On-Board Wildfire Detection

**ITU Webinar on
"Fighting wildfires with AI-powered insights",
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ORORA TECHNOLOGIES

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ORORA TECHNOLOGIES

"Thermal Intelligence for a Sustainable Earth"

- Founded in 2018

- More than 80 employees in Munich

- Protect >161 Mio hectar of forest all around the world

How can you keep wildfires from getting out of control?

> 4 million km^2
burned area per year
(~ size of India)

$15.9 billion
property damage caused by
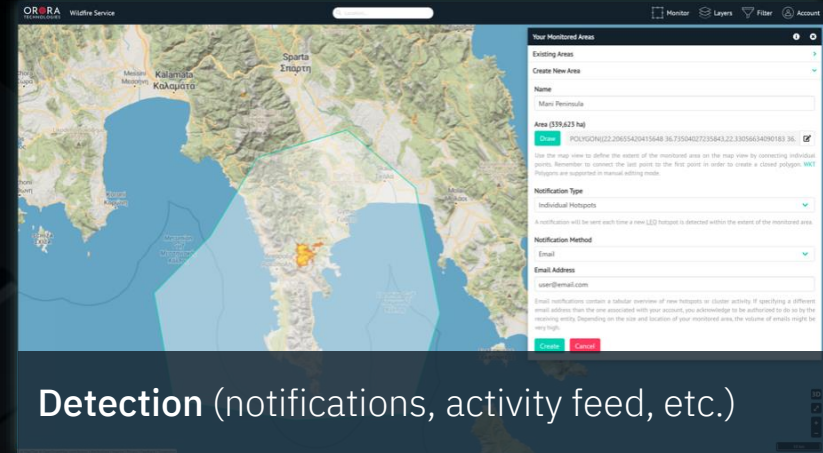wildfires in 2021 in USA alone

6.5 billion tons
of CO_2 equivalent released in 2021
(17 % of total carbon emissions)

Wildfire Service WFS:
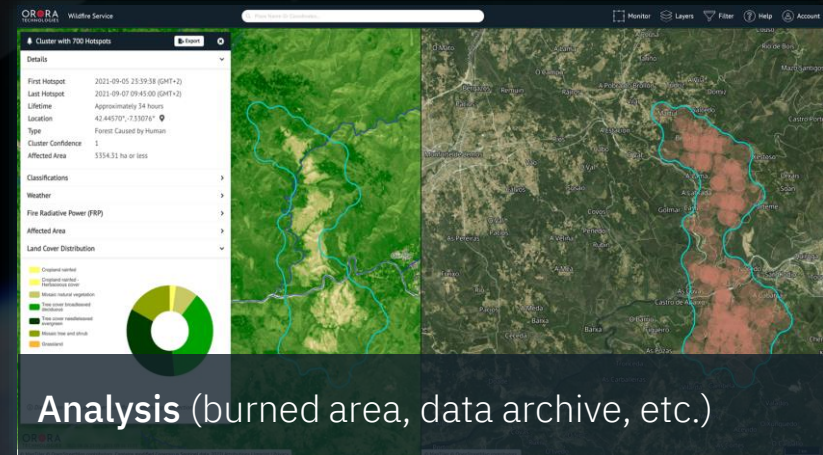# An Innovative, Easy-To-Use, Central Platform

Assessment (fire risk index, EVI, etc.)

Detection (notifications, activity feed, etc.)

Monitoring (clustering, fire progression, etc.)

Analysis (burned area, data archive, etc.)

