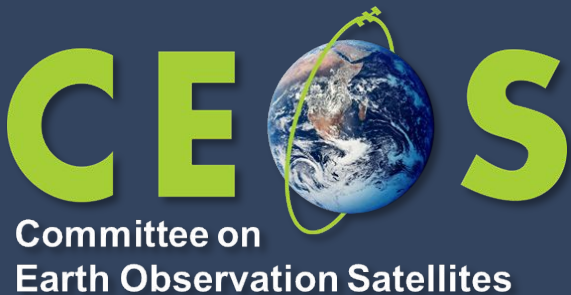


LSI-VC-18

OroraTech



Josephine Wong, OroraTech
Anastasia Sarelli, OroraTech Greece

Agenda Item 7.5

LSI-VC-18

Ispra, Italy

2-5 September, 2025

- Company intro
- Current missions
- Sensor specifications
- Data products
- Cal/Val L1
- Cal/Val LST
- Discussion on CEOS-ARD

Hi, we are OroraTech



2018

Founded
in Munich

150

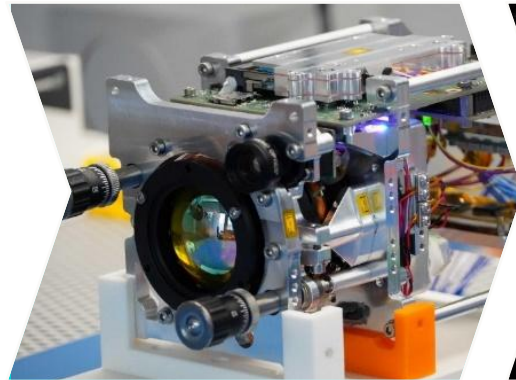
Employees on
5
continents

300

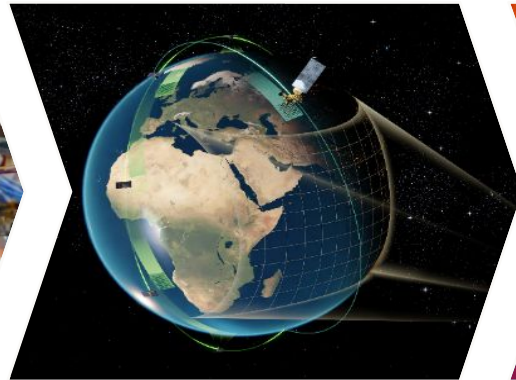
Users in
20
countries

27

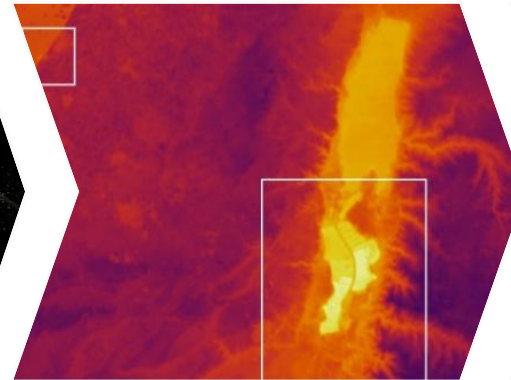
Satellite sources
10
Own satellites
in orbit



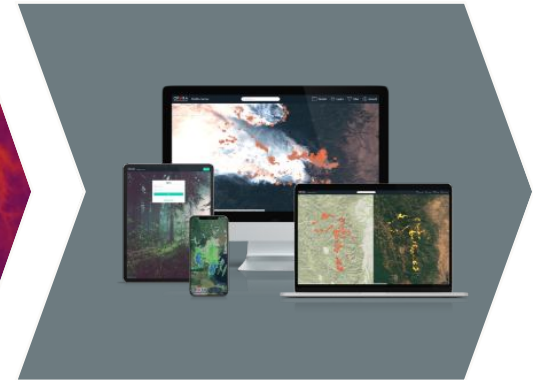
**Patented thermal
camera**



**Unique constellation
for real-time data**



**On-Board
Processing**



**Visualization,
API**

OroraTech in the news



20M Greece



OroraTech receives €20M to build satellite-based wildfire system in Greece

BY ABHINAYA PRABHU · JULY 4, 2024 · 2 MINUTE READ



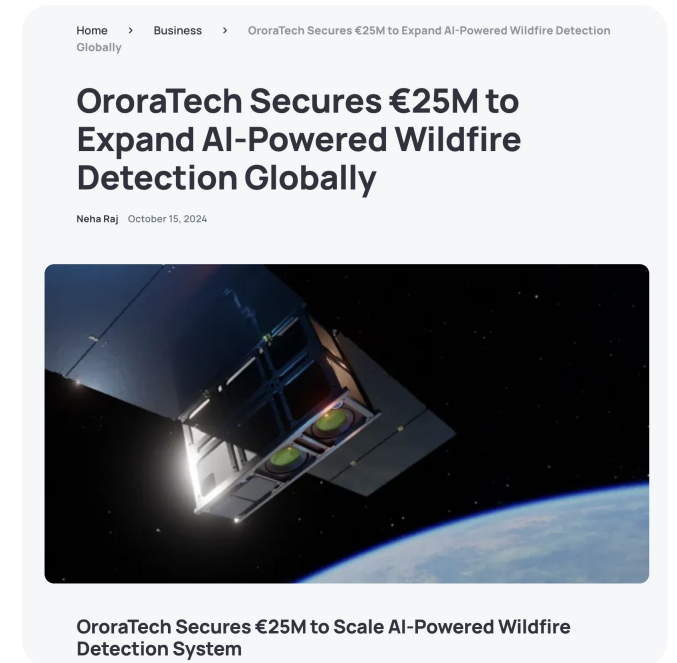
Picture credits: OroraTech

The Greek Ministry of Digital Governance has awarded a €20 million investment into the German thermal intelligence provider [OroraTech](#). It will be used to build a satellite-based early warning system for [wildfires](#).

