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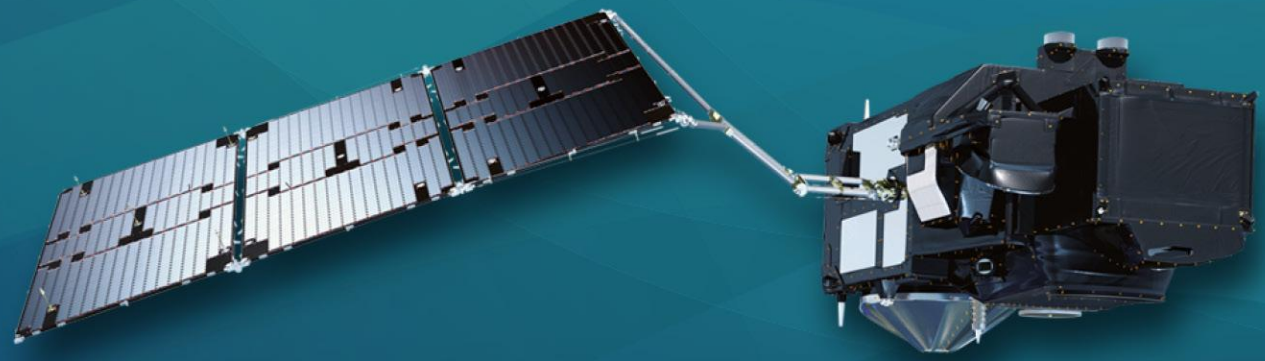


9th Sentinel-3 Validation Team meeting 2026

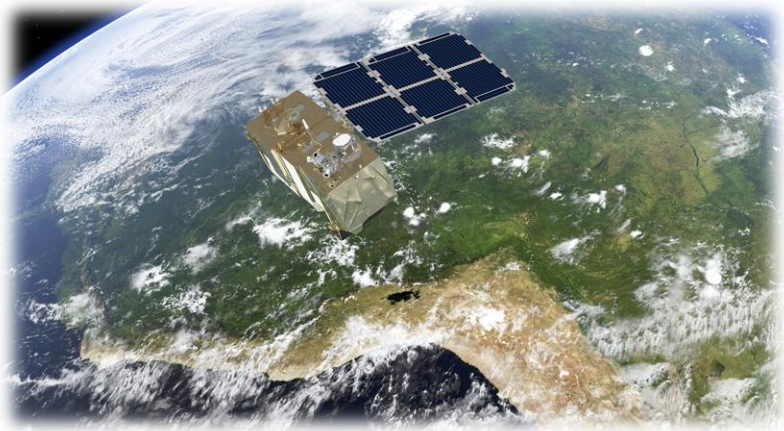
30 March–01 April 2026 | ESA–ESRIN | Frascati (Rome), Italy

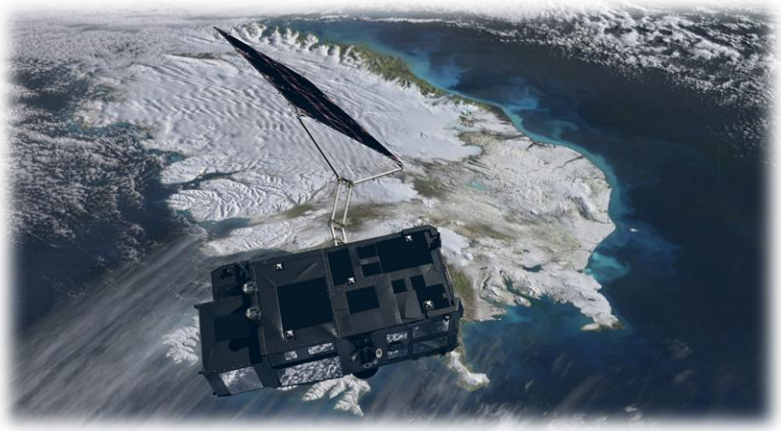
Development and enhancement of monitoring and Cal/Val tools within the Sci4MaST project

C. Ribere[1], E. Bodéré[2], B. Delaveau[1], D. Briand[2], M. El Hajj[1], J-F. Piollé[2], J. Sarrau[1], A. Zafiamy[1], N. Lalloué[1] , G. Corlett[3], A. Reed[3], I. Tomazic[3], S. Kabir[3]

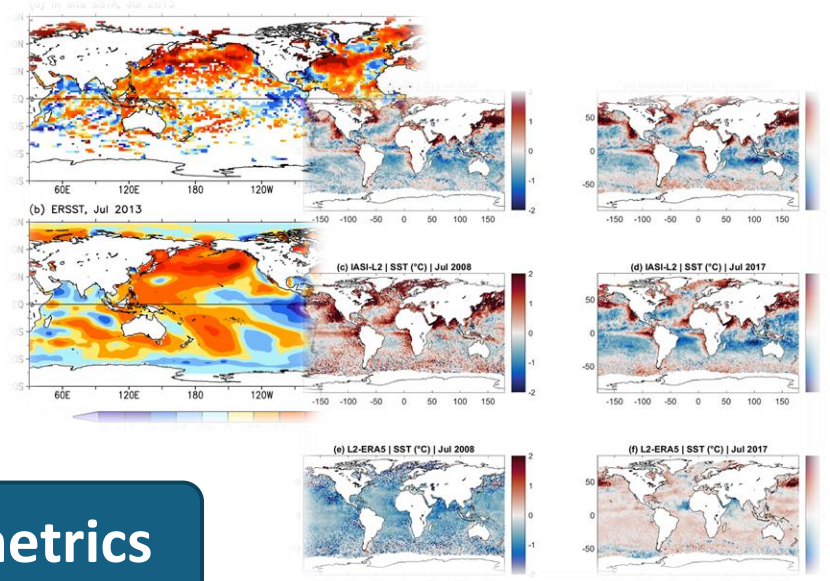
1. NOVELTIS, France – 2. Ifremer, France – 3. EUMETSAT, Germany