Filling the monitoring gap and improving delivery from 120min to 3min
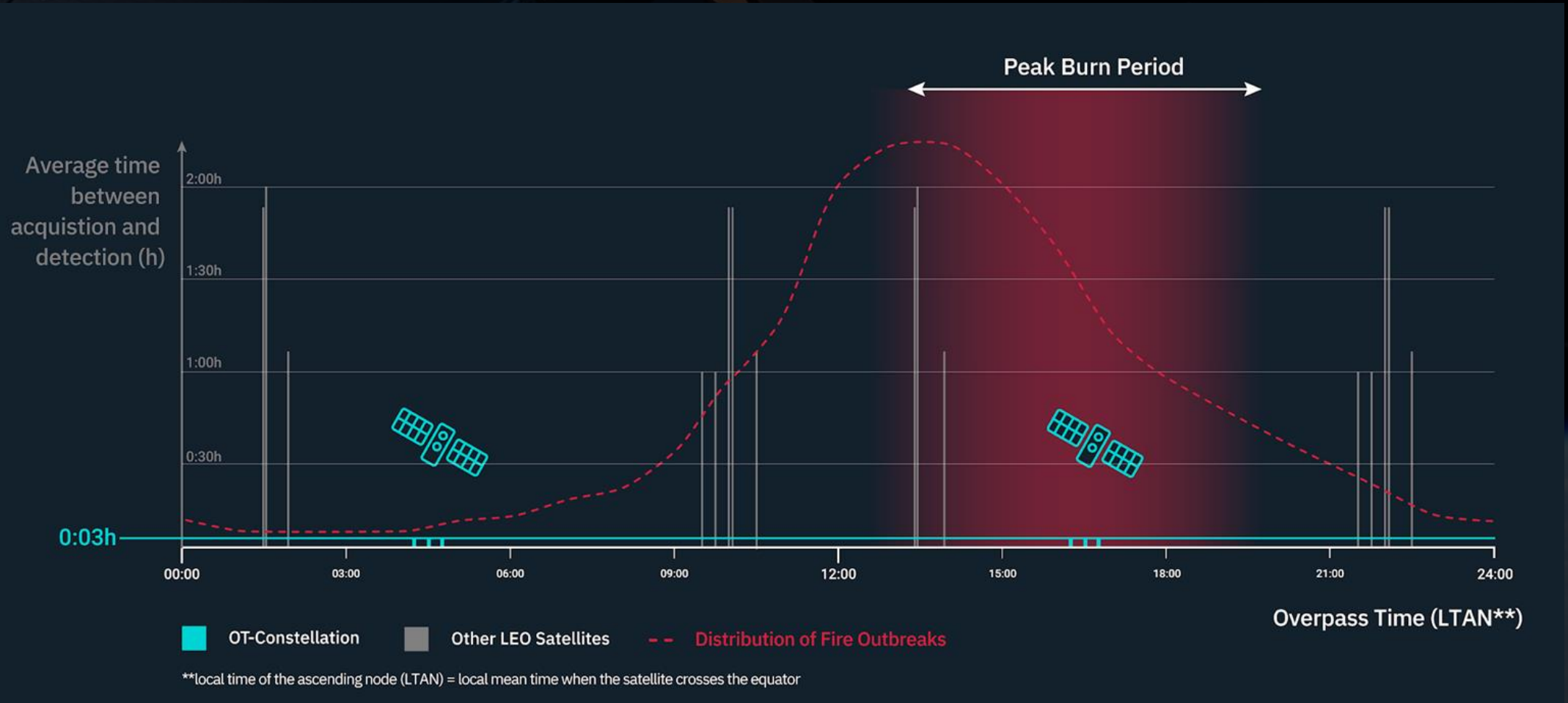
First satellite: FOREST-1
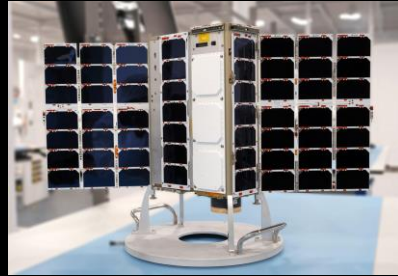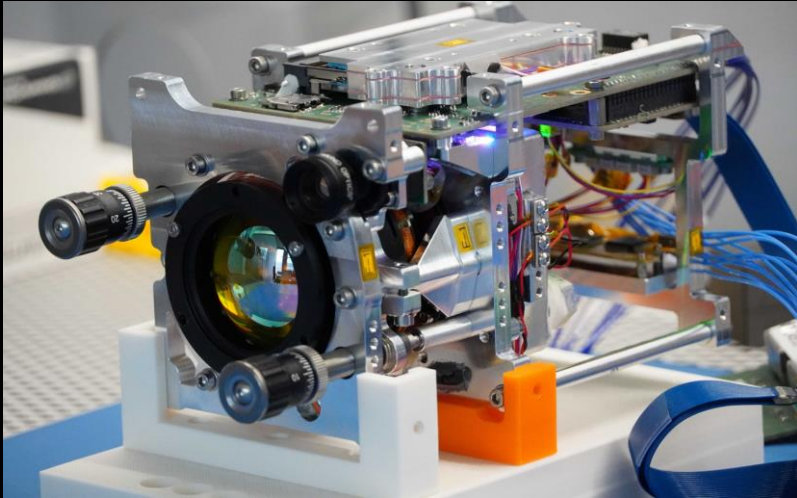
- Launched in January 2022