72M CAN with Spire



25M Series B closed



OroraTech



ESA Copernicus Contributing Missions Program

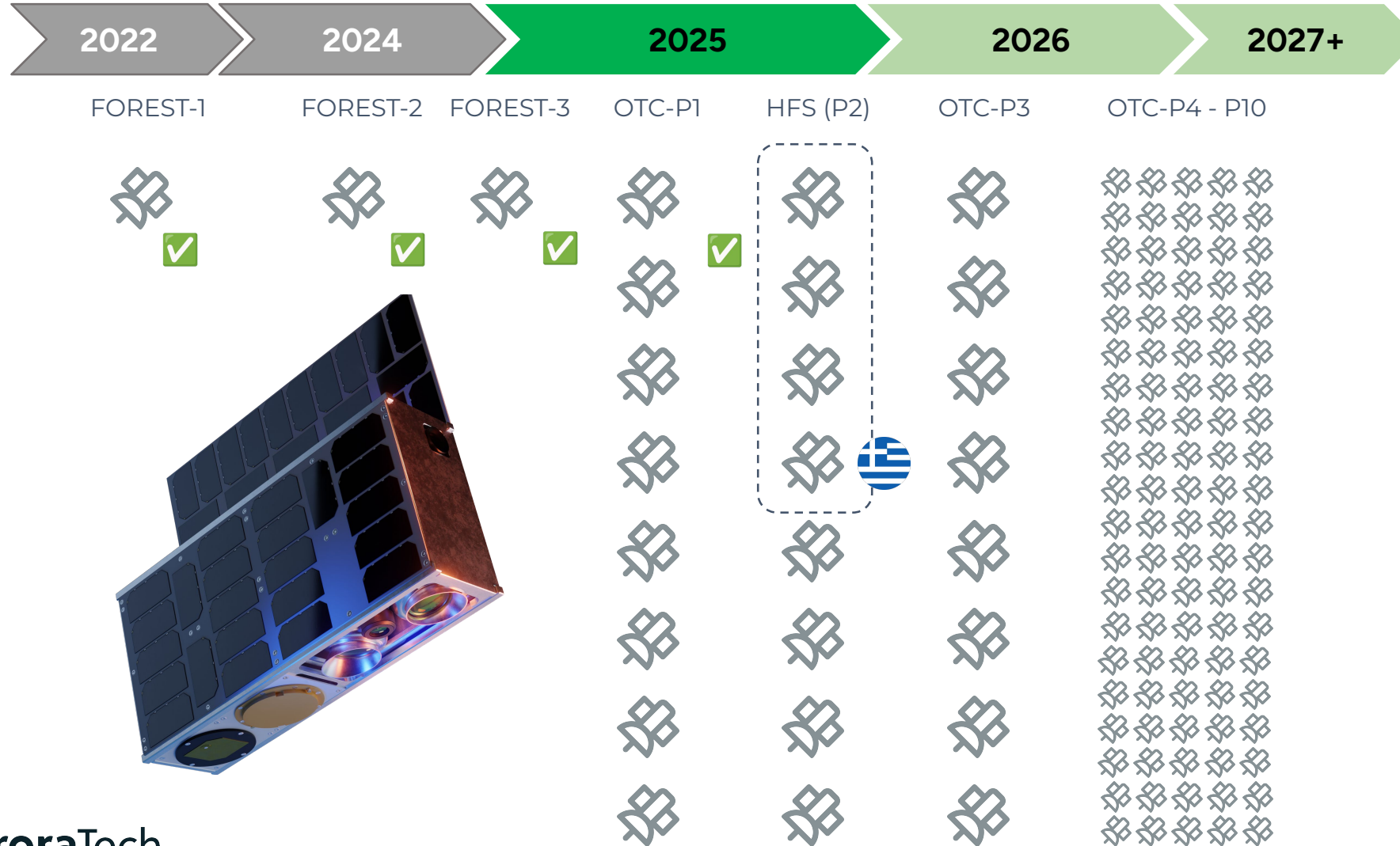


 OroraTech

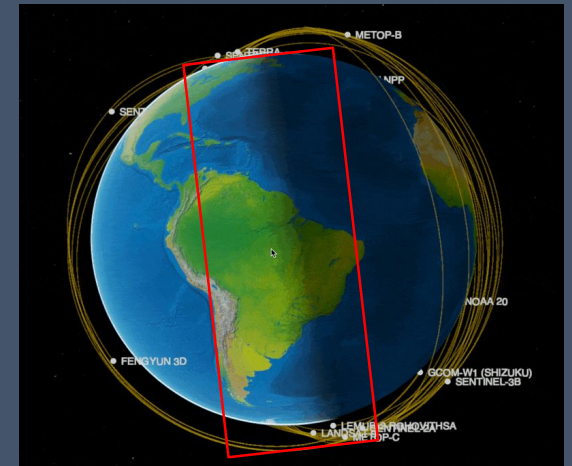
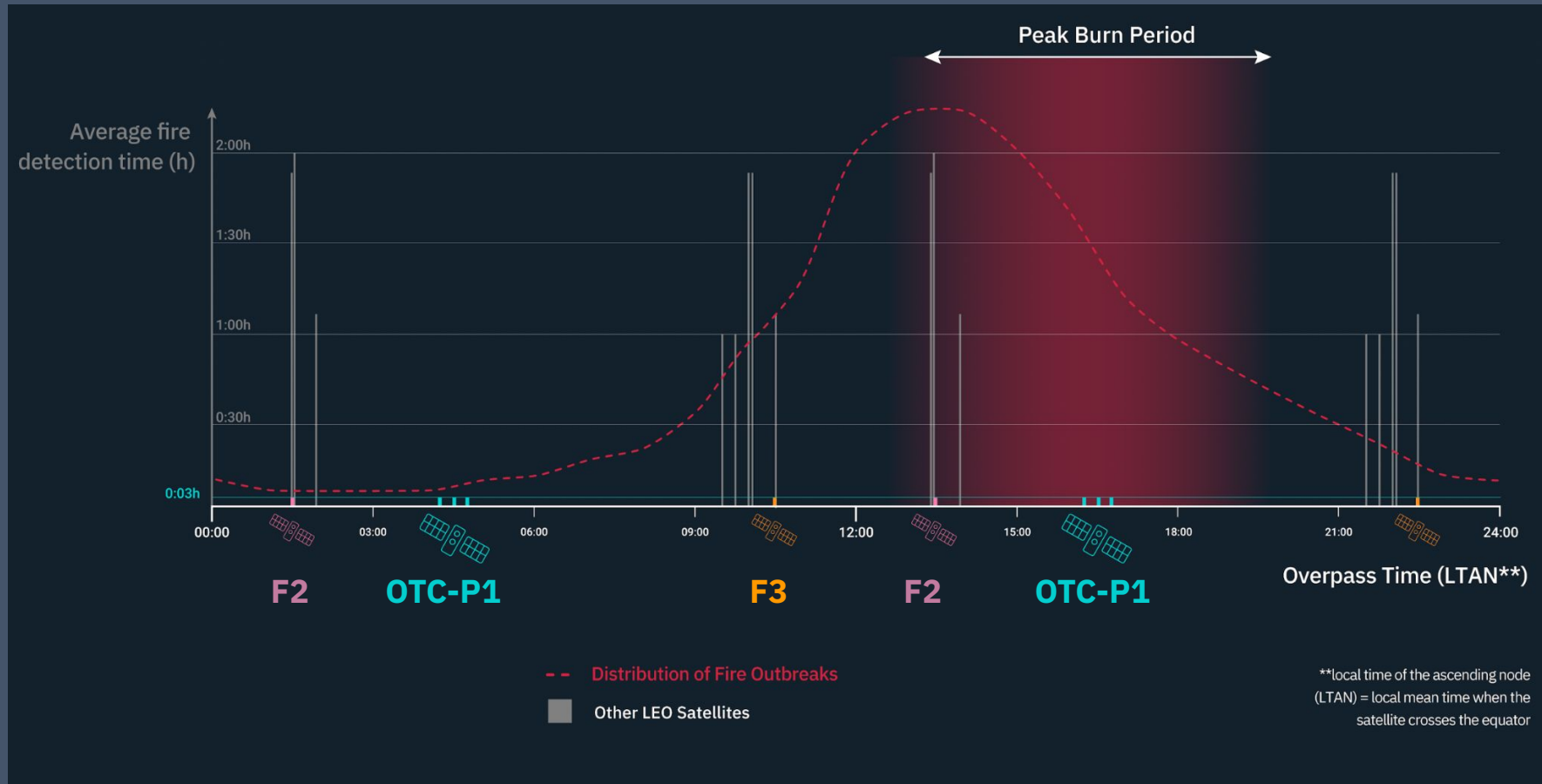
OroraTech



