

PrecSat: An Open, Modular, and Scalable Platform for Satellite Precipitation Monitoring, Validation, Tracking, and Nowcasting

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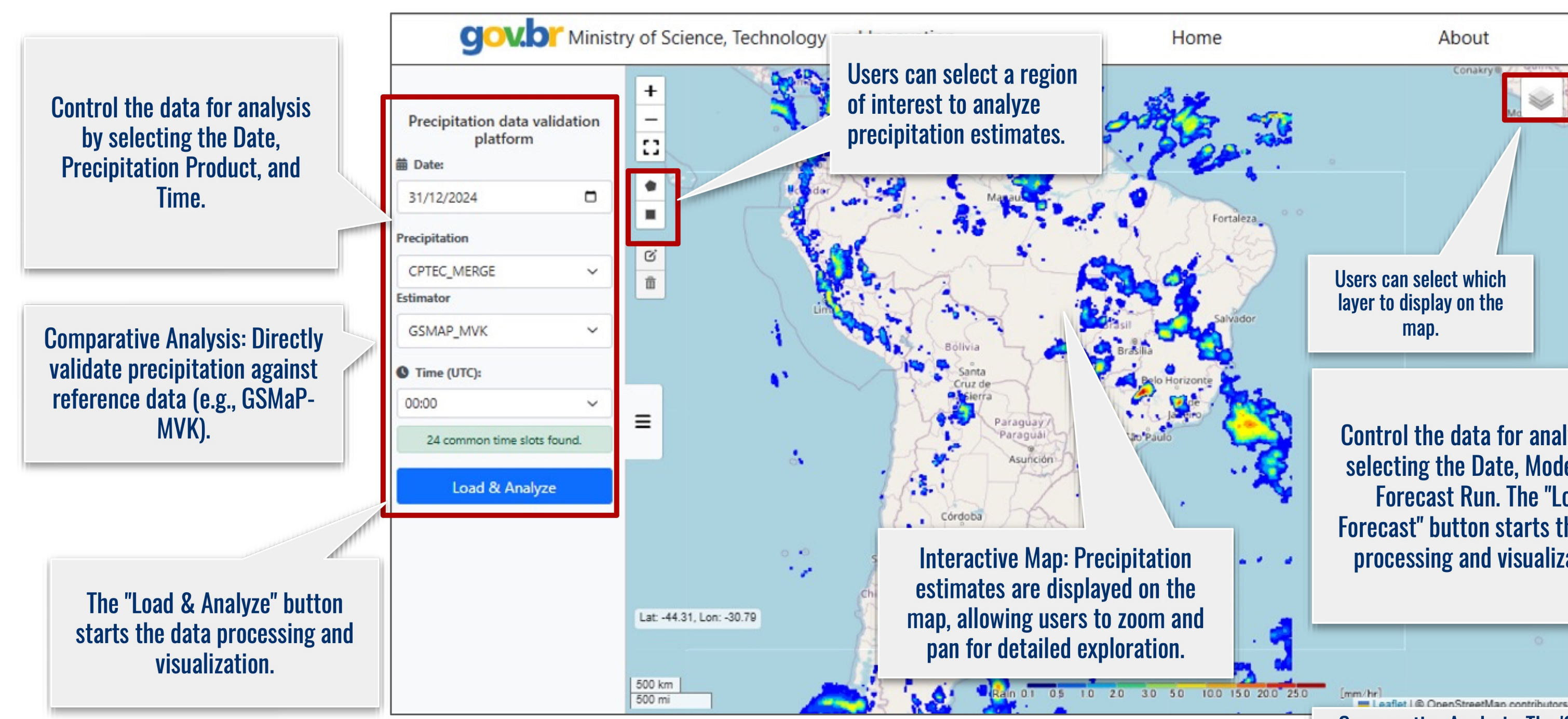


Motivation

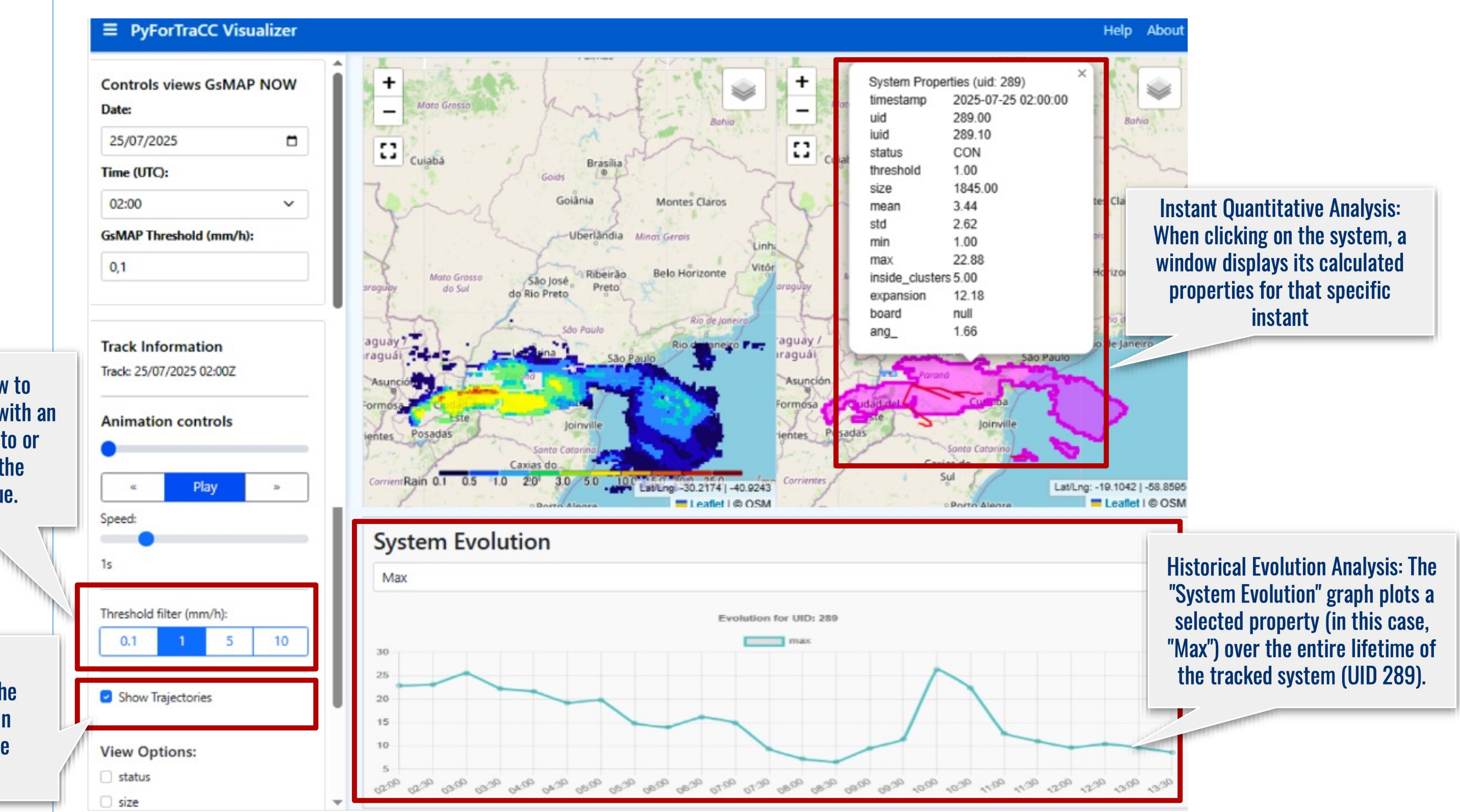
Reliable precipitation monitoring and nowcasting remain challenging in regions with sparse rain-gauge and weather-radar coverage. Satellite precipitation products provide frequent and broad-scale observations, but their uncertainties vary across meteorological regimes, precipitation intensities, and spatial scales. At the same time, monitoring, validation, storm tracking, and AI-based nowcasting are often implemented as disconnected workflows. This limits reproducibility, operational deployment, and the ability to diagnose where and why precipitation estimates fail.

PrecSat was developed as an open, modular, and operation-oriented platform that connects these stages in a single reproducible environment.

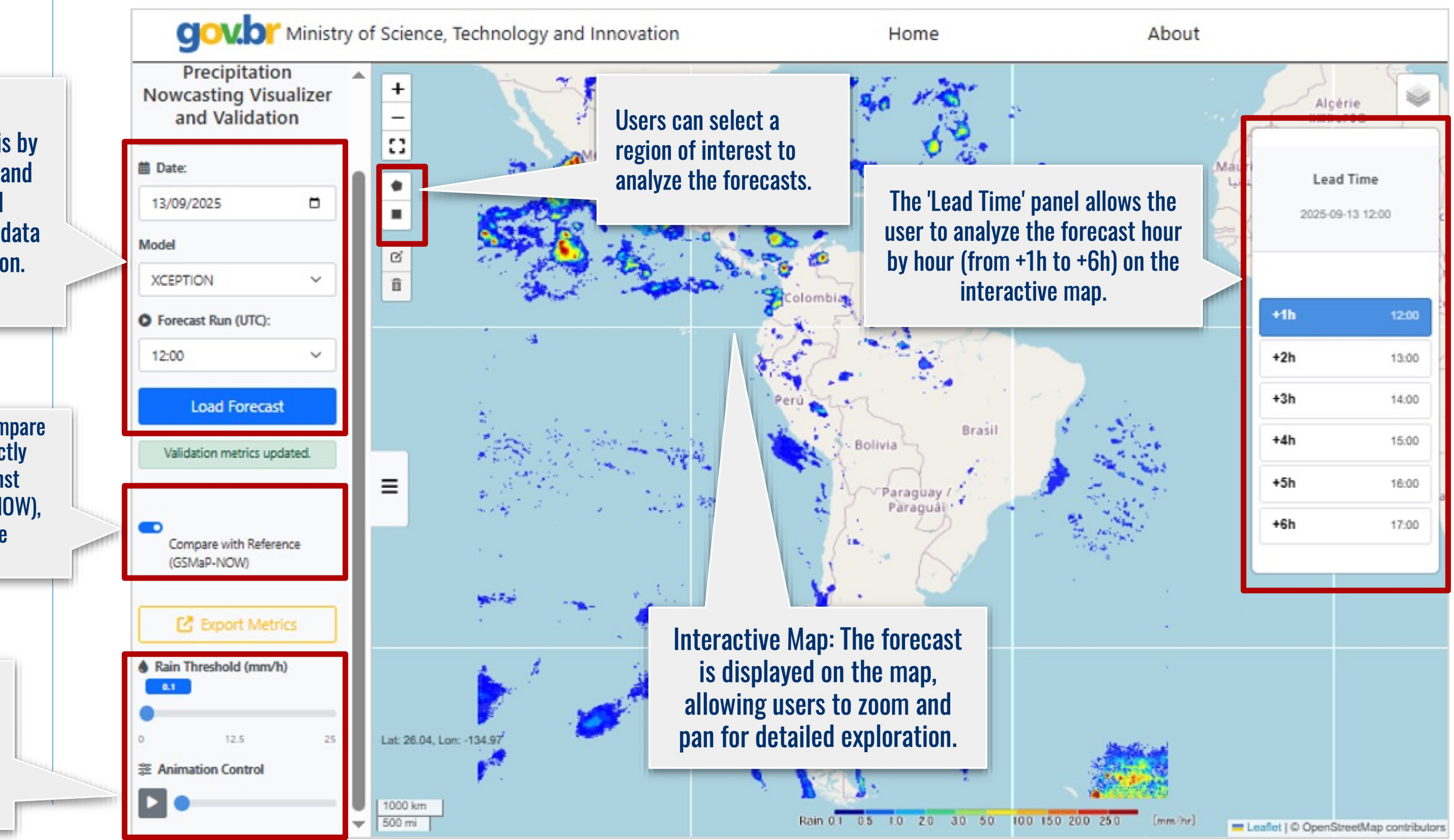
Monitoring



Tracking



Nowcasting



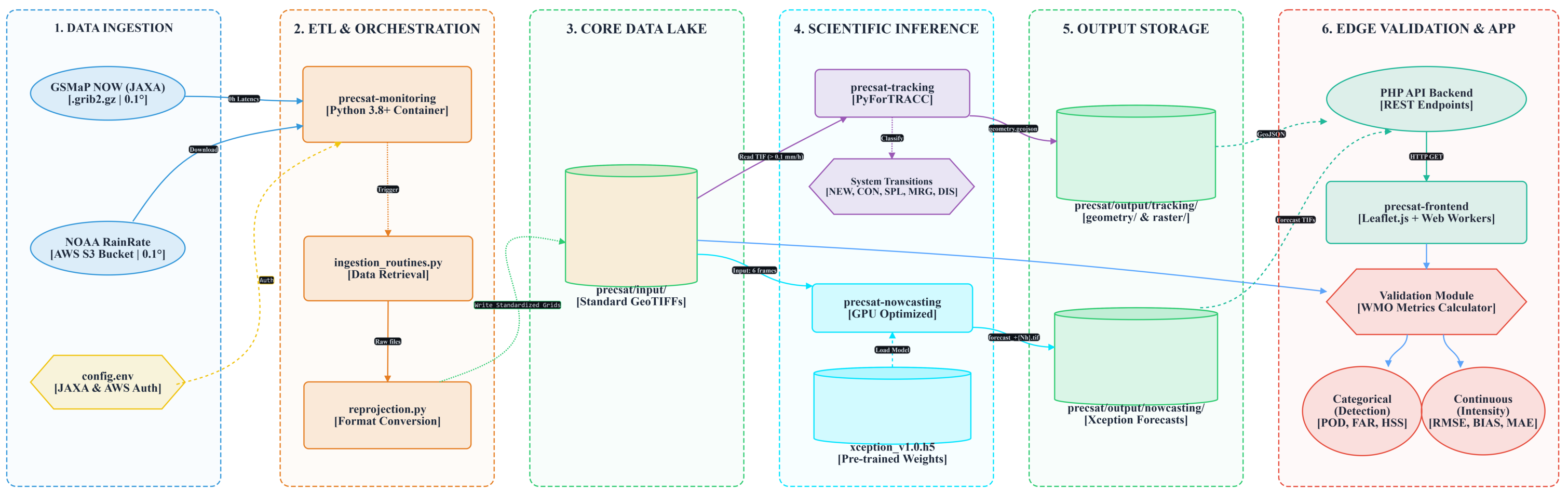
Validation



PrecSat Architecture

PrecSat uses Docker-orchestrated microservices to separate data ingestion, preprocessing, tracking, AI inference, validation, APIs, storage, and visualization.

- This architecture enables:
- Reproducible execution environments;
 - Independent scaling of high-cost processing modules;
 - Replacement or addition of precipitation products and forecasting models;
 - Partial deployment according to local infrastructure;
 - Standardized outputs for visualization and analysis.



ACKNOWLEDGEMENTS