Context & Motivation





- 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

Sci4MaST project objectives

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

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

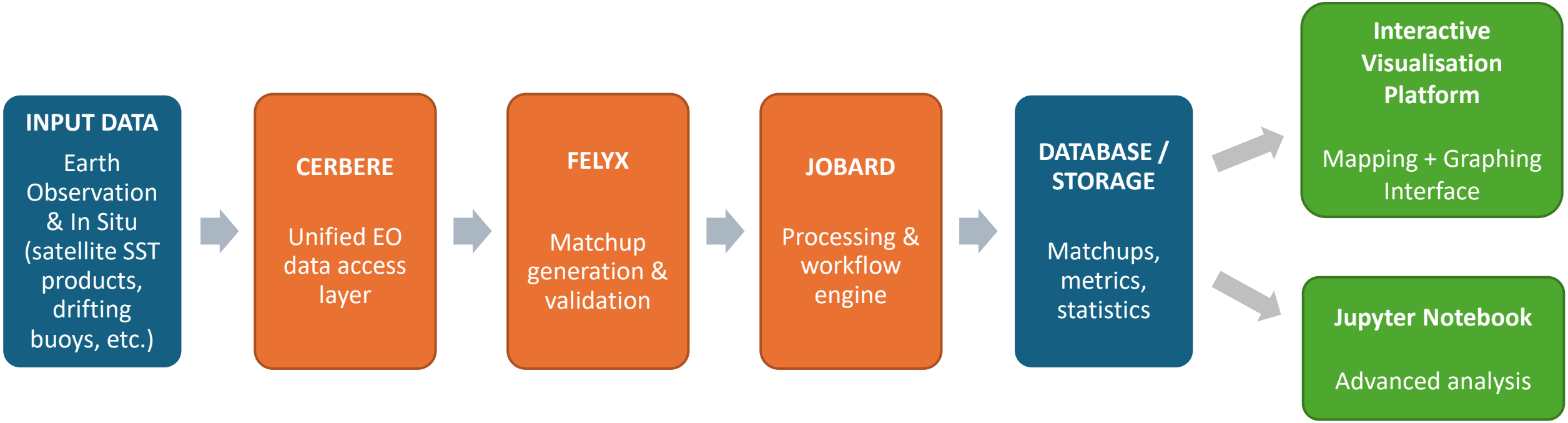
1. Improvement to Sentinel-3 SLSTR sea and sea-ice surface temperature **product quality**

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

Architecture - Overview

A modular pipeline from data ingestion to scientific exploration



Cerbere – Data accessing

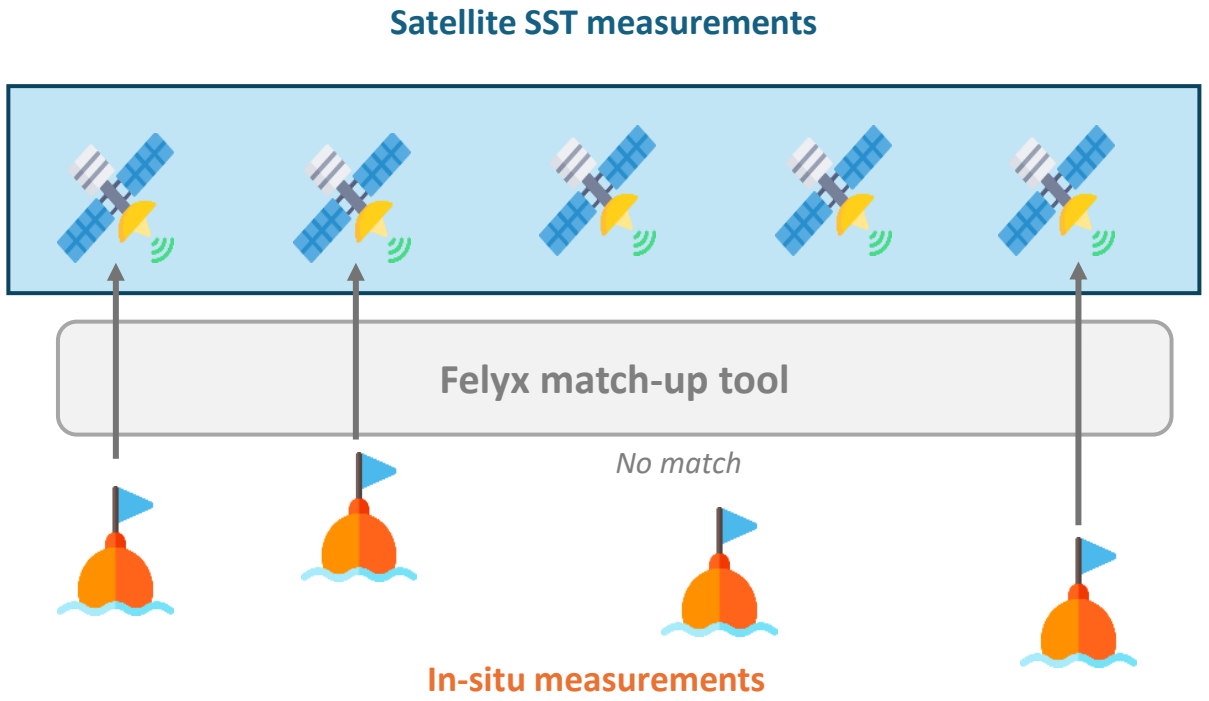
Provides a consistent **interface to access Earth Observation datasets** across different formats