Towards 30 minutes revisit



Fixing the “afternoon data gap”



Orbits of different satellites. Each orbital plane is indicated in yellow. Red box highlights the peak burn period which we aim to cover



Our second generation TIR Imager

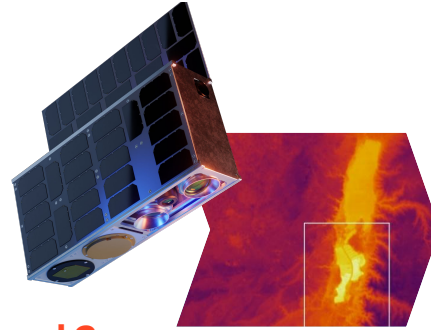
- On board Forest-2, Forest-3 and OTC-P1
- 410 km swath at 200m GSD
- Thermal channels:
 - M0: 3.4 – 4.2 μm
 - L1: 8.1 – 9.3 μm
 - L2: 10.4 – 12.5 μm
- Additional RGB sensor, on-board GPU
- Saturation 650 K for MWIR



OroraTech Data Products



FOREST Clean Data



Level 1

Level 2

Level 3 & Level 4



Tasking
On-Demand L1+L2

Preview

Scan
Systematic L1+L2

2025

TOA
Radiance
and BT
Top Of
Atmosphere
Radiance and
Brightness
Temperature

Preview

Release 2025

OT NRT Active Fire
Near Real Time Fire Detection

Preview

Release 2025

OT LST
Land Surface Temperature

Preview

Release 2026

OT SST
Sea Surface Temperature

2026

OT FRP
Fire Radiative Power

2026

OT Aggregated Active Fire
Wildfire Detection and Monitoring

Live

OT Fire Spread
Fire Spread Prediction

Live

OT Burnt Area
Burnt Area Mapping

Live

OT FireSight AI
Short Term Fire Hazard Prediction

Preview

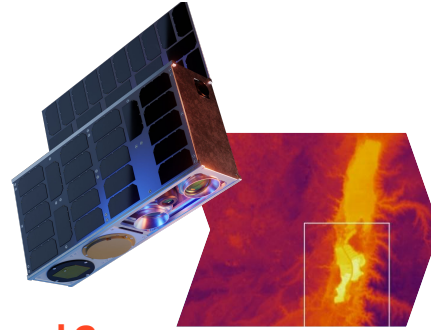
WFS & API
Tasking,
Dissemination,
Analysis



