Thermal Data Intelligence

04/05/2023

Geospatial World Forum, Rotterdam

Session: Generating Intelligence with AI/ML

The New York Times

Wildfires Are Intensifying.

BBC NEWS

Climate change: Heat deaths could triple by 2050

Bloomberg

Drought in Americas Threatens Outlook for Crucial Crop Supplies

Detect **natural threats** before they cause economical or physical harm

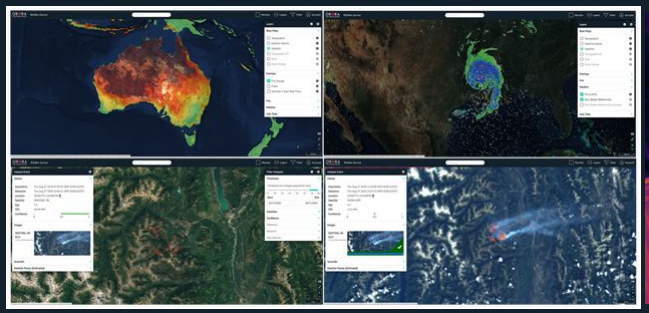
Use **scarce resources** most efficiently

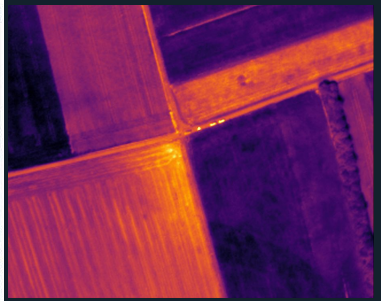
Global insights - natural disasters such as wildfire or drought **do not stop at borders.**

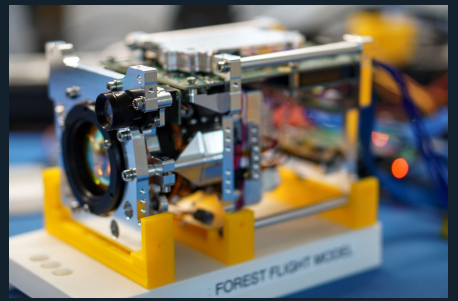
Company Profile

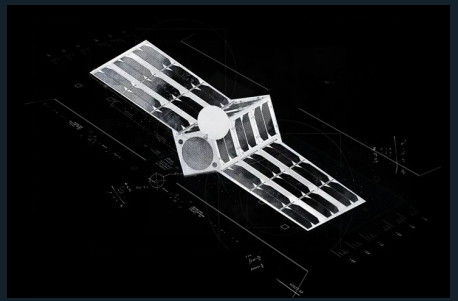
ORORA TECHNOLOGIES

- Founded 2018 in Munich/Germany
- Spin-off from the Technical University of Munich
- Grown to a team of over 80 international team members
- Successfully raised >20 Mio € in Seed & Series A Round









Market Leader - Over 30 customers worldwide trust in us

Constellation for continuous global monitoring

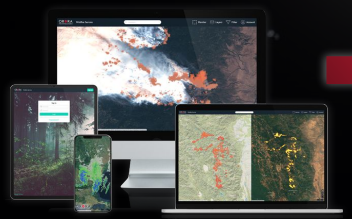
Q1 2022 → June 2023 → 2024 → 2026-2027

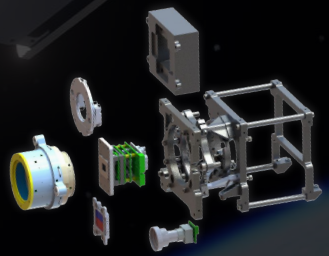
Forest-1 in space ✅
Successful in-orbit demonstration

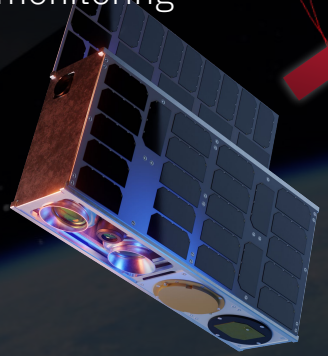
Forest-2 launch
Swath: 410 km
GSD: 200m

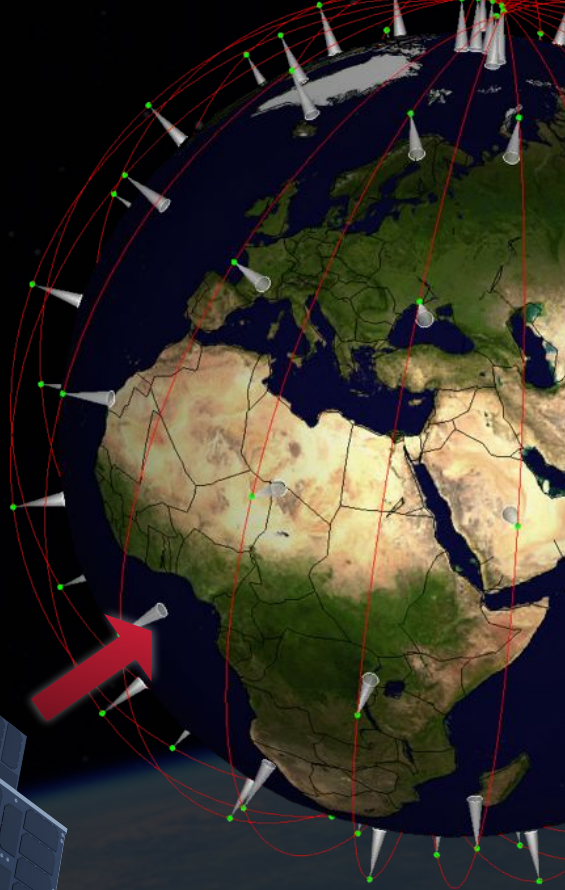
Constellation launch
12h revisit global data acquisition