- ✓ 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



Architecture – Core processing tools

Jobard – data processing framework

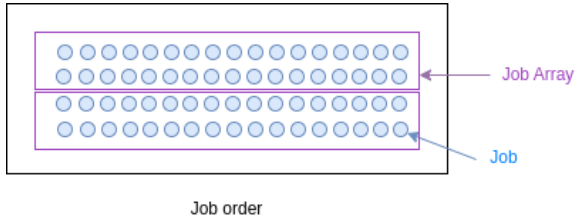
Enables **automated and distributed job-array** processing

HTCondor

- ✓ Framework for parallel processing (same processor on multiple input)
- ✓ Used for massive reprocessing: distribution of processing tasks over multiple processing nodes, report and monitor

docker

- ✓ Scalable and deployable on many different HPCs and cloud infrastructures through connectors (HTCondor, PBS, SLURM, …)
- ✓ Full python



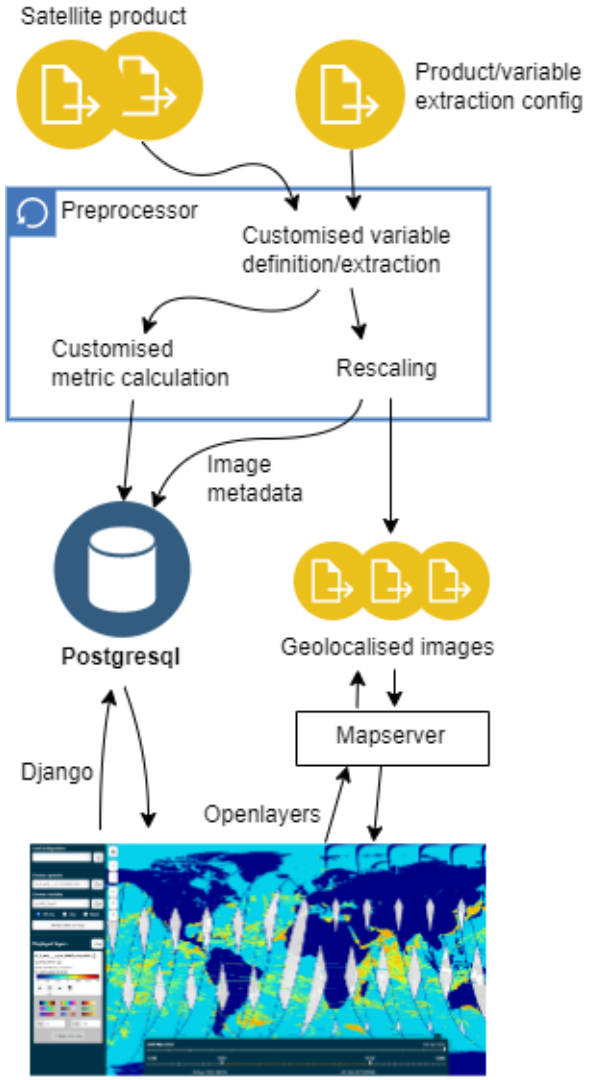
slurm workload manager

kubernetes

Architecture – Core processing tools

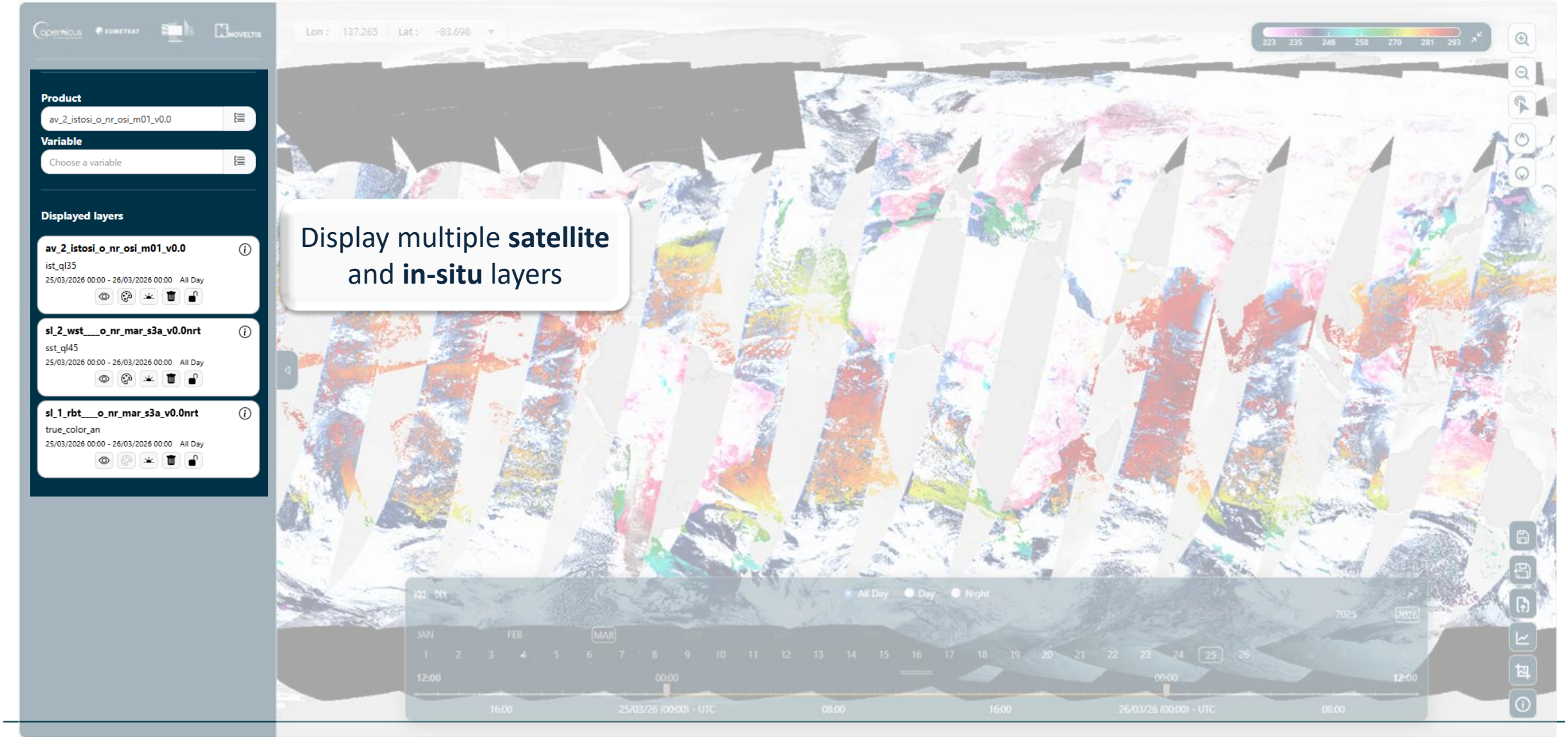
