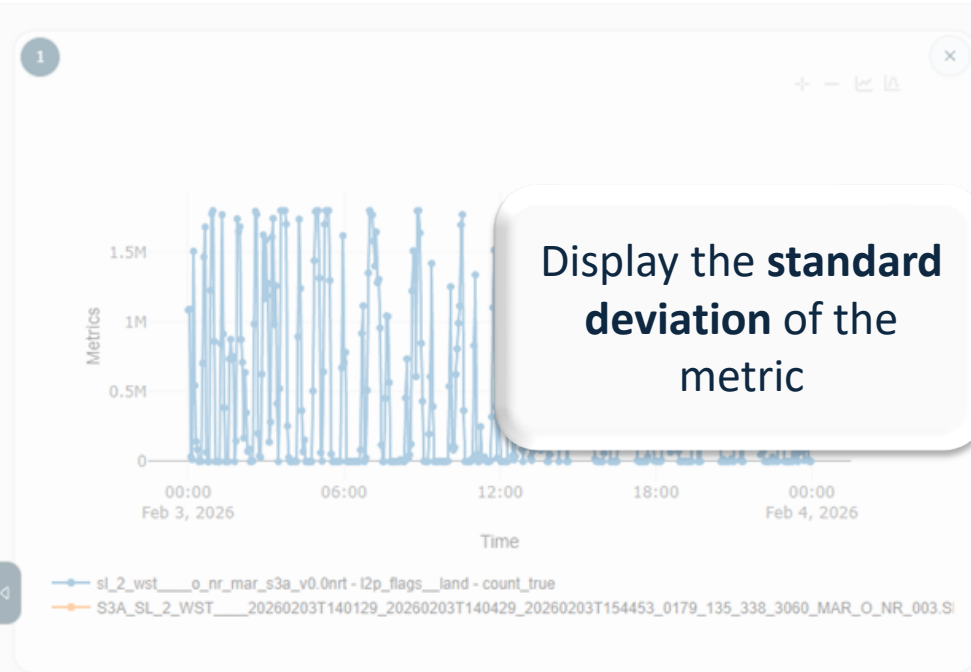
Add data

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2 450

Time interval
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Update graphs to selected time period



From processing to user tools

Interactive data analysis



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Product
sl_2_wstn__p_nr_eum_s3b_v0.0nrt

Variable
SST deviation from last analysis field

Metric
mean

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No aggregation

Panel

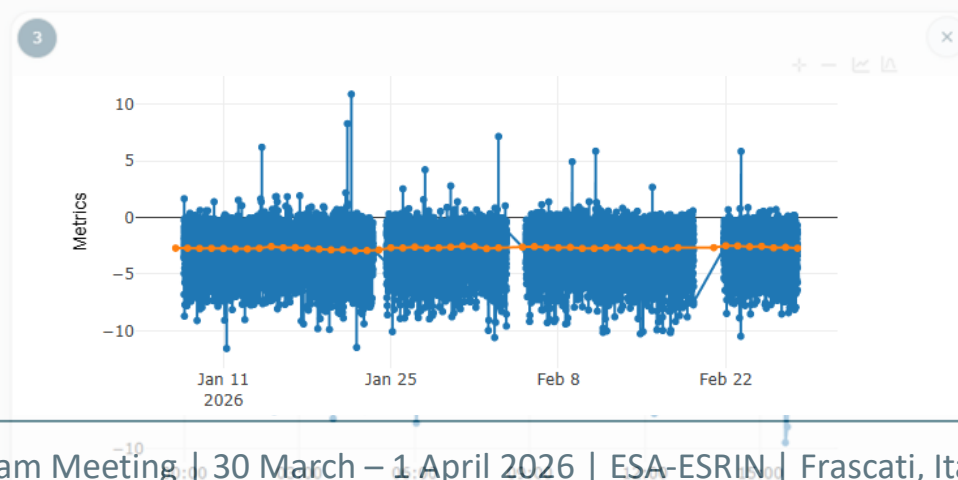
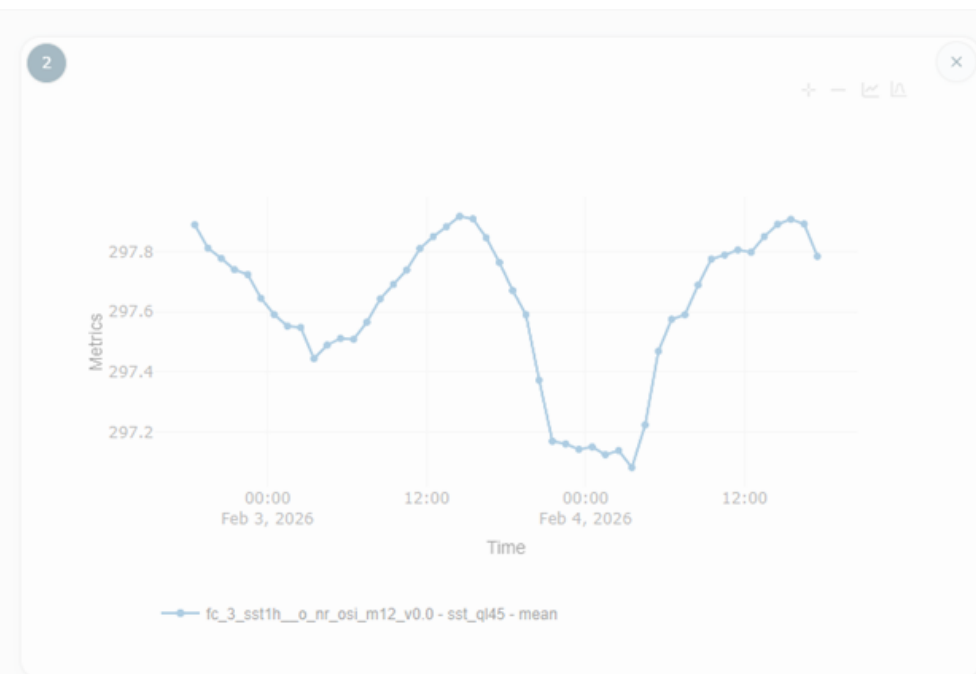
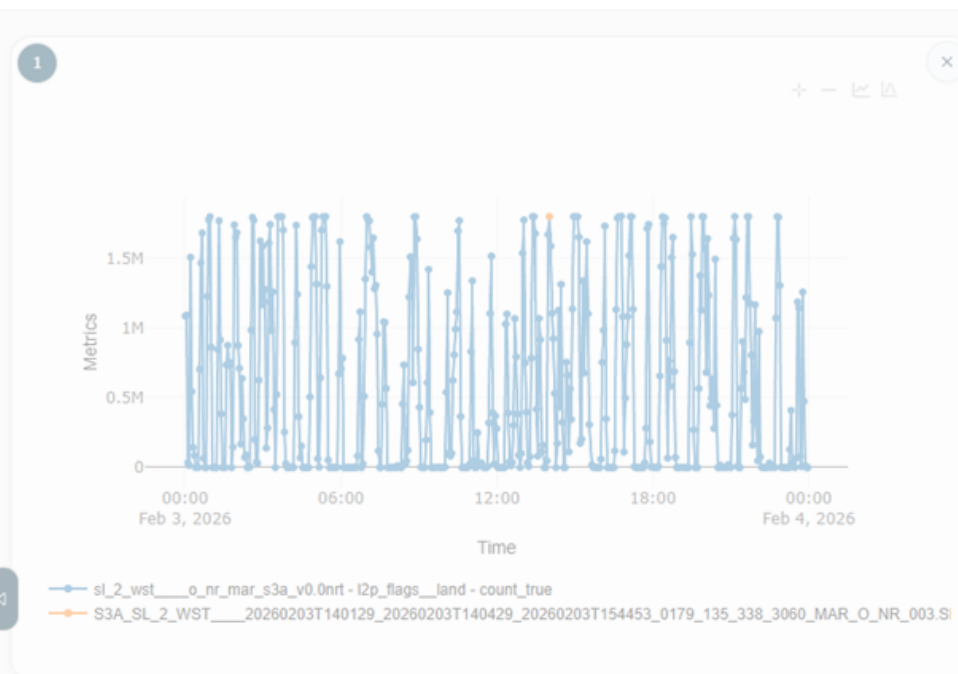
Add data