Constellation expansion
Real-time global monitoring

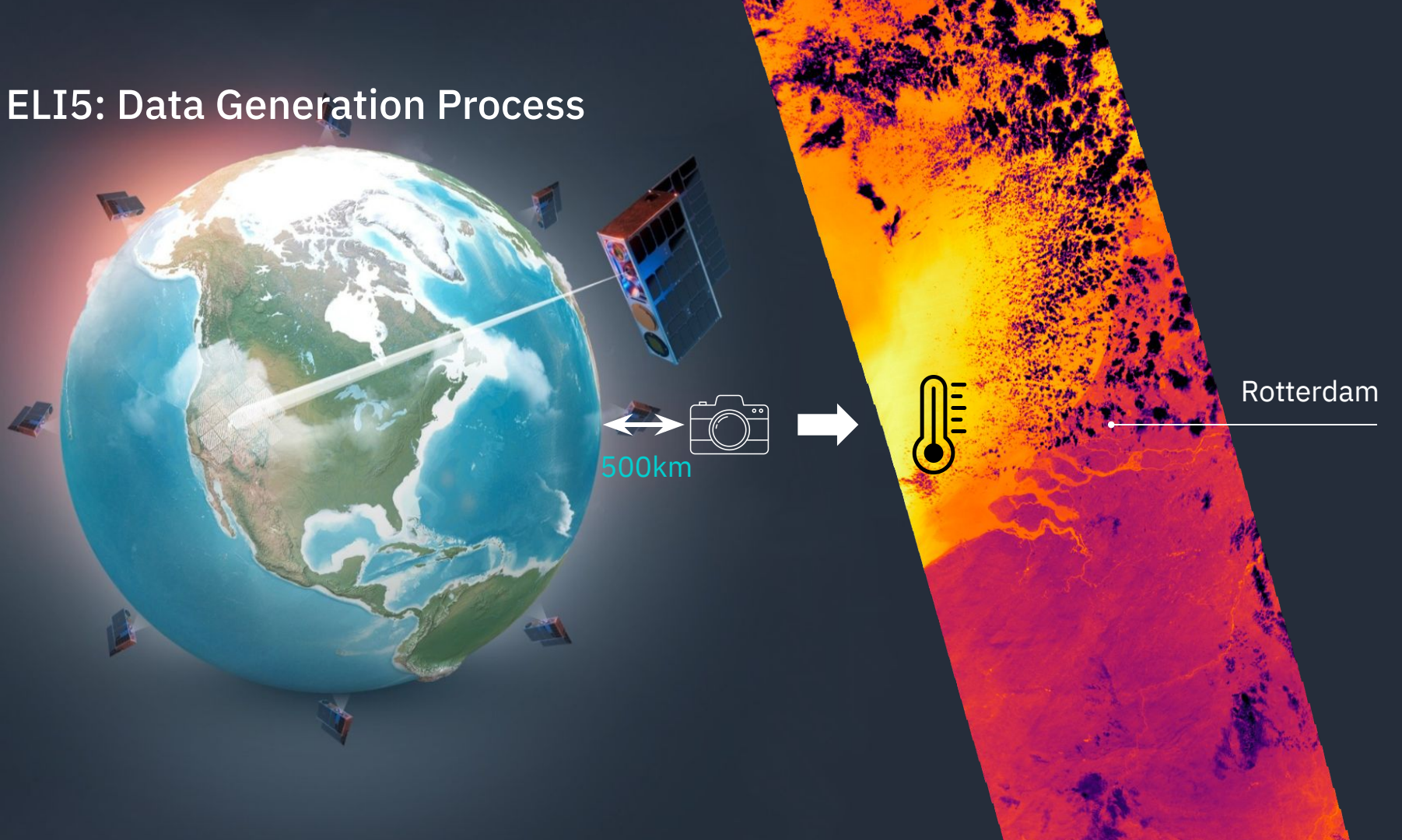




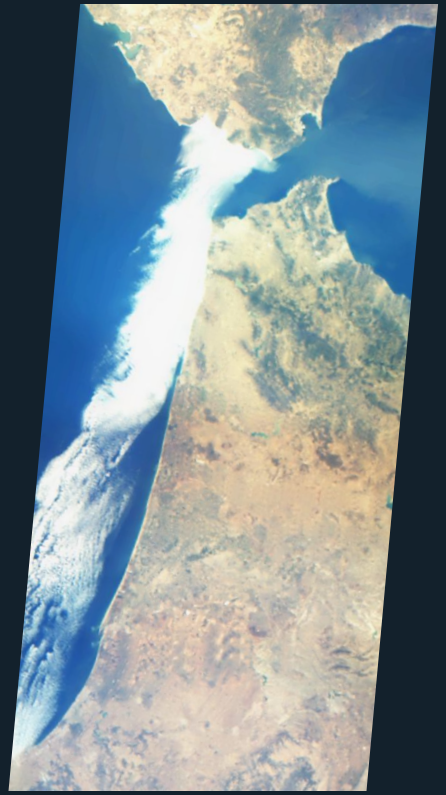




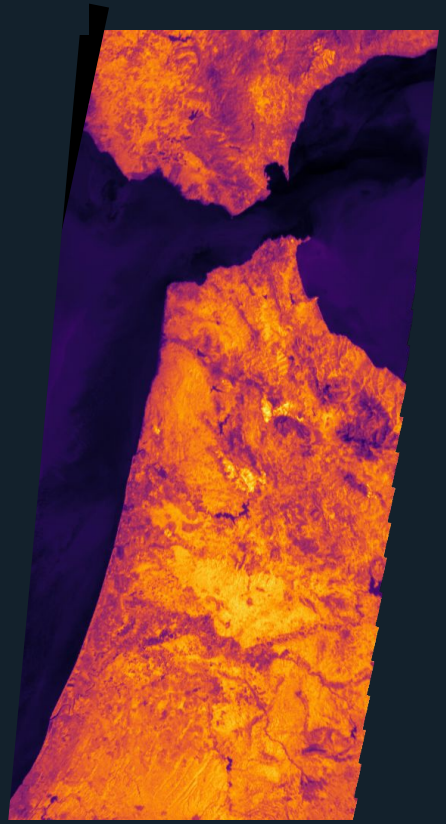
ELI5: Data Generation Process



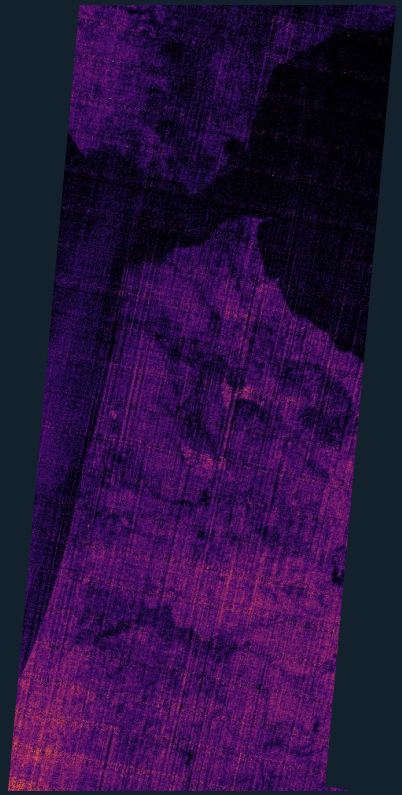