OroraTech Data Products

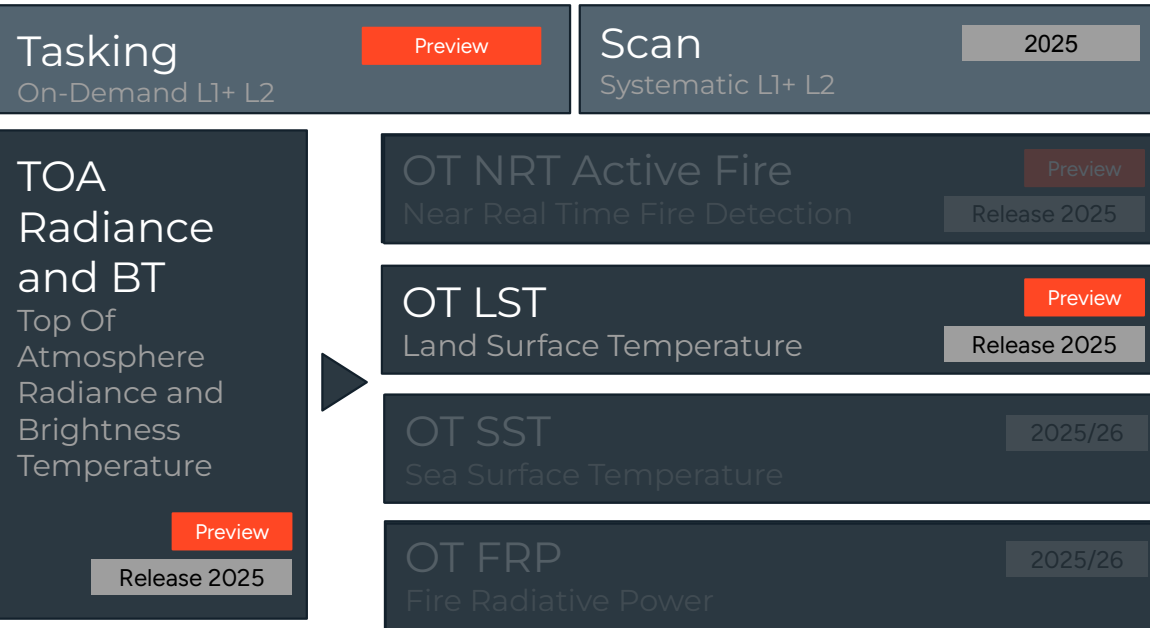


FOREST Clean Data



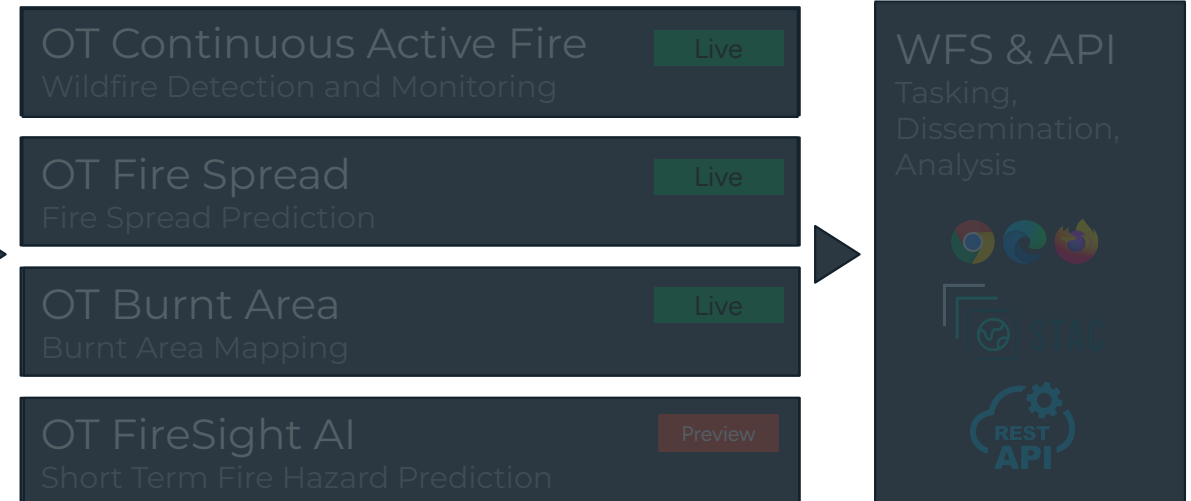
Level 1

Level 2



Smart Data & Analytics

Level 3 & Level 4



Preview

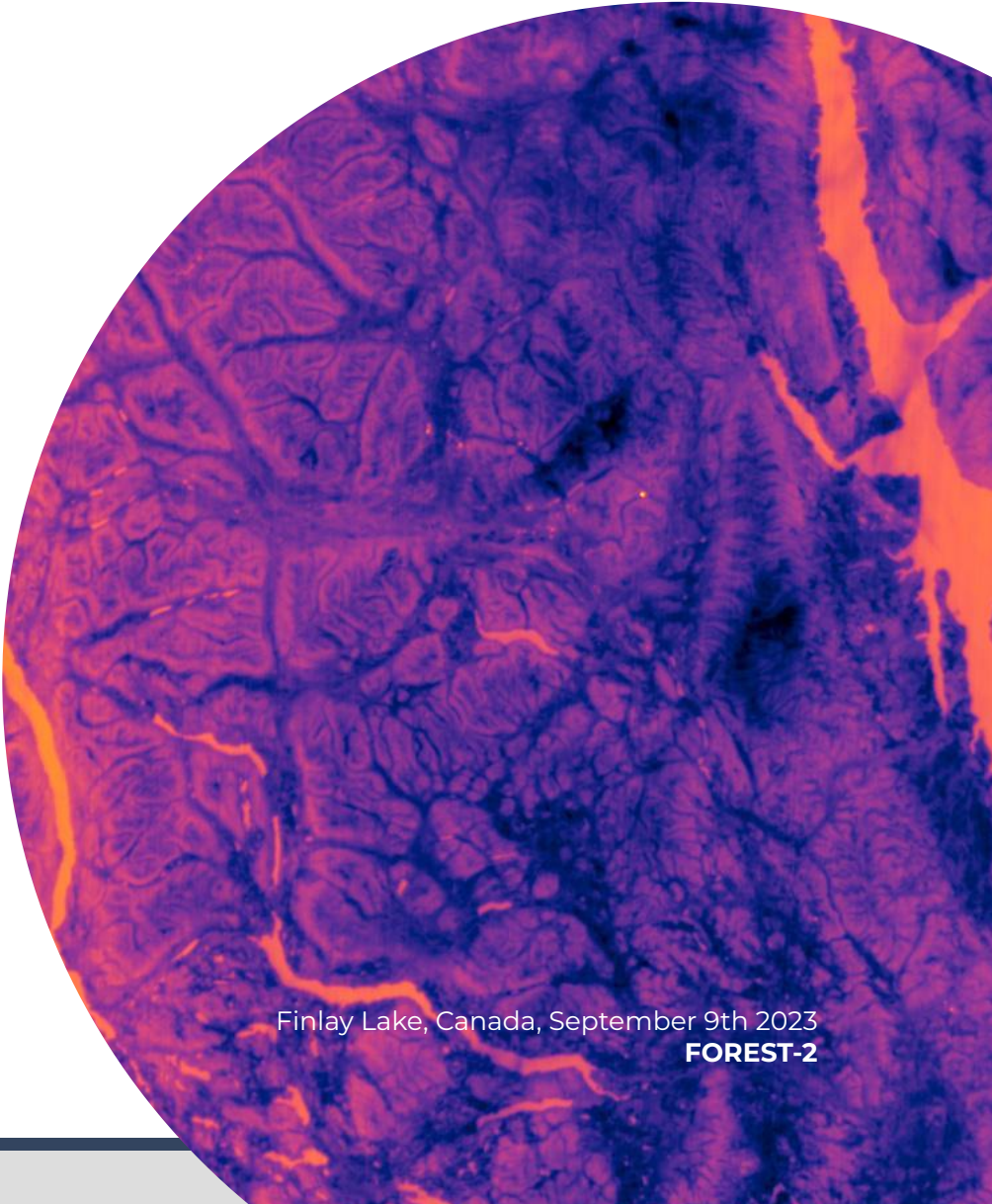
Radiances and BT



Target Data Product Specs	
GSD	200 m
Absolute Radiometric Accuracy	M0: 8K L2: 2K
Image Size	Up to 410km x 450km
Absolute Geolocation Accuracy	200m = 1 pixel
Band-to-Band Registration Accuracy	200m = 1 pixel
Revisit	Daily (end of 2025) - Subdaily (2026+)
Format	netCDF
Cloud Mask	available