Pre-processor

- 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

From processing to user tools
Interactive spatial exploration



From processing to user tools
Interactive spatial exploration

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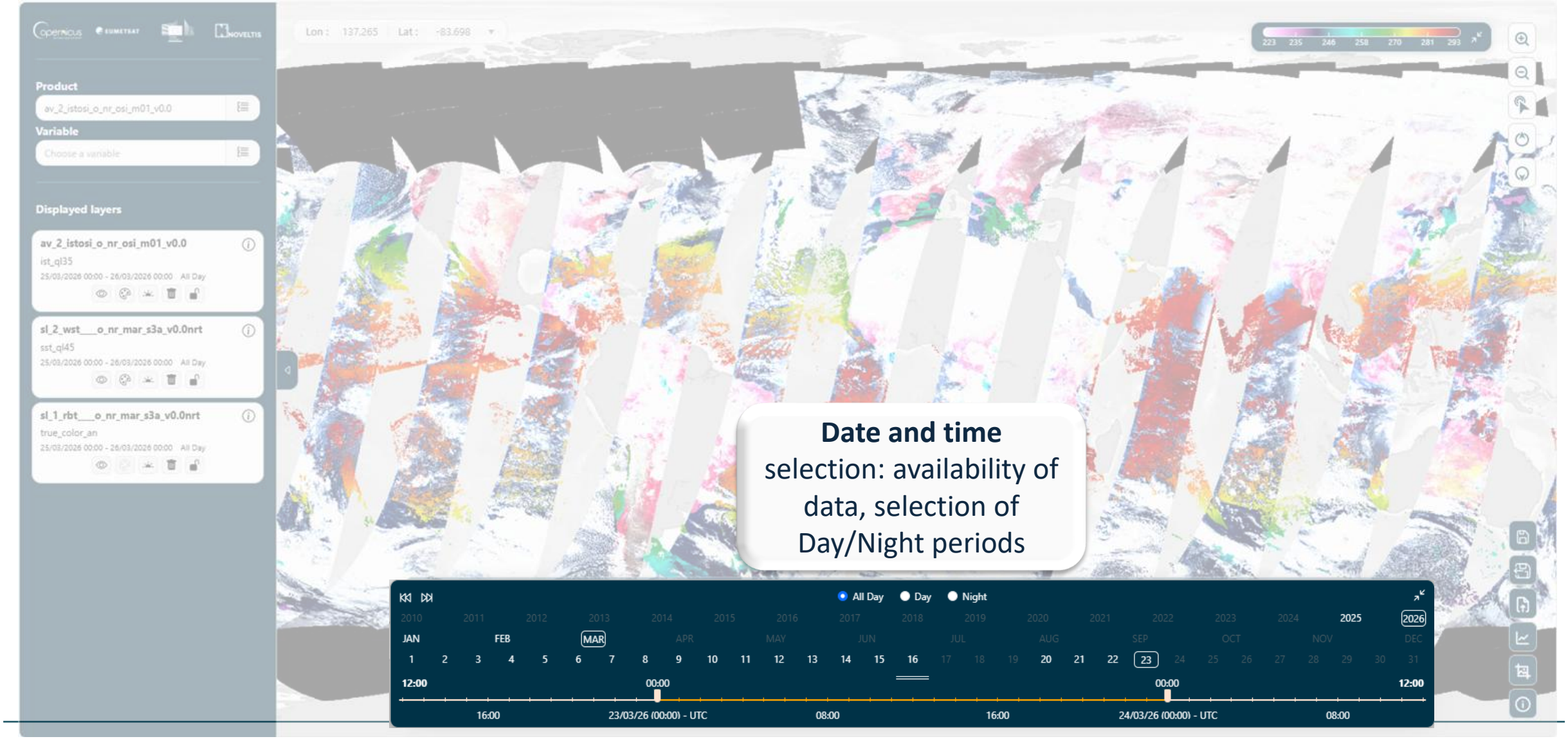
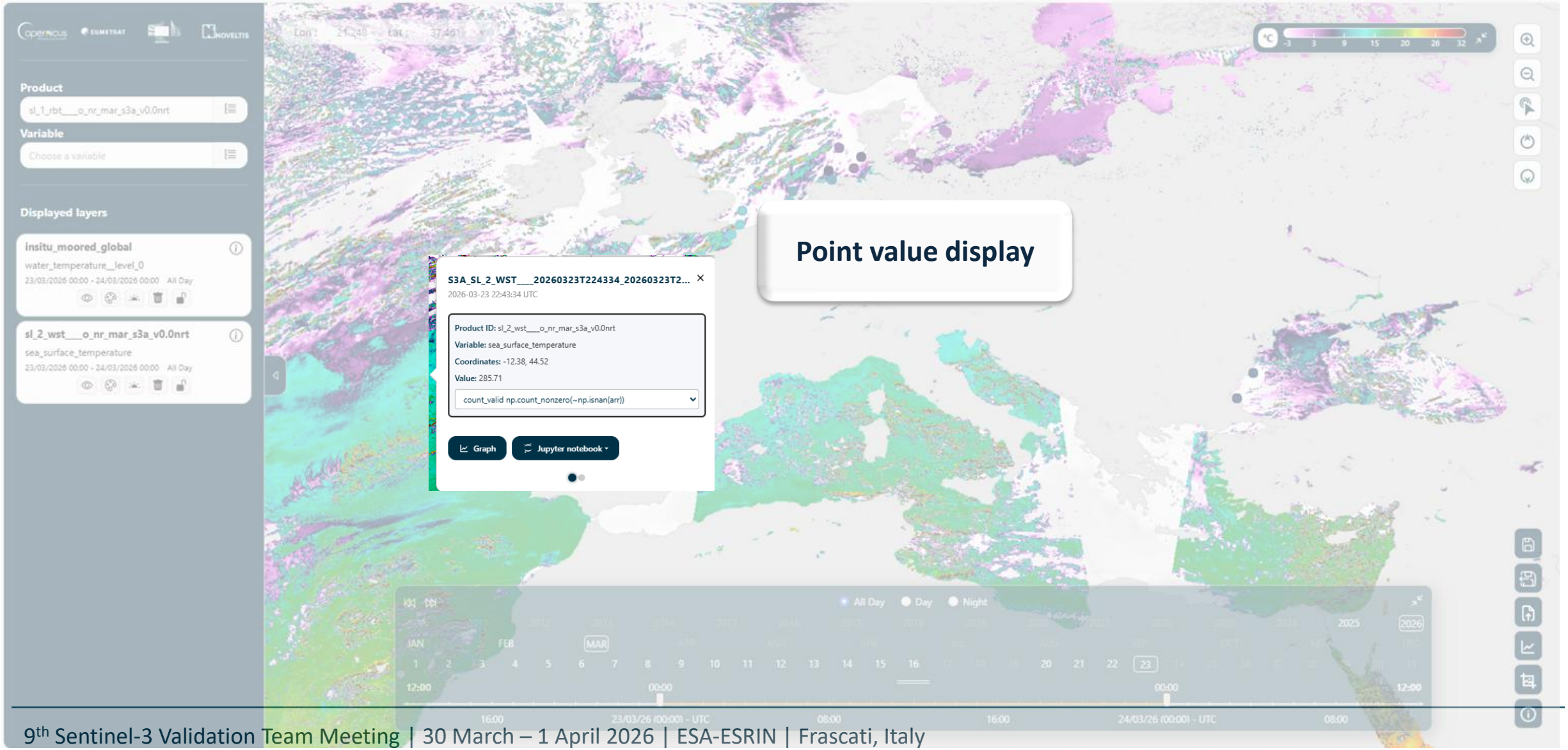
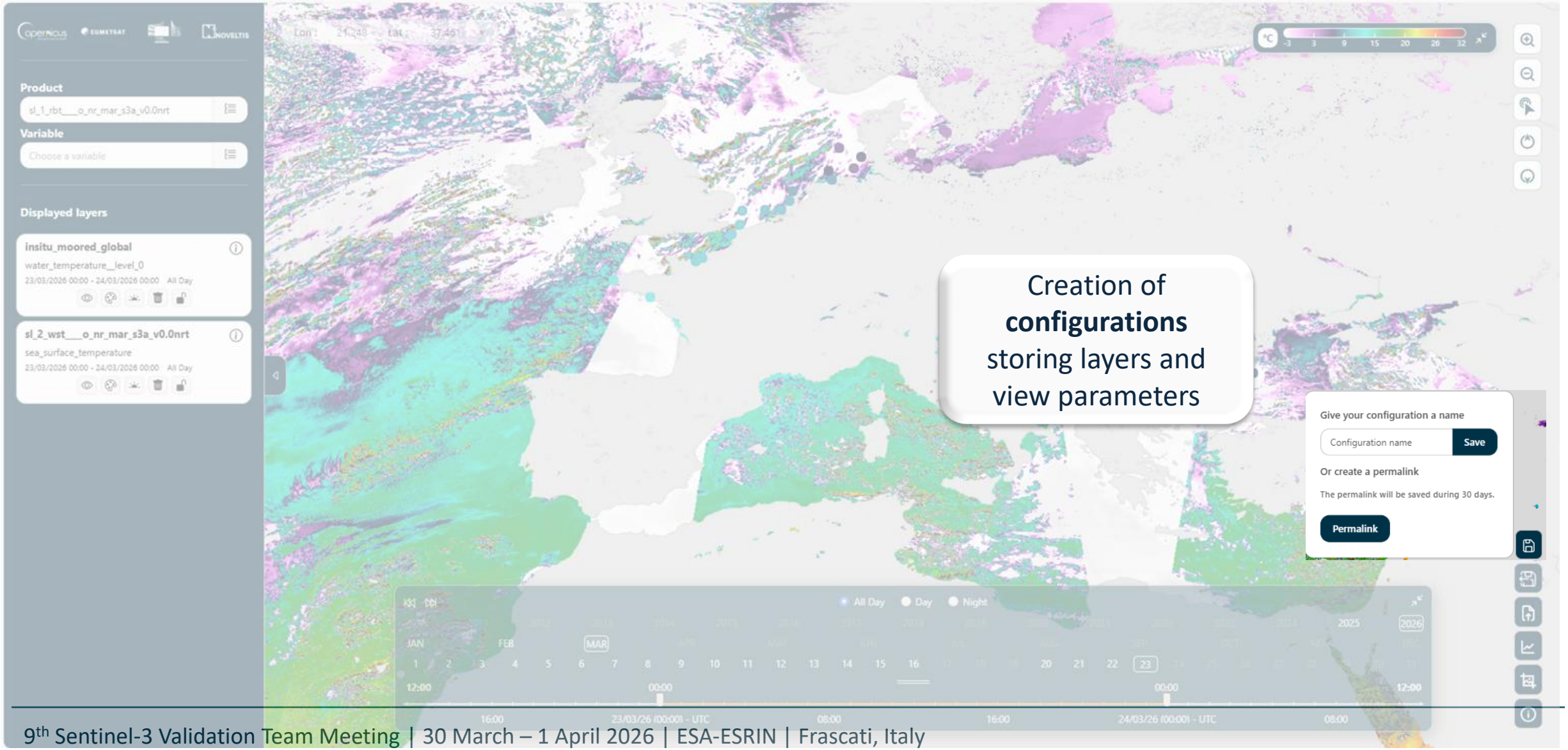