FOREST-1 Picture Family



RGB

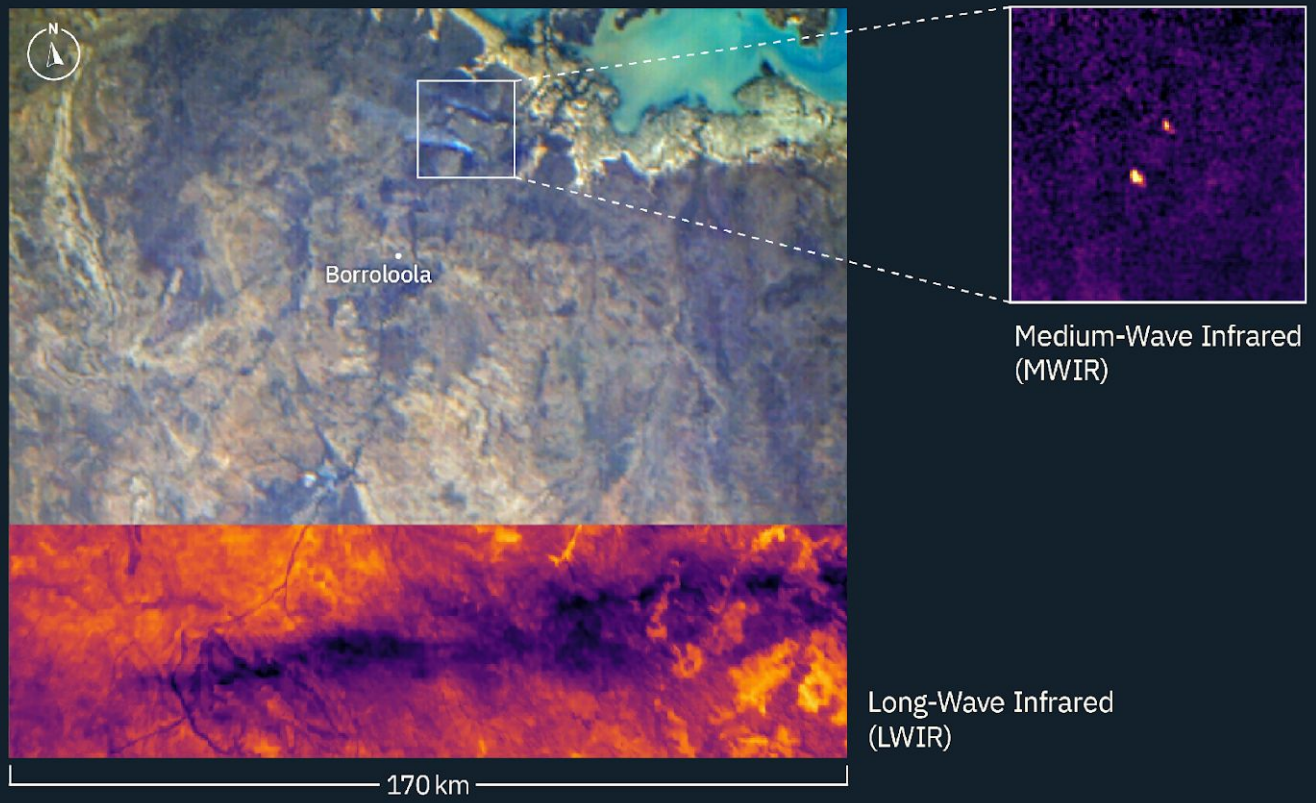


LWIR

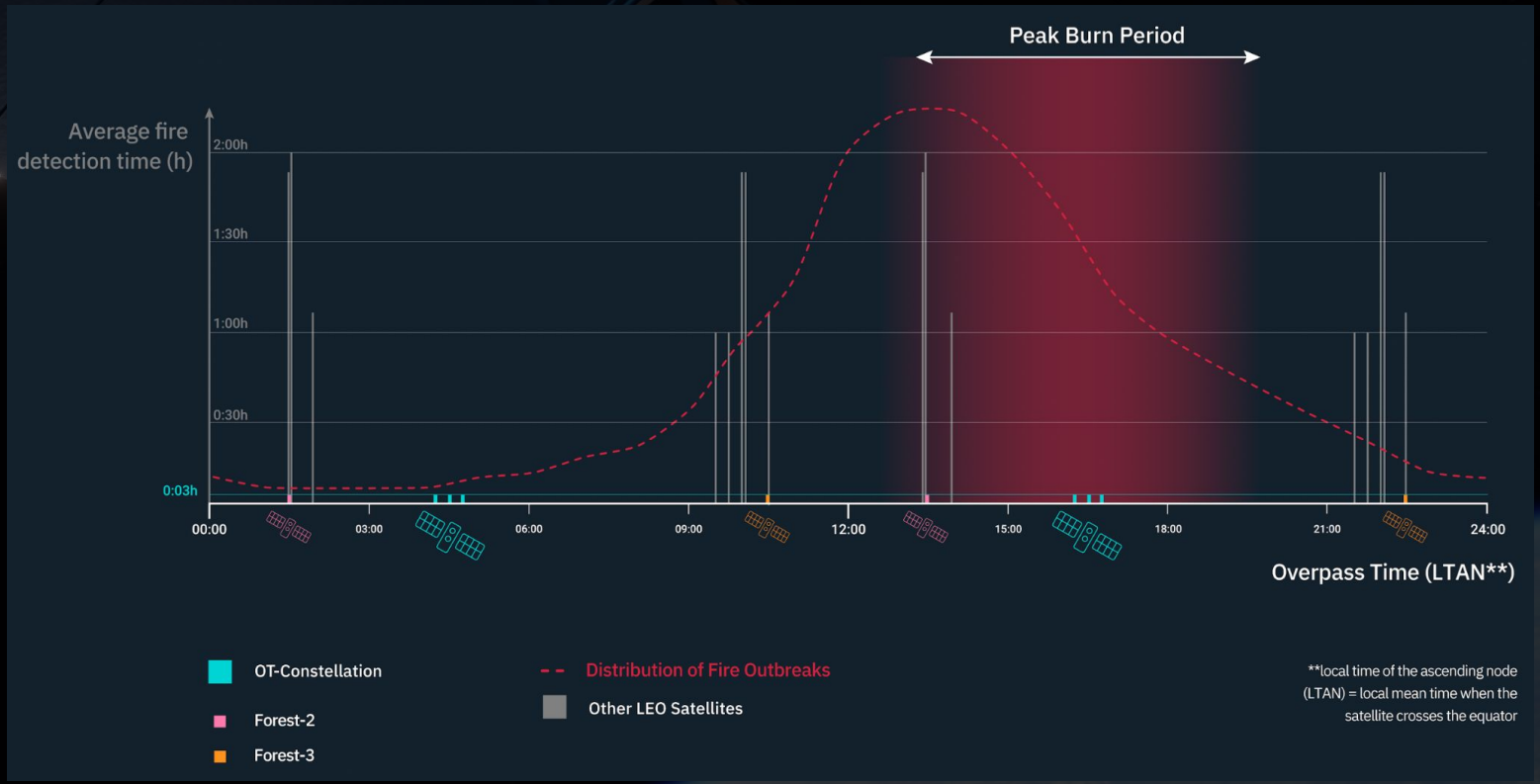


MWIR

FOREST-1: Wildfire Data Example



Filling the monitoring gap - providing data that does not exist yet.