* further improvements expected in final release

OroraTech



Finlay Lake, Canada, September 9th 2023
FOREST-2

Preview

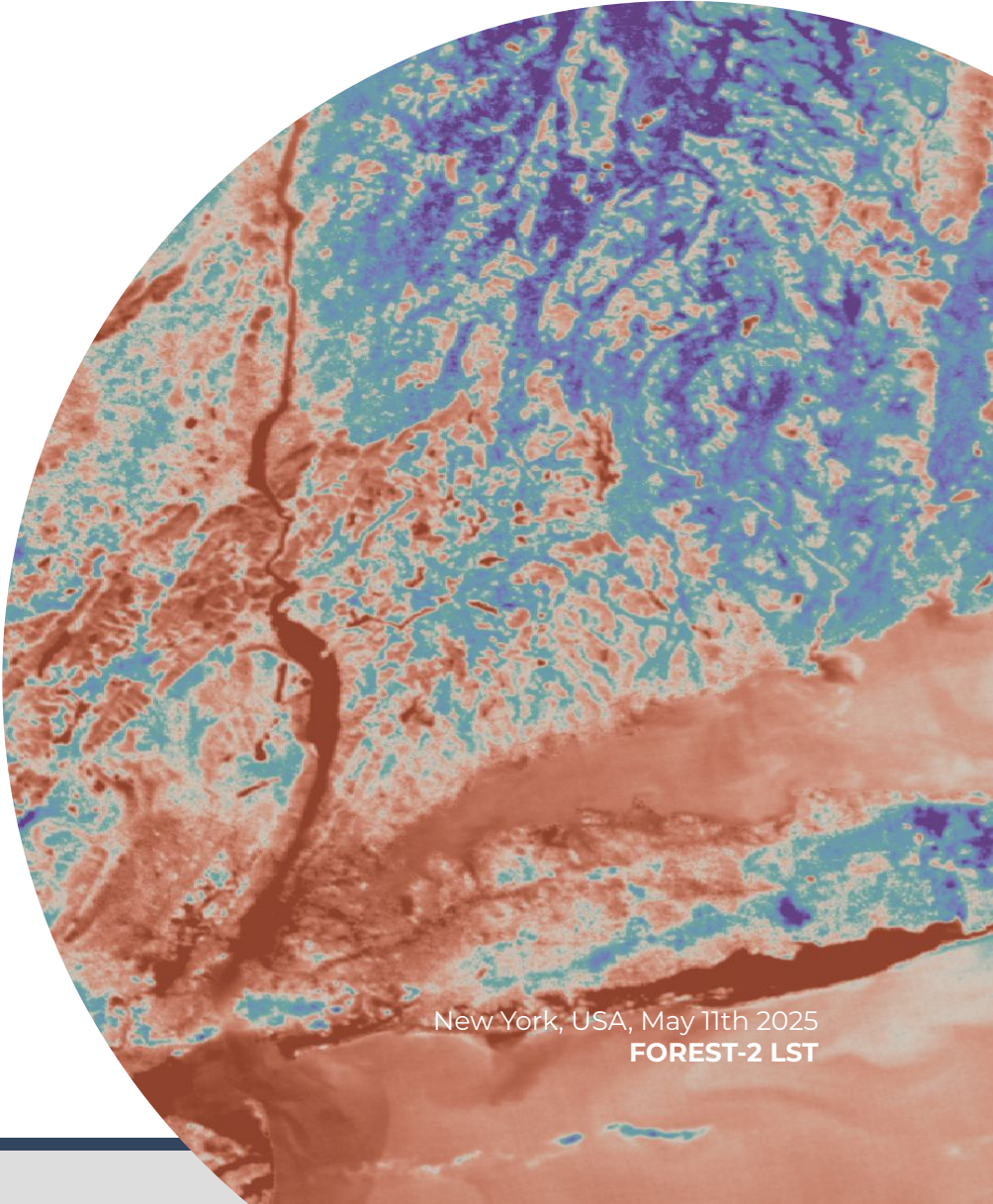
Single Band Retrieval



Target Data Product Specs	
GSD	200 m
Absolute Radiometric Accuracy	3K
Image Size	Up to 410km x 450km
Absolute Geolocation Accuracy	200m = 1 pixel
Revisit	Daily (end of 2025) - Subdaily (2026+)
Format	netCDF, GTiff
Cloud Mask	available