Date and time selection: availability of data, selection of Day/Night periods

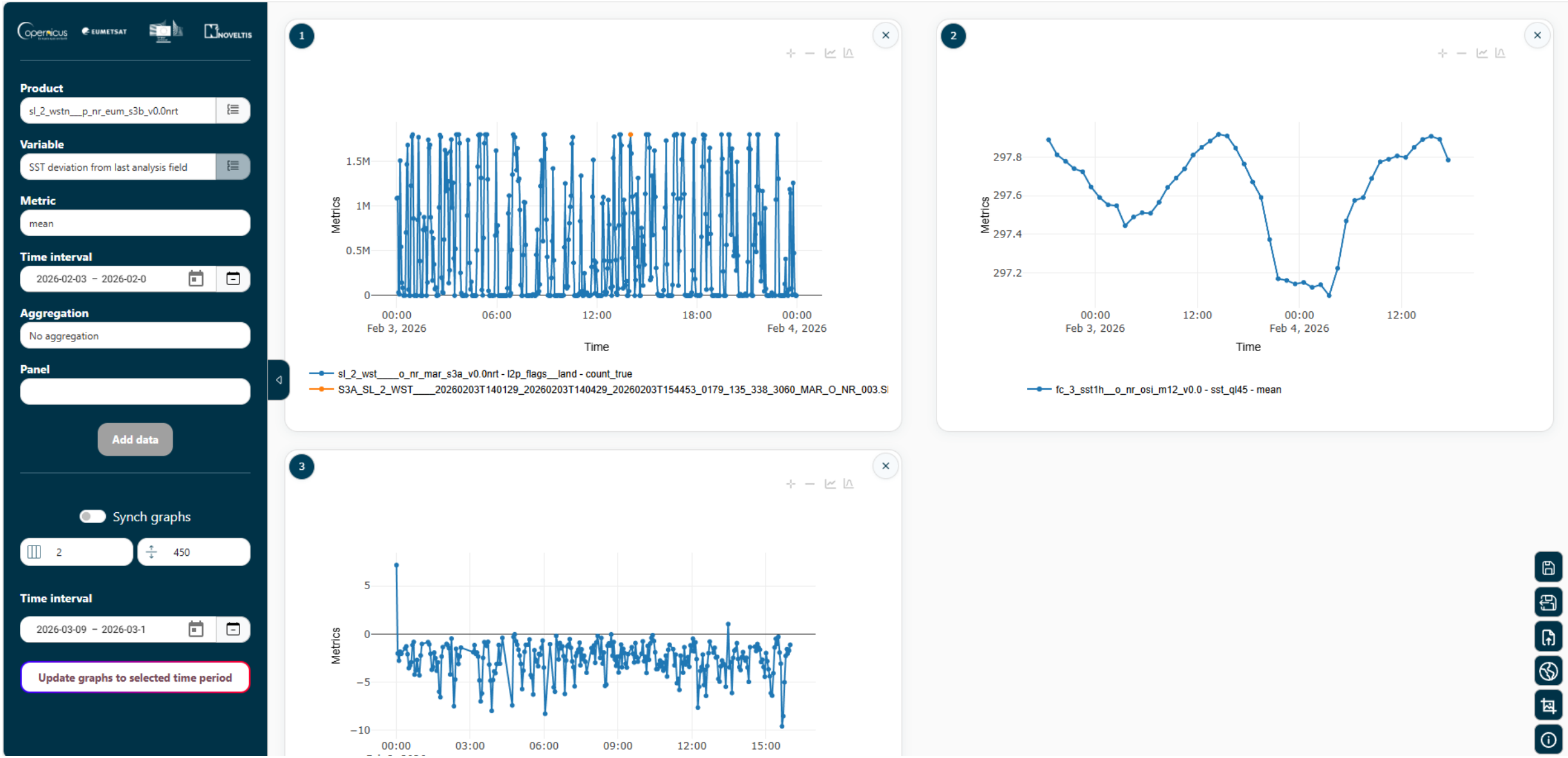
From processing to user tools
Interactive spatial exploration