We Transform raw Data Into Actionable Insights

Our Data Sources

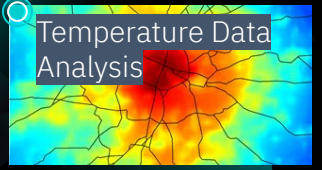
01 OroraTech Satellites

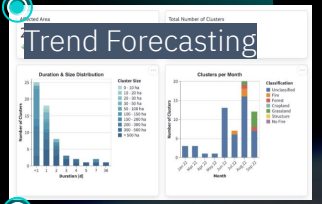
02 Public Satellites **

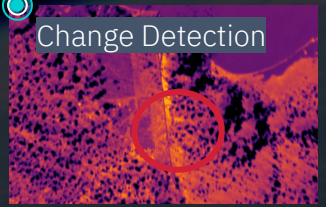
03 Ground-based Cameras & IoT Sensors

04 Customer Data

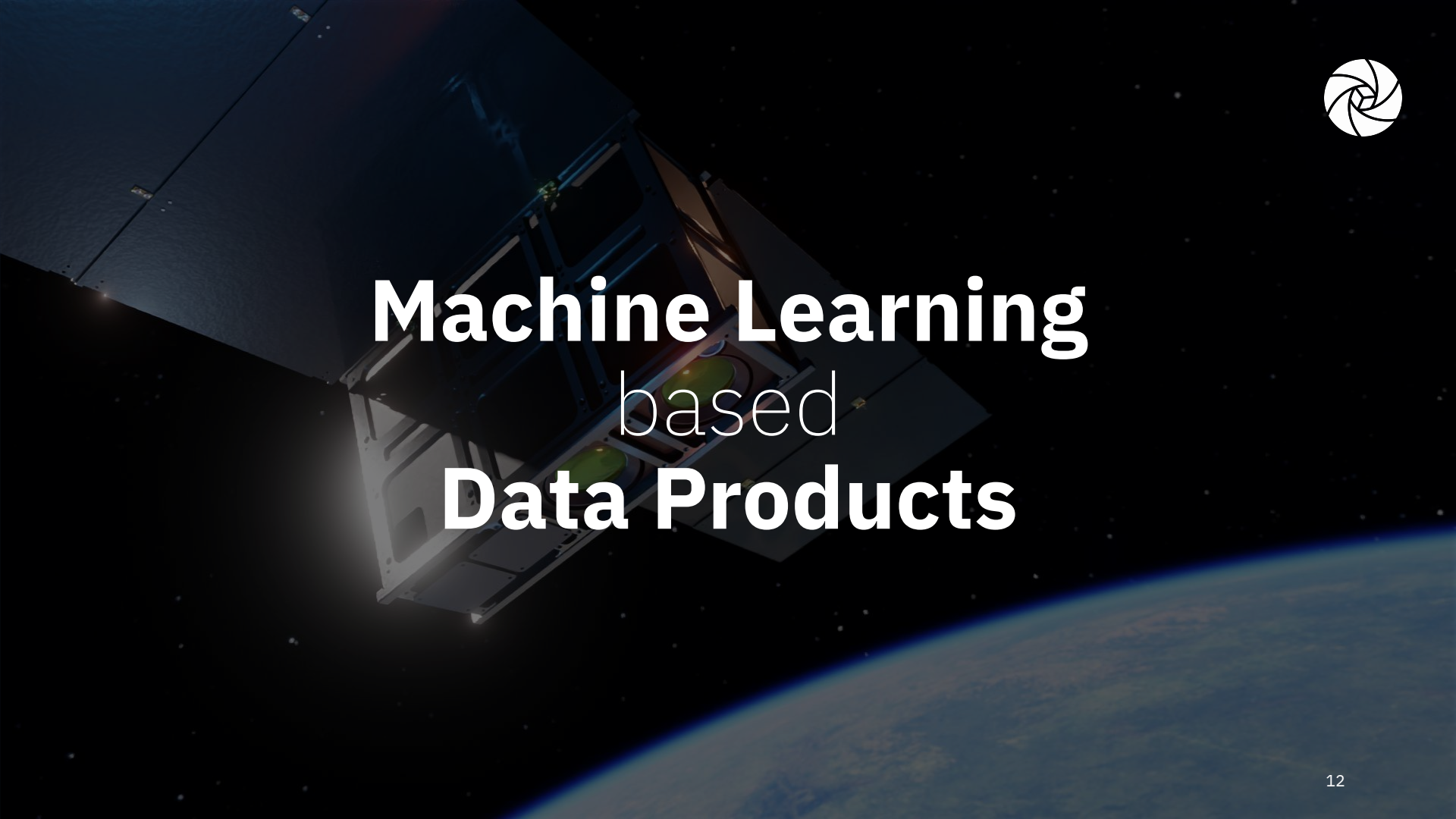
Analytics Core





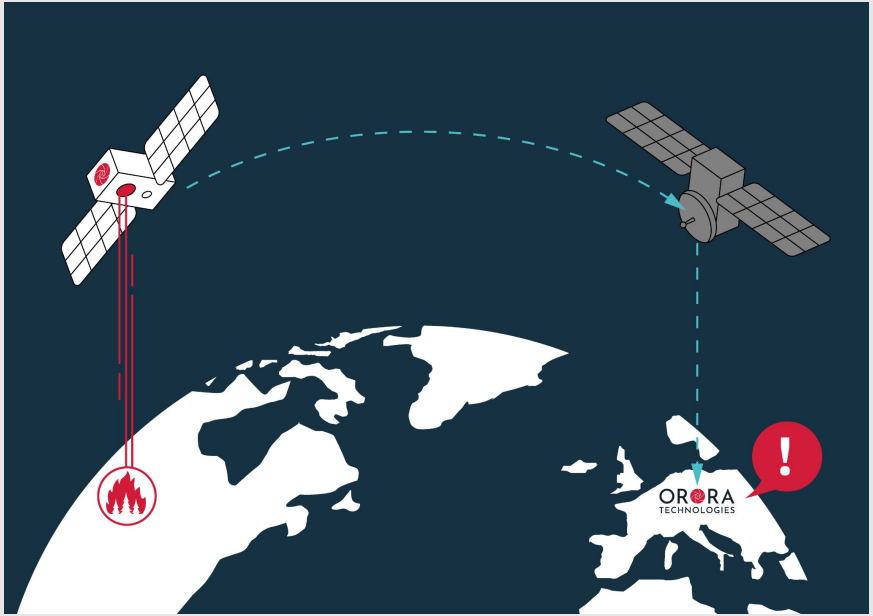


**AQUA, TERRA, SUOMI-NPP, NOAA-20, SENTINEL-3A, SENTINEL-3B, GOES-16, GOES-17, Meteosat-8, Meteosat-10, Meteosat-11, MetOp-A, MetOp-B, MetOp-C, LANDSAT-8, Himawari-8, SENTINEL-2A, SENTINEL-2B, SENTINEL-5P, FENGYUN-3D