* further improvements expected in final release

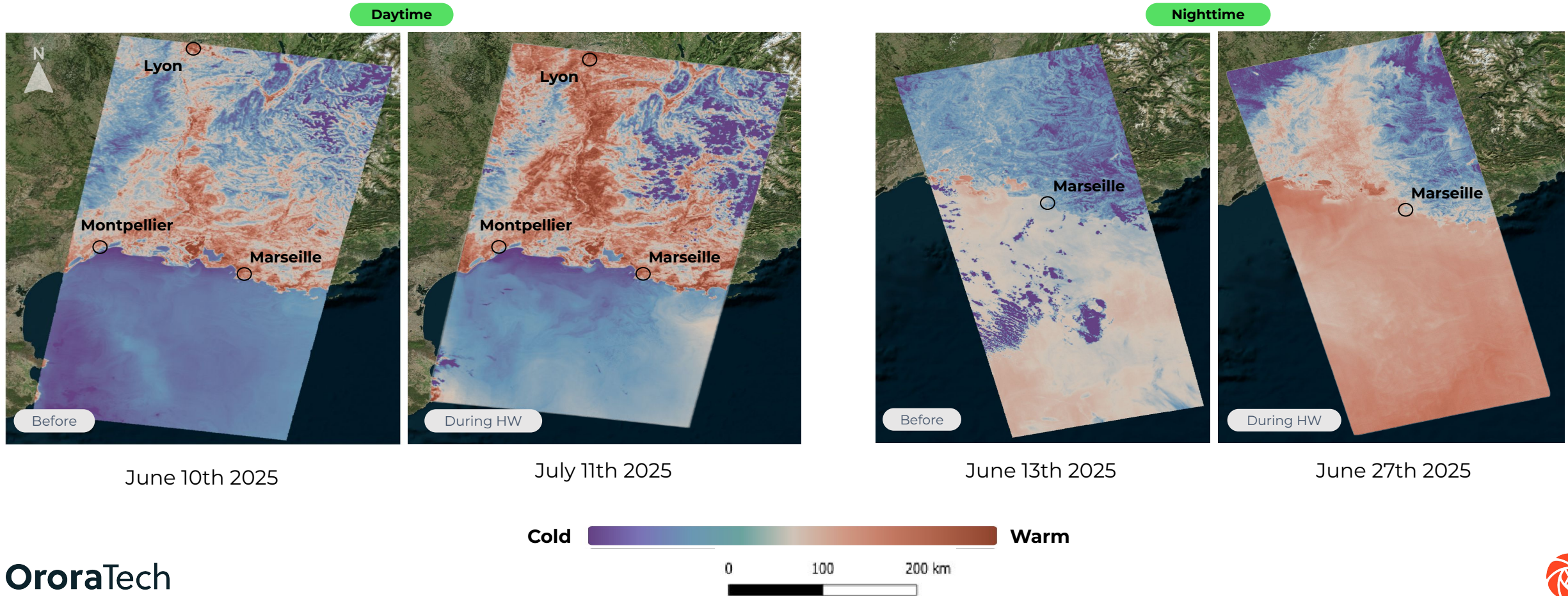
OroraTech



We captured the 2025 heatwave in South of France



FOREST-2 LST



Methodology

On-Ground

- Geometric characterization (MTF)
- Radiometric calibration and characterization

In-Flight

- Lunar calibration
⇒ Gains
- Deep-space acquisitions
⇒ Camera-self emitting mode
- Flatfielding
- Automated cross-overpass tasking & validation

Independent Data Quality Assessment

Collaboration with the OPT-MPC

- As a Copernicus Contributing Mission, the data quality of OroraTech's data products are regularly assessed by the Optical Mission Performance Cluster (OPT-MPC) of ESA.
- These data products are in the progress of being CEOS ARD compliant.

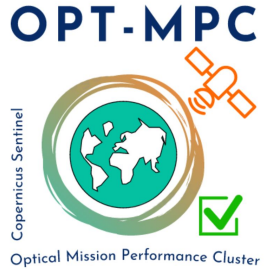


OroraTech



Independent Data Quality Assessment

ESA OPT-MPC Assessment 2025/07



- ❖ **Radiometric accuracy:** Cross sensor validation with VIIRS of L1 product

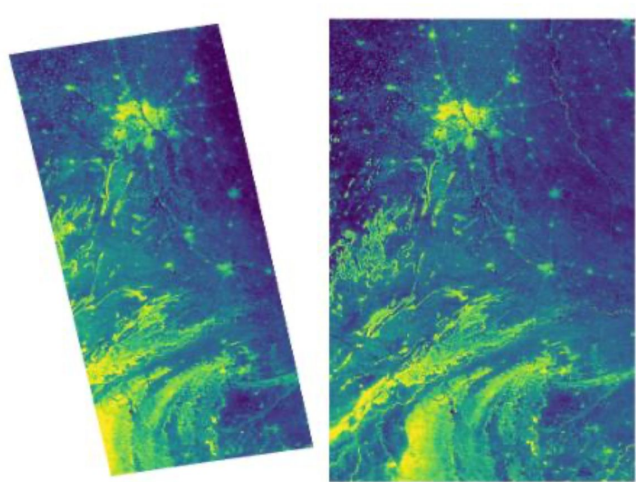


Figure 3. (left) The L2 band of the SAFIRE-2 image (a); (right) band 105 of the associated VIIRS product over the same area.

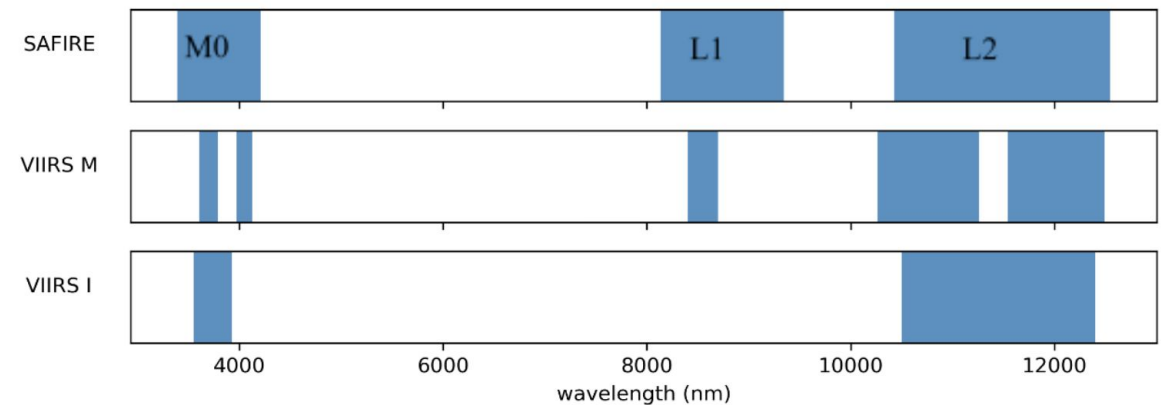
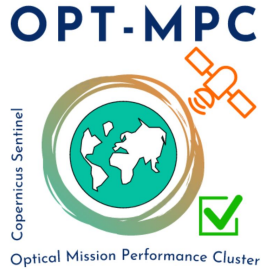


Figure. Spectral Response Functions of SAFIRE and VIIRS M and I bands.