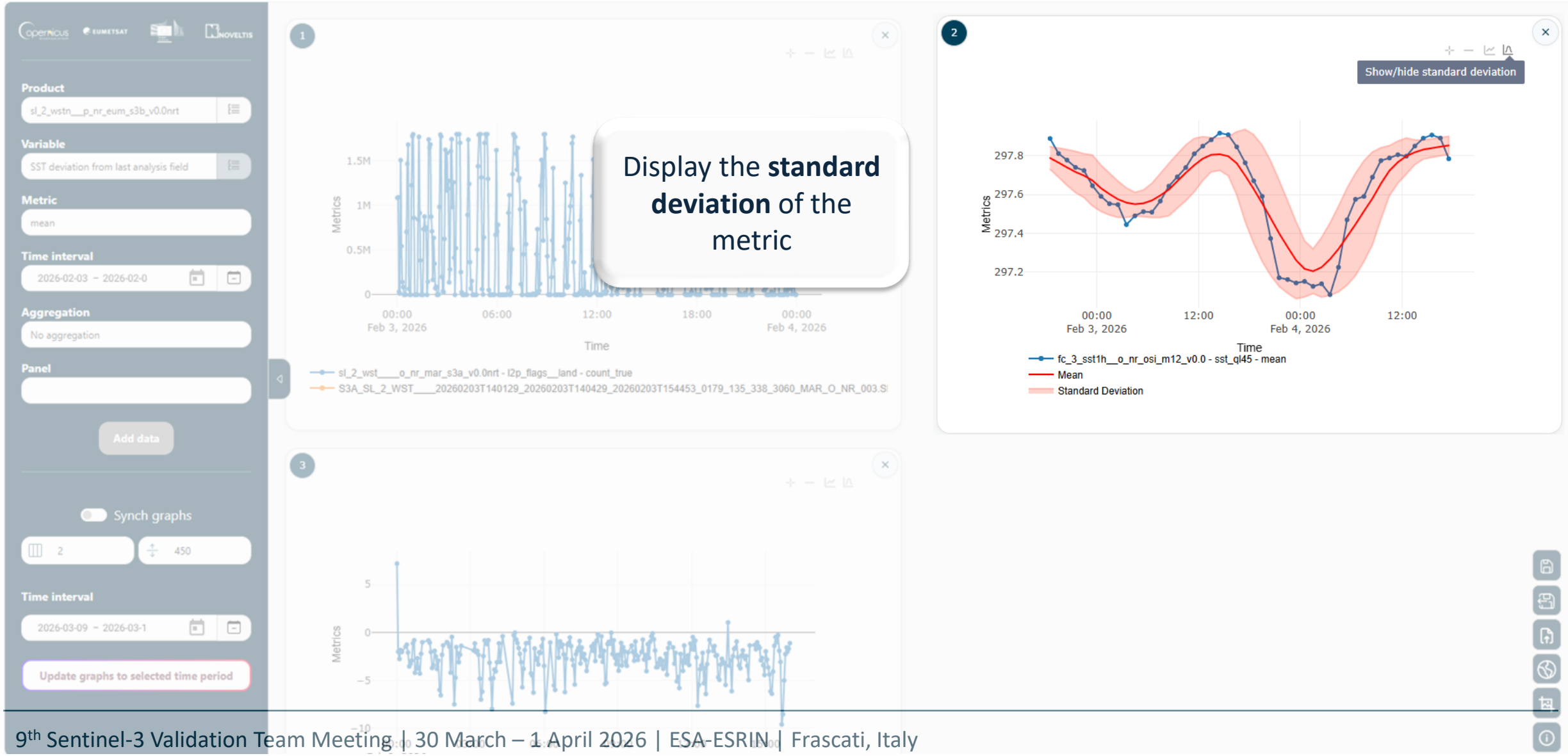
From processing to user tools
Interactive spatial exploration