Machine Learning
based
Data Products

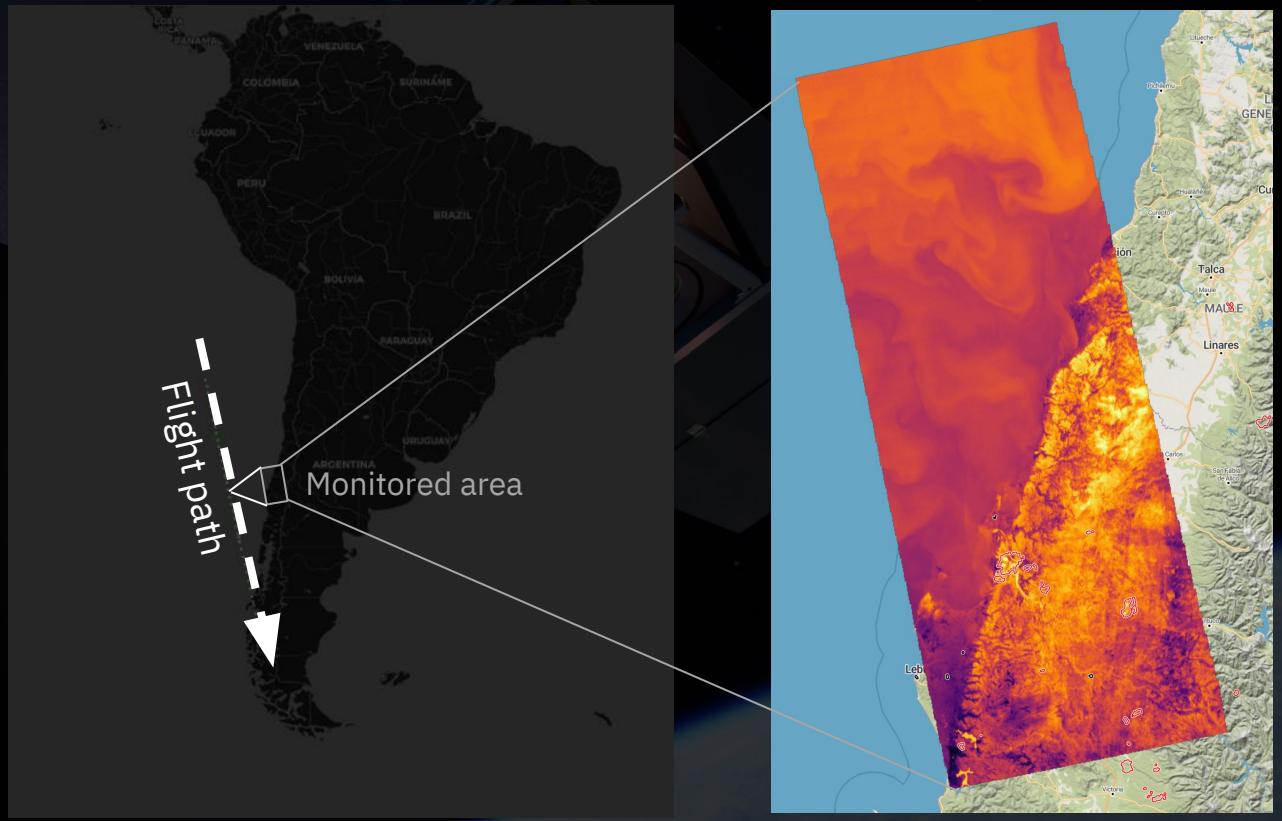
Edge ML: On-Board Processing

Closing the gap between detection and on-ground action.