Independent Data Quality Assessment

ESA OPT-MPC Assessment 2025/07



❖ **Radiometric accuracy:** Cross sensor validation with VIIRS of L1 product

- Radiometric accuracy better than 2%
- L2 band RMSE <0.5K

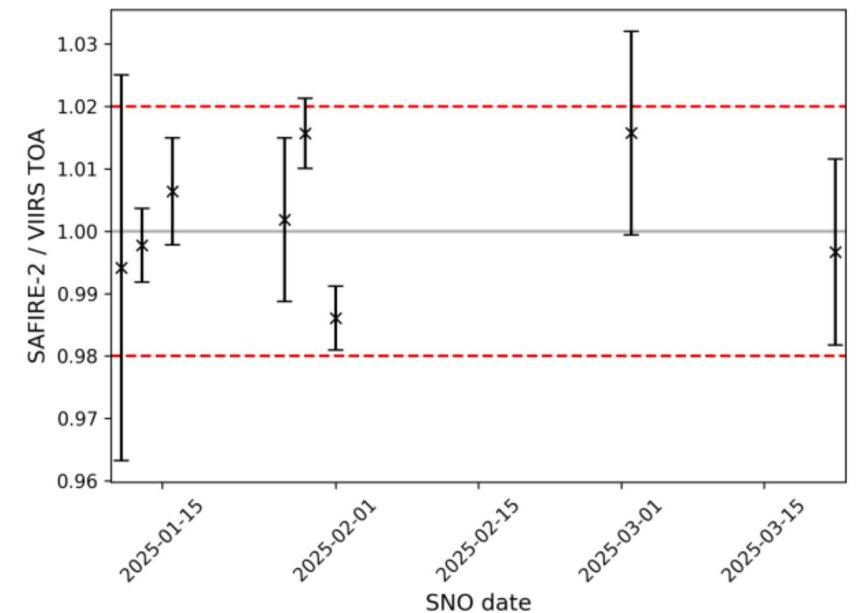


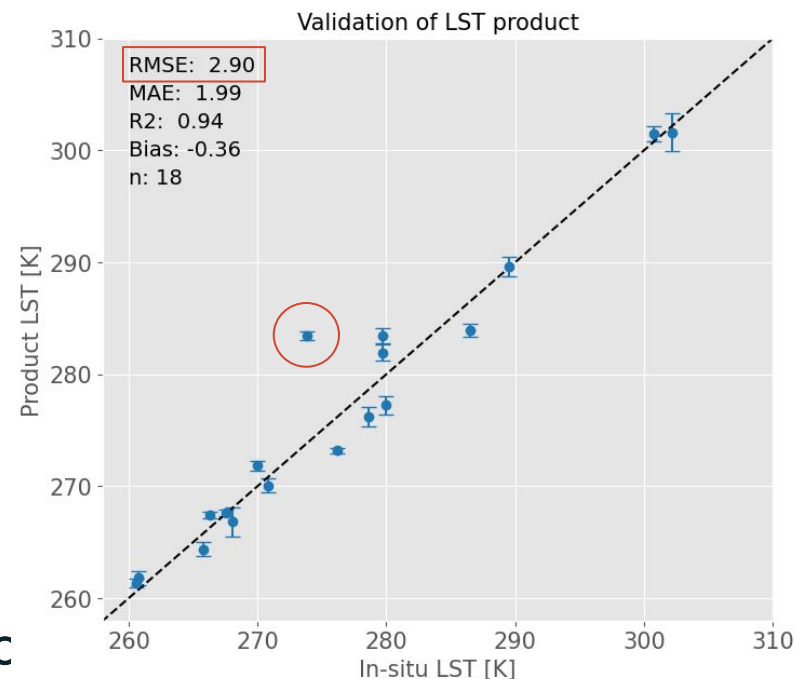
Figure. Results for L2 band of SAFIRE-2.

Independent Data Quality Assessment

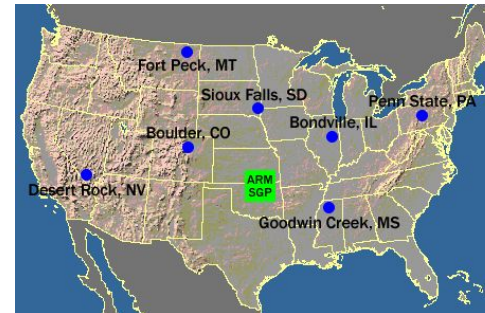
ESA OPT-MPC Assessment 2025/07



❖ Radiometric accuracy: Validation against ground stations









OroraTec



Source: [SURFRAD - NOAA Global Monitoring Division](#)



Source: [ECMWF Confluence Wiki](#)

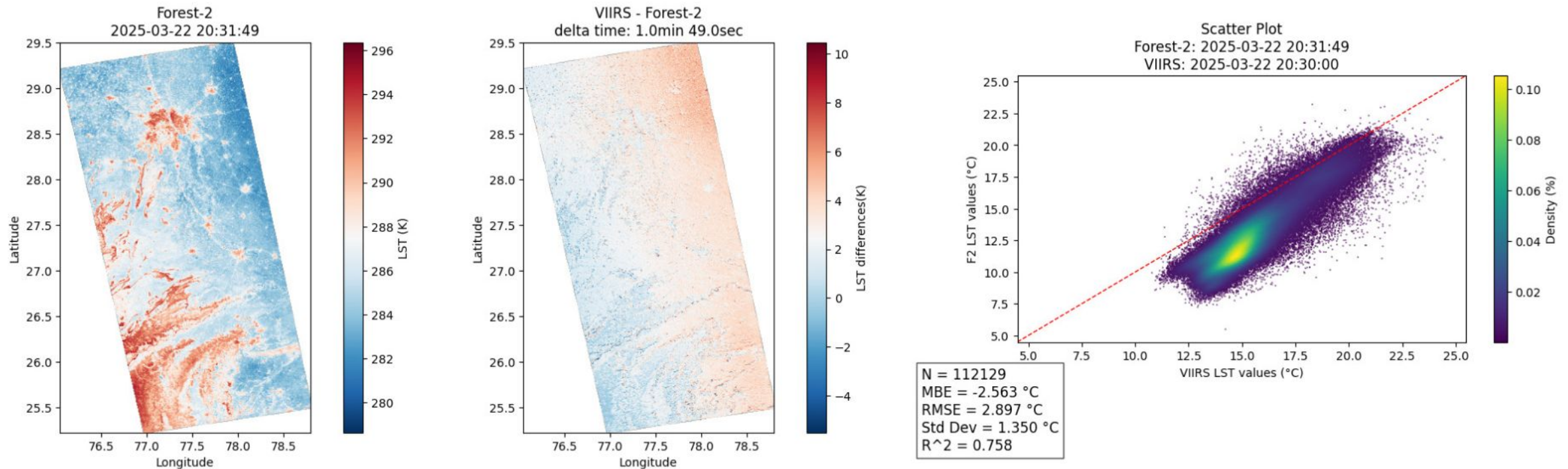
	Svartberget (Sweden)
	Hyytiälä (Finland)
	Robson Creek (Australia)
	Dahra (Senegal)
	KIT forest (Germany)
	Puechabon (France)