Synch graphs

2 450

Time interval
2026-03-09 - 2026-03-1

Update graphs to selected time period



Use different aggregation levels (daily, weekly, monthly ...) to investigate patterns



From processing to user tools

Deeper investigation



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File Edit View Run Kernel Tabs Settings Help

Filter files by name

/ notebooks / graphing /

Name	Last Modified
default_gra...	6 months ago
default_gra...	yesterday
default_gra...	6 months ago
default_gra...	4 months ago
default_gra...	4 months ago
default_gra...	2 months ago
default_gra...	last month
default_gra...	1 minute ago

```
[19]: cur = conn.cursor()

[20]: metric = 'count_valid'
variable = 'sst_q15'
product = 's1_2_wstn__p_nr_eum_s3a_v0.0nrt'
start_time = '2025-08-02T12:50:32.078Z'
end_time = '2025-09-02T12:50:32.079Z'

[21]: cur.execute('SELECT id FROM metric WHERE name=%s', (metric,))
metric_id = cur.fetchone()[0]

[22]: cur.execute('SELECT id FROM variable WHERE name=%s', (variable,))
variable_id = cur.fetchone()[0]

[23]: cur.execute('SELECT id FROM product WHERE identifier=%s', (product,))
product_id = cur.fetchone()[0]

[24]: cur.execute('SELECT id FROM metric_variable WHERE metric_id=%s AND variable_id=%s', (metric_id, variable_id,))
metric_variable_id = cur.fetchone()[0]

[25]: cur.execute('SELECT granule.start_time, metric_value.value FROM metric_value, granule WHERE metric_value.metric_variable_id=%s AND metric_value.granule_id=granule.id AND granule.product_id=%s', (metric_va

[26]: res = cur.fetchall()

[27]: x = list()
y = list()
for item in res:
    x.append(item[0])
    y.append(item[1])

[28]: fig, ax = plt.subplots(figsize=(10,6))
ax.plot(x, y)
ax.set(xlabel='Time', ylabel='%s - %s' %(variable, metric))
plt.show()
```

-
- ✓ Integrated tools for SST monitoring and Cal/Val
 - ✓ Scalable processing of EO and in-situ datasets
 - ✓ Interactive visualisation and analysis tools
 - ✓ Supporting reproducible scientific workflows

More information on the project:

<https://www.eumetsat.int/Sci4MaST>

GHRSSST website:

<https://www.ghrsst.org/>

Thank you for your attention!

Get in touch: sci4mast@noveltis.fr