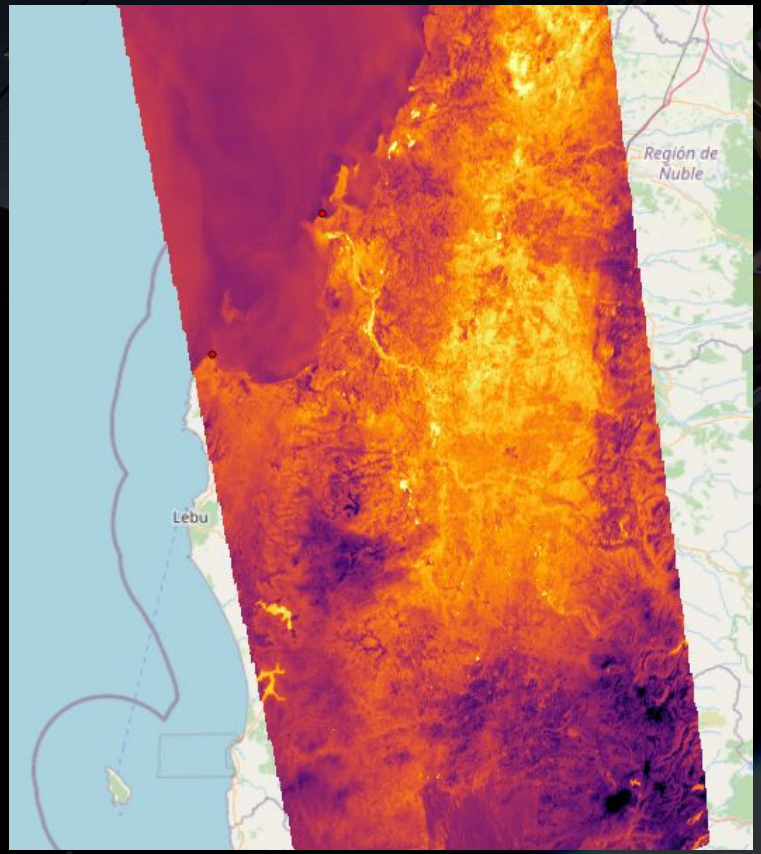


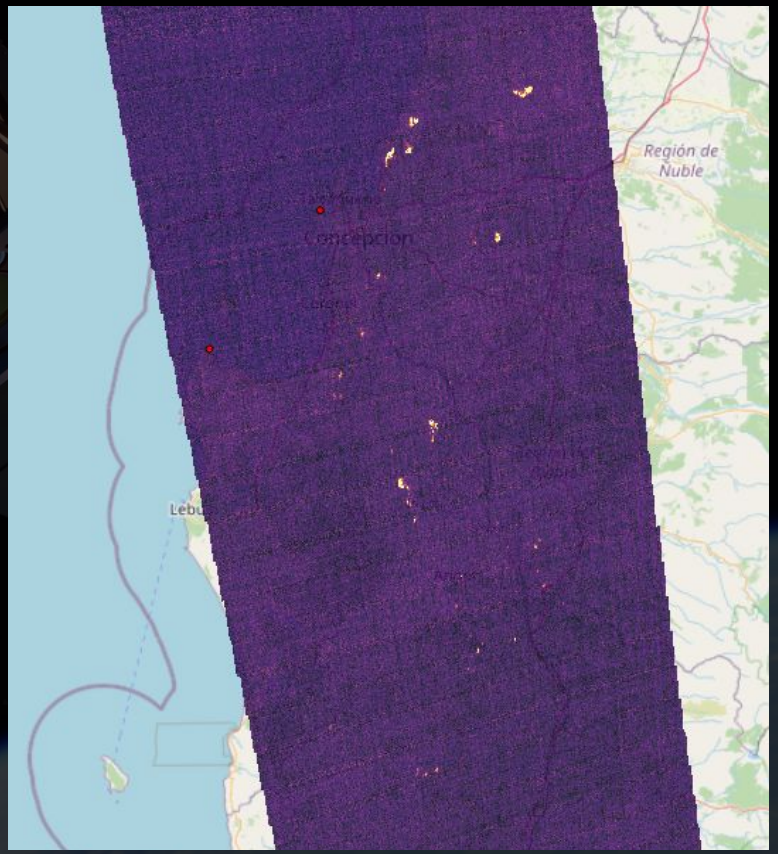
NVIDIA
JETSON

Edge ML: On-board data processing and fire detection

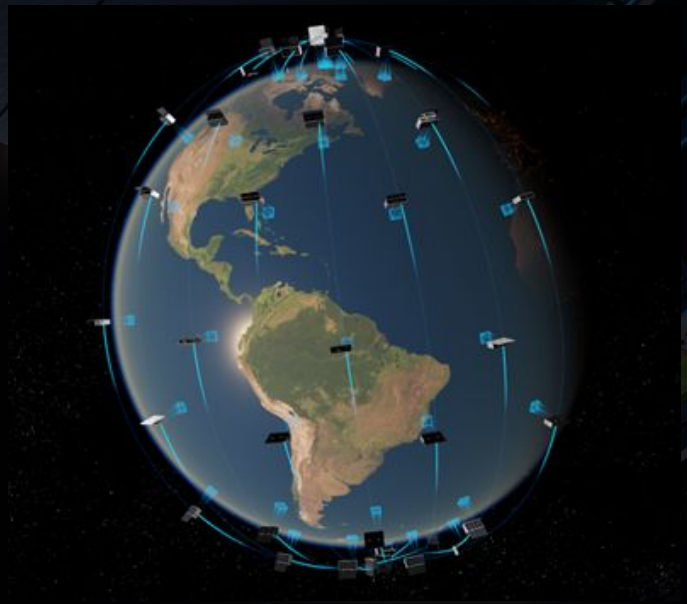


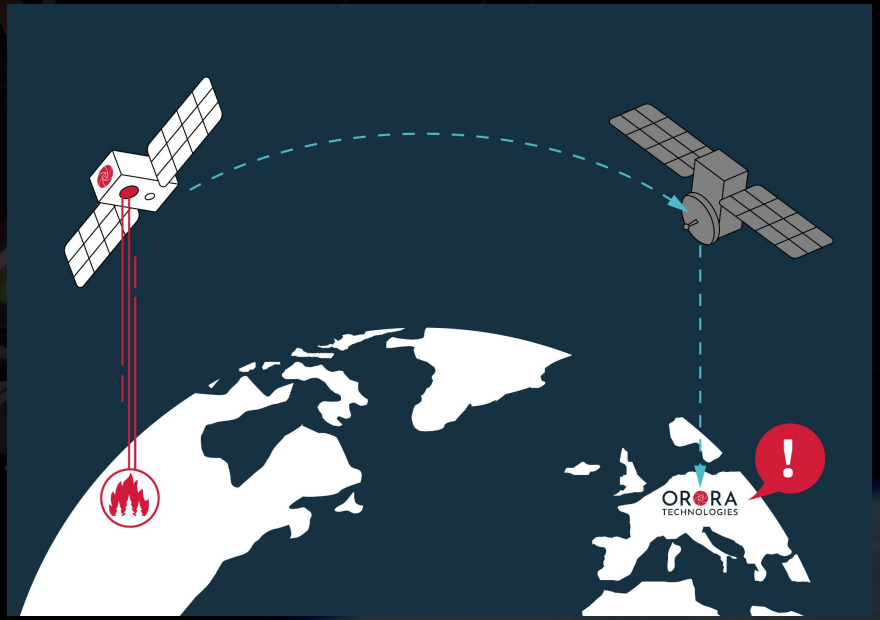
Edge ML: On-board data processing and fire detection





Edge ML: On-board data processing and fire detection

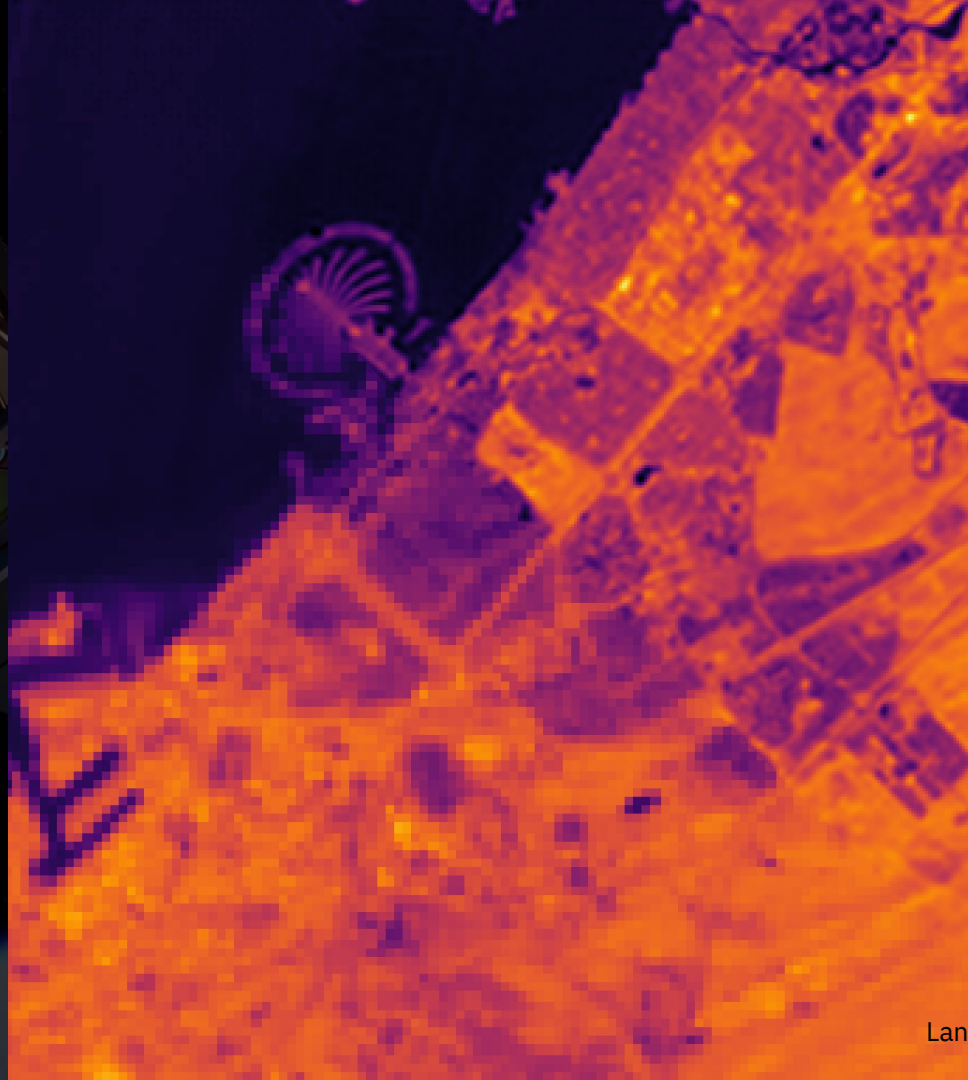




→ 3-10 Minutes between recording and wildfire notification (instead of >1.5h)

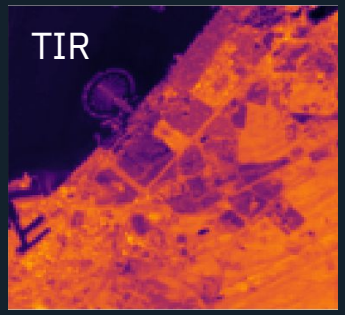
Super Resolution

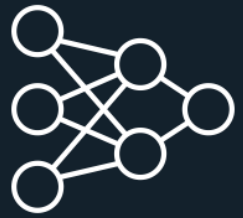
Increasing the effective resolution of our data products.

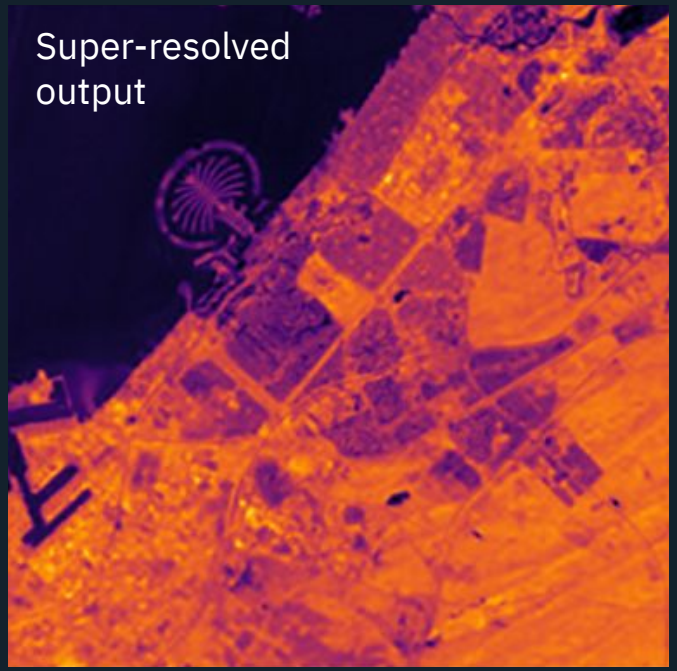


Lan

4x Effective Resolution using Machine Learning







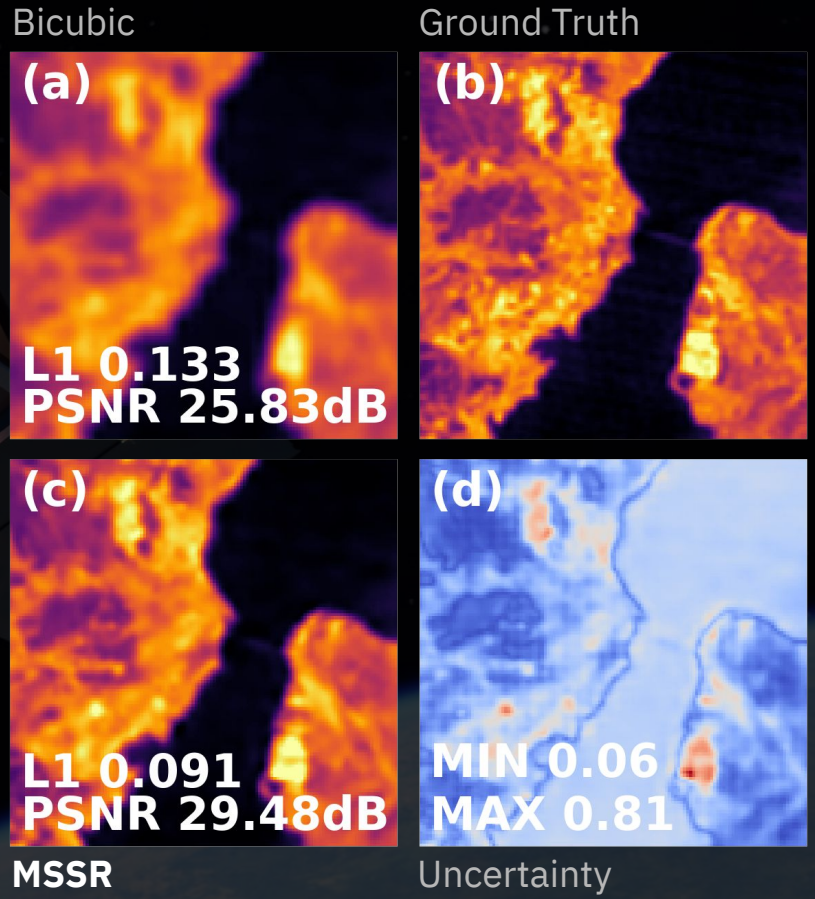
In cooperation with The ESA Φ-lab

Enhancing the effective spatial data resolution with Deep Learning

- Multi-spectral Fusion of TIR & VIS data.
  - **4x** increase in spatial resolution.
  - Validated on **L1 Radiance** and **L2 LST**.
  - Estimation of **predictive uncertainty** as a data quality indicator

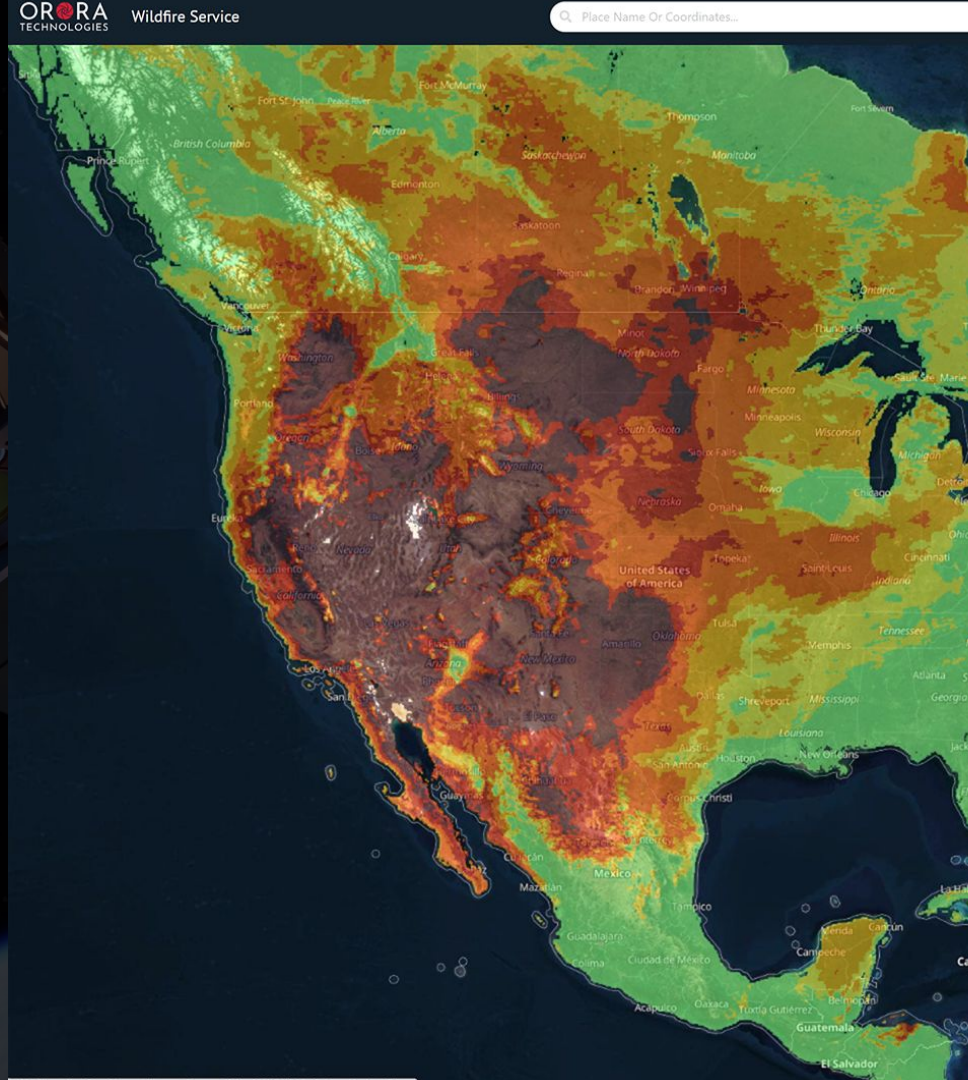
Upcoming publication

Multi-Spectral Super-Resolution of Thermal Infrared Data Products for Urban Heat Applications,
IGARSS 2023



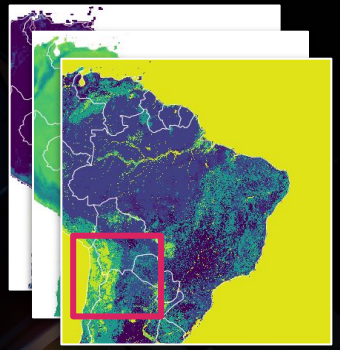
Fire Risk

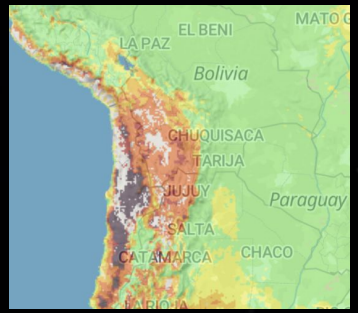
Deriving the next 7d-fire hazard from our satellite data



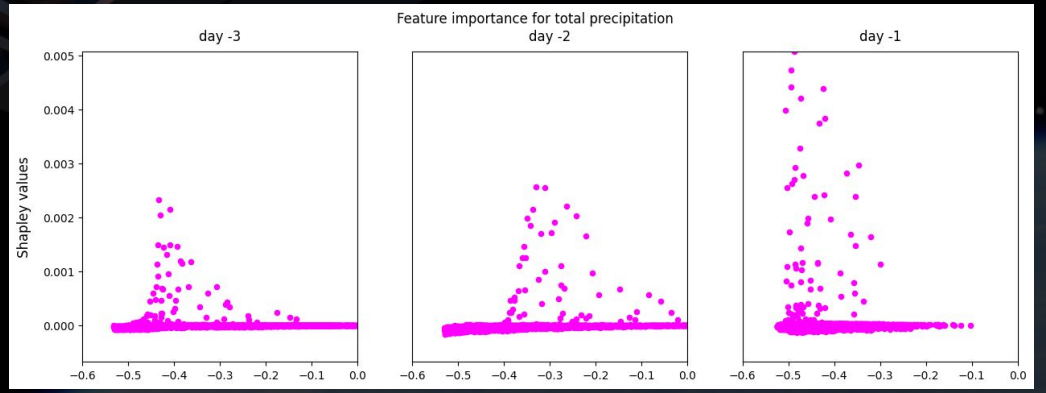
Fire Risk Forecasting with ML

- **Spatiotemporal Model**: **3D U-net**
  - Data Input: Meteorological data, socioeconomic data, landcover, engineered features
  - Outperforms standard risk model FWI





- **Explainability:** Feature importance
  - **Shapley values**
  - What is the **contribution** of each **input feature** to the model **prediction**?



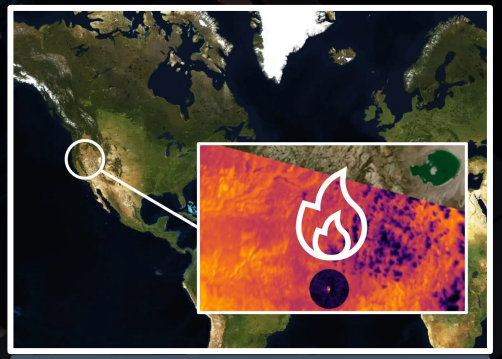
Presented at:

EGU "AI for natural hazard management", publication late 2023

Get in touch for early access
to our ARD Thermal Intelligence Base Products!

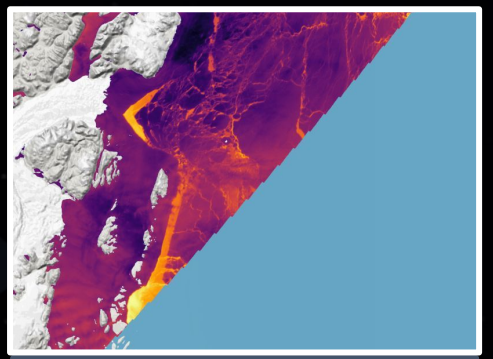
OroraTech LST
Land Surface Temperature

80m	12h	<2K
Resolution	Revisit	Accuracy



OroraTech WFS Pro
Thermal Anomaly Detection

4x4m	5min	48/d
Anomaly Size	Latency	Scans



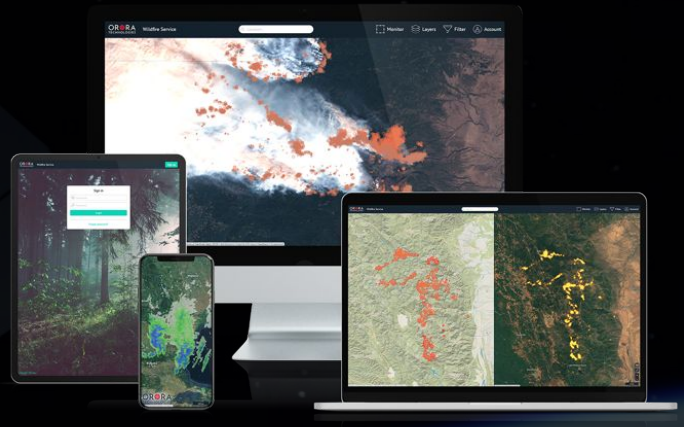
OroraTech SST
Sea Surface Temperature

200m	12h	<1K
Resolution	Revisit	Accuracy

ORORA TECHNOLOGIES

Data Product Access

API based access to integrate our data Into Your Existing Platforms



On demand: Customizable Data Visualization Platform

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Julia Gottfriedsen
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Thank you!
Questions?

Thermal Intelligence for Sustainable Earth

Satellite Data Products

ORORA TECHNOLOGIES