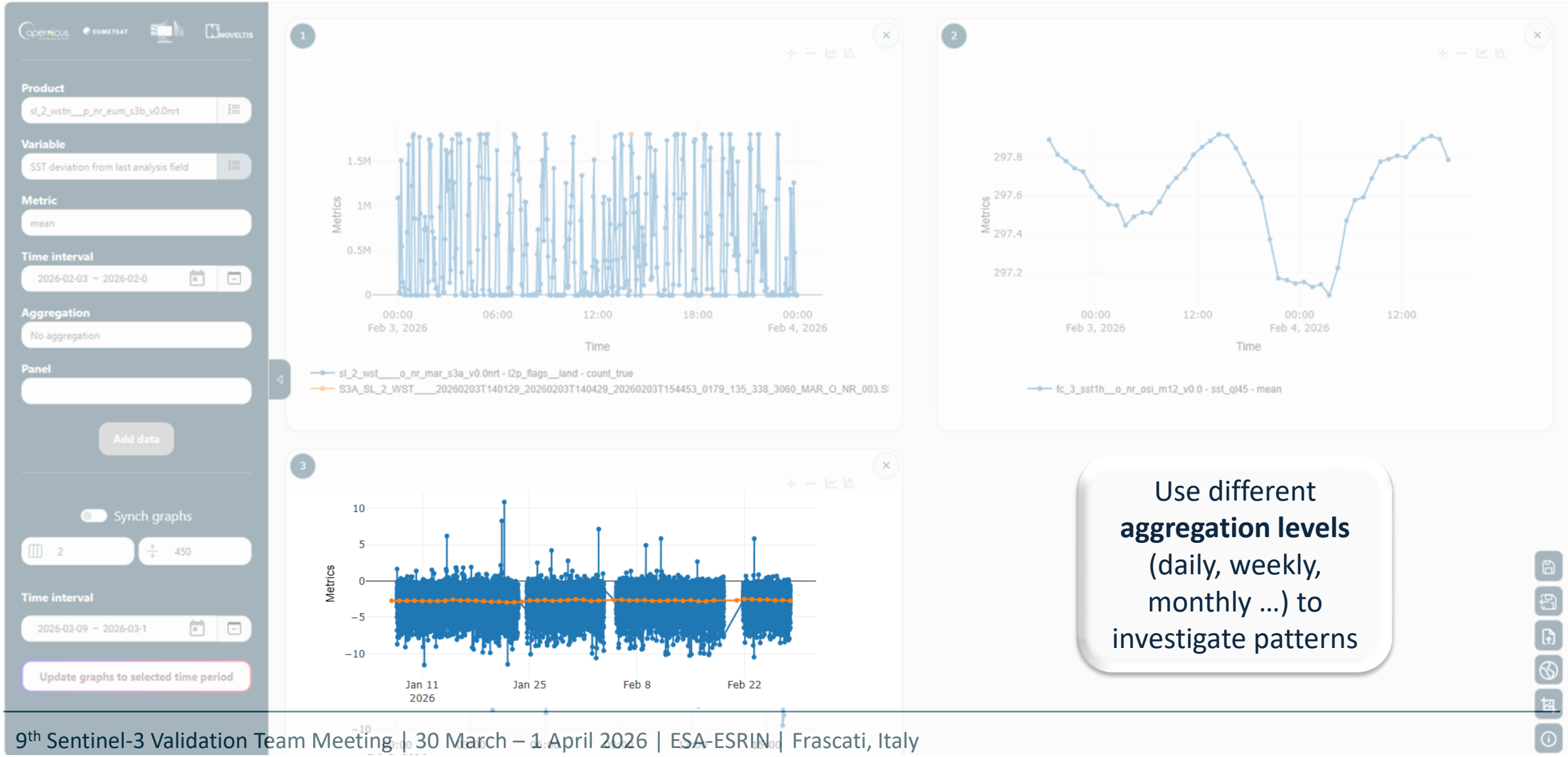
From processing to user tools
Interactive data analysis



From processing to user tools
Interactive data analysis

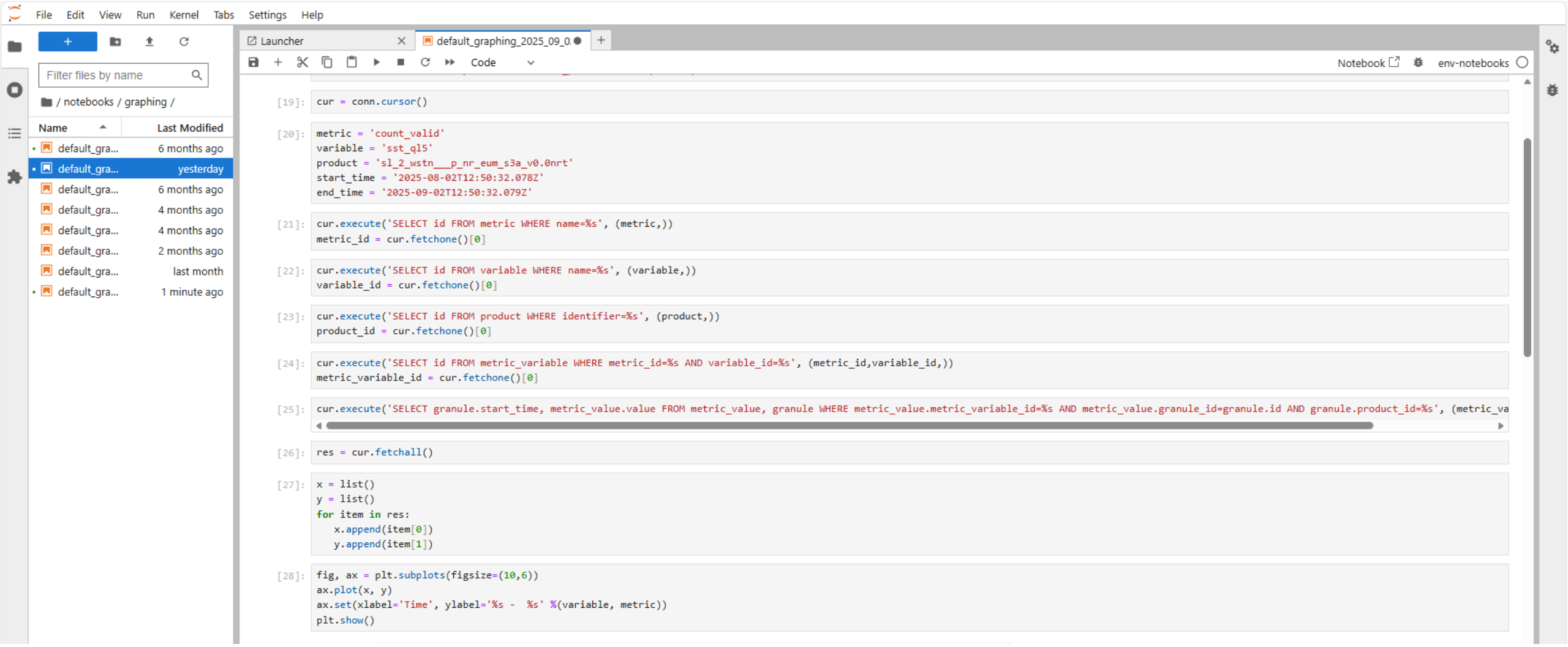


From processing to user tools
Interactive data analysis



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

From processing to user tools
Deeper investigation



Conclusions

- ✓ 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
GHRSST website:
https://www.ghrsst.org/

Thank you for your attention!

Get in touch: sci4mast@noveltis.fr