Source: Land Surface Temperature, Aerosol Optical Depth, and Water Vapour Sentinel-3 Products ([LAW](#))



Radiometric accuracy

Cross-sensor validation against VIIRS



CEOS ARD compliance



#	Item	Threshold	Target
1	General Metadata		
1.1	Traceability	Clarification needed	
1.2	Metadata Machine Readability		
1.3	Data Collection Time	✓	
1.4	Geographical Area	✓	
1.5	Coordinate Reference System	✓	✓
1.6	Map Projection	✓	
1.7	Geometric Correction Methods	Clarification needed	
1.8	Geometric Accuracy of the Data	Clarification needed	
1.9	Instrument	Clarification needed	

CEOS ARD compliance



#	Item	Threshold	Target
1	General Metadata		
1.1	Traceability		
1.2	Metadata Management		
1.3	Data Collection		
1.4	Geographical Information		
1.5	Coordinate Reference		
1.6	Map Projection		
1.7	Geometric Corrections		
1.8	Geometric Accuracy		
1.9	Instrument		

#	Item	Threshold	Target
1	General Metadata		
1.10	Spectral Bands	✓	
1.11	Sensor calibration	Clarification needed	
1.12	Radiometric Accuracy	✓	Clarification needed
1.13	Algorithms	Clarification needed	
1.14	Auxiliary Data	✓	Clarification needed
1.15	Processing Chain Provenance	Clarification needed	
1.16	Data Access	--	
1.17	Overall Data Quality	Clarification needed	

CEOS ARD compliance



#	Item	Threshold	Target
1	General Metadata		
1.1	Traceability		
1.2	Metadata Machine Readability		
1.3	Data Collection		
1.4	Geographical		
1.5	Coordinate Reference		
1.6	Map Projection		
1.7	Geometric Corrections		
1.8	Geometric Accuracy		
1.9	Instrument		

#	Item	Threshold	Target
1	General Metadata		
1.10	Spectral Band		
1.11	Sensor Calibration		
1.12	Radiometric		
1.13	Algorithm		
1.14	Auxiliary Data		
1.15	Processing		
1.16	Data Access		
1.17	Overall Data		

#	Item	Threshold	Target
2	Per-pixel metadata		
2.1	Metadata Machine Readability	✓	✓
2.2	No Data	✓	✓
2.3	Incomplete Testing	✓	Clarification needed
2.4	Saturation	✓	✓
2.5	Cloud	✓	--
2.6	Cloud Shadow	--	--
2.7	Snow/ Ice Mask	--	--
2.8	Solar and Viewing Geometry	✓	✓

CEOS ARD compliance



#	Item	Threshold	Target
1	General Metadata		
1.1	Traceability		
1.2	Metadata Machine Readability		
1.3	Data Collection		
1.4	Geographical		
1.5	Coordinate Reference		
1.6	Map Projection		
1.7	Geometric Corrections		
1.8	Geometric Accuracy		
1.9	Instrument		

#	Item	Threshold	Target
1	General Metadata		
1.10	Spectral Band		
1.11	Sensor Calibration		
1.12	Radiometric		
1.13	Algorithm		
1.14	Auxiliary Data		
1.15	Processing		
1.16	Data Access		
1.17	Overall Data Quality		

#	Item	Threshold	Target
2	Per-pixel metadata		
2.1	Metadata Machine Readability	✓	✓
2.2	No Data	✓	✓
2.3	Incomplete Testing	✓	Clarification needed
2.4	Saturation	✓	✓
2.5	Cloud	✓	--
2.6	Cloud Shadow	--	--
2.7	Snow/ Ice Mask	--	--
2.8	Solar and Viewing Geometry	✓	✓

CEOS ARD compliance



#	Item	Threshold	Target
1	General Metadata		
1.1	Traceability		
1.2	Metadata Machine Readability		
1.3	Data Collection		
1.4	Geographical		
1.5	Coordinate Reference		
1.6	Map Projection		
1.7	Geometric Corrections		
1.8	Geometric Accuracy		
1.9	Instrument		

#	Item	Threshold	Target
1	General Metadata		
1.10	Spectral Bandwidth		
1.11	Sensor Calibration		
1.12	Radiometric		
1.13	Algorithm		
1.14	Auxiliary Data		
1.15	Processing		
1.16	Data Access		
1.17	Overall Data		

#	Item	Threshold	Target
2	Per-pixel metadata		
2.1	Metadata Machine Readability	✓	✓
2.2	No Data	✓	✓
2.3	Incomplete		
2.4	Saturation		
2.5	Cloud		
2.6	Cloud Shadow		
2.7	Snow/ Ice M		
2.8	Solar and V		

#	Item	Threshold	Target
3	Radiometric and Atmospheric Corrections		
3.1	Measurement	✓	--
3.2	Corrections for Atmosphere and Emissivity	Clarification needed	
3.3	Measurement Uncertainty	--	To-be-implemented
4	Geometric Corrections		
4.1	Geometric Correction	--	--

- Cross-sensor validation
 - Coordinate validation activities with publicly available missions to ensure comparability and reliability.
- ATBD (Algorithm Theoretical Basis Document)
 - Is public release required?
 - Would independent assessments (e.g. ESA MPC) provide sufficient credibility for end users?
 - Clarifications of some requirements in CEOS ARD is needed

Discussion on CEOS-ARD



- VC & Interoperability
 - Explore the use of a universal resampling grid to enhance consistency across missions
 - Clarifications on the target audience and their user needs
 - Introduce subgroups of target users and optional requirements for each user groups



Thank you!



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