- LWIR+MWIR Thermal-Infrared, RGB

- NVIDIA Jetson On-orbit processing
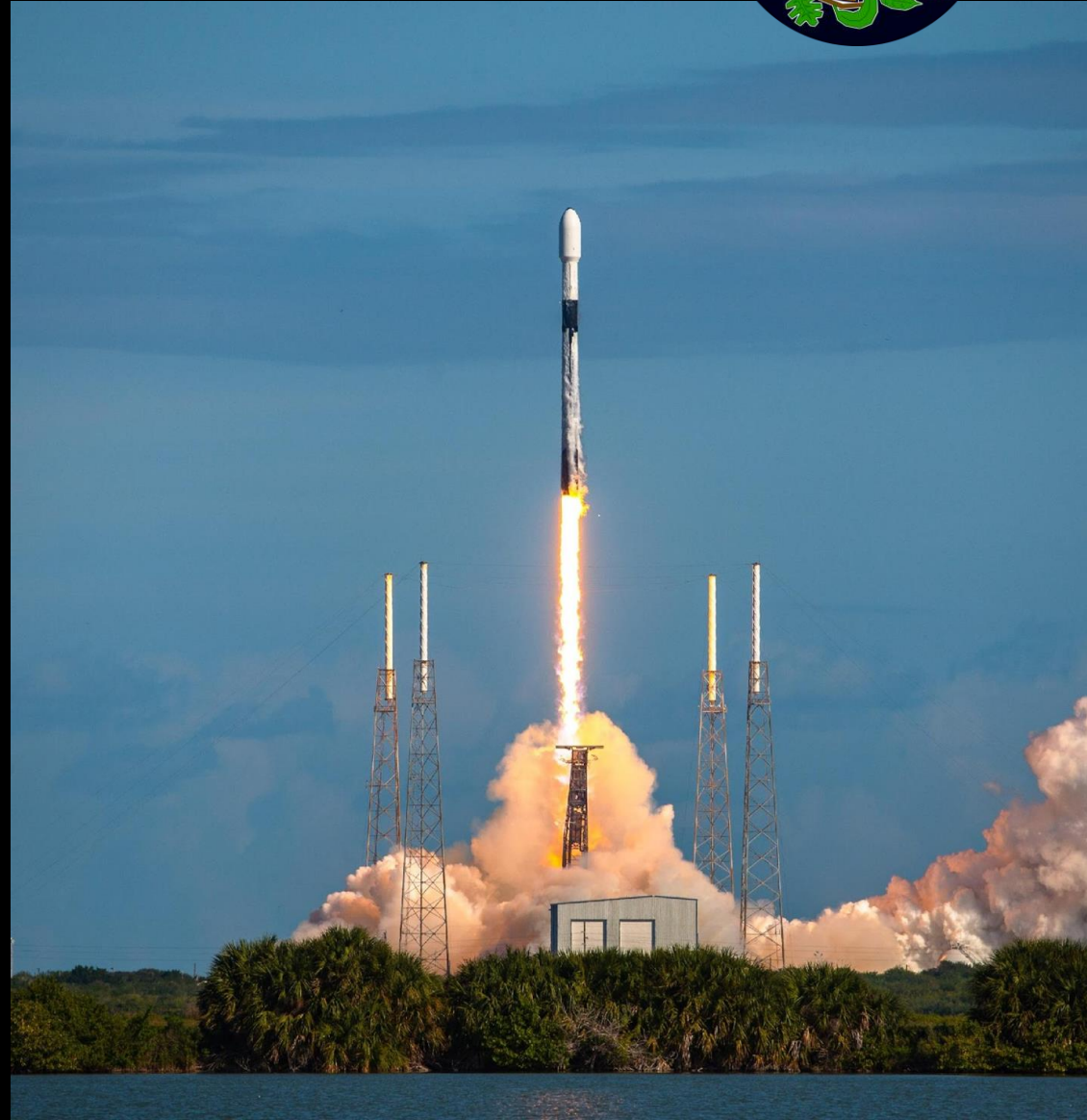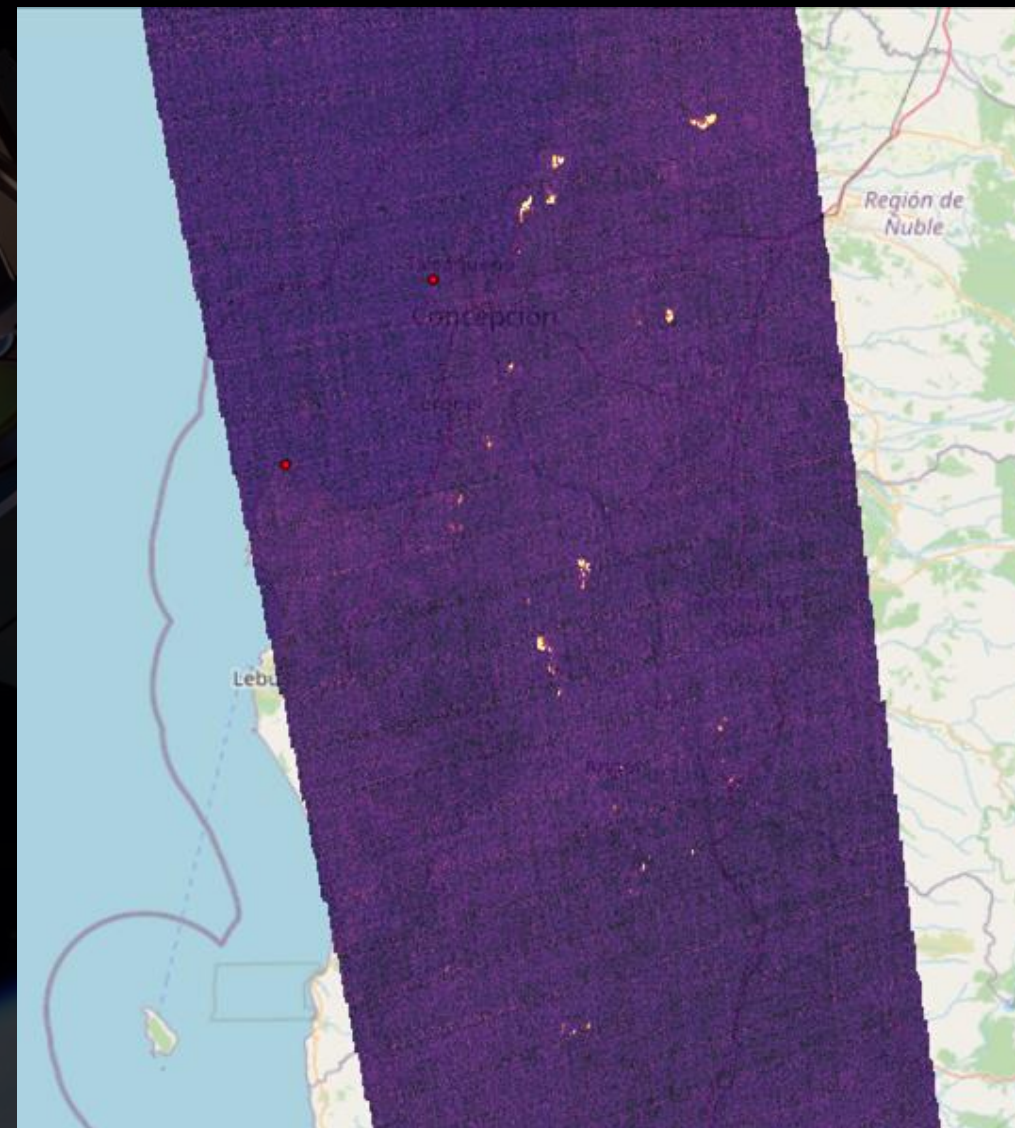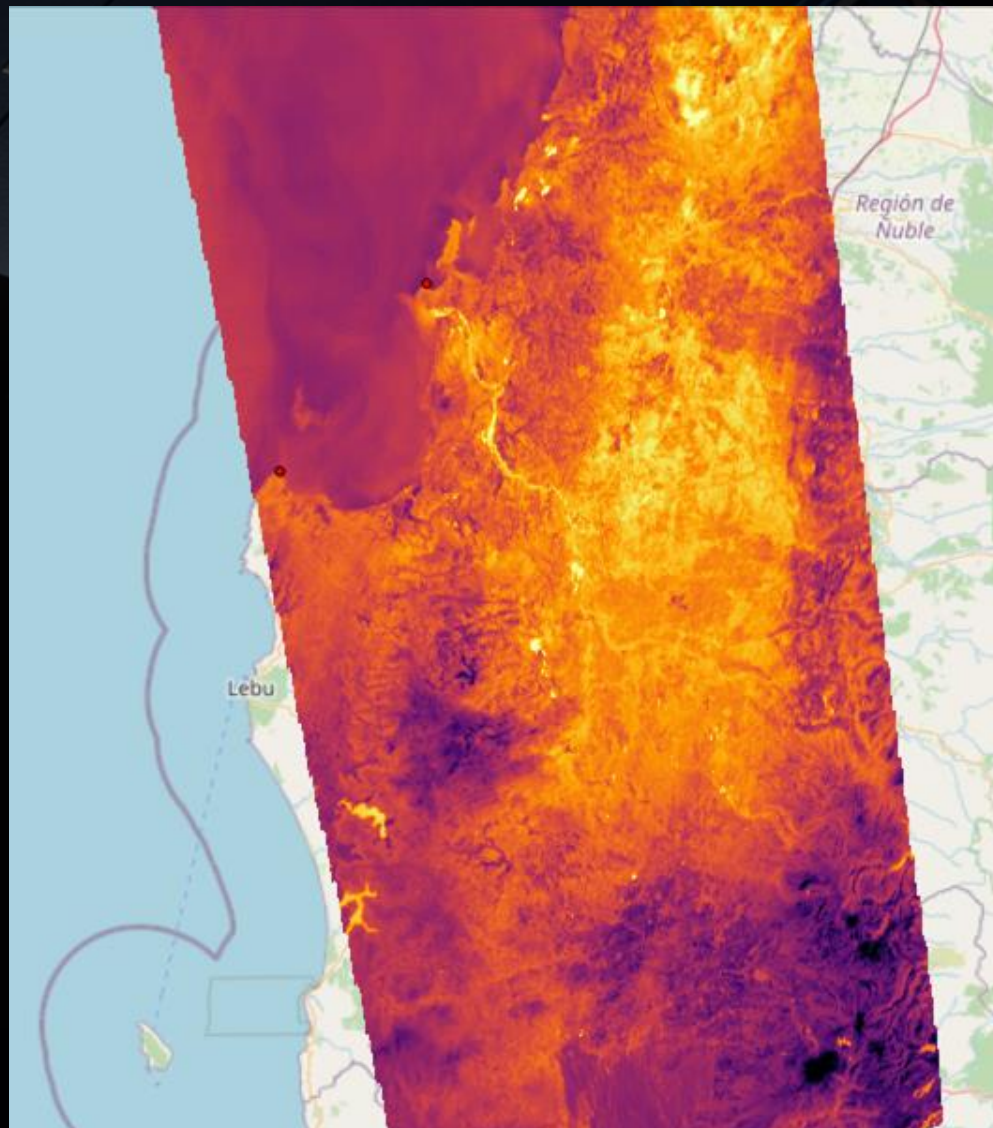
Wildfires in Chile (02/23)

Fast On-orbit Wildfire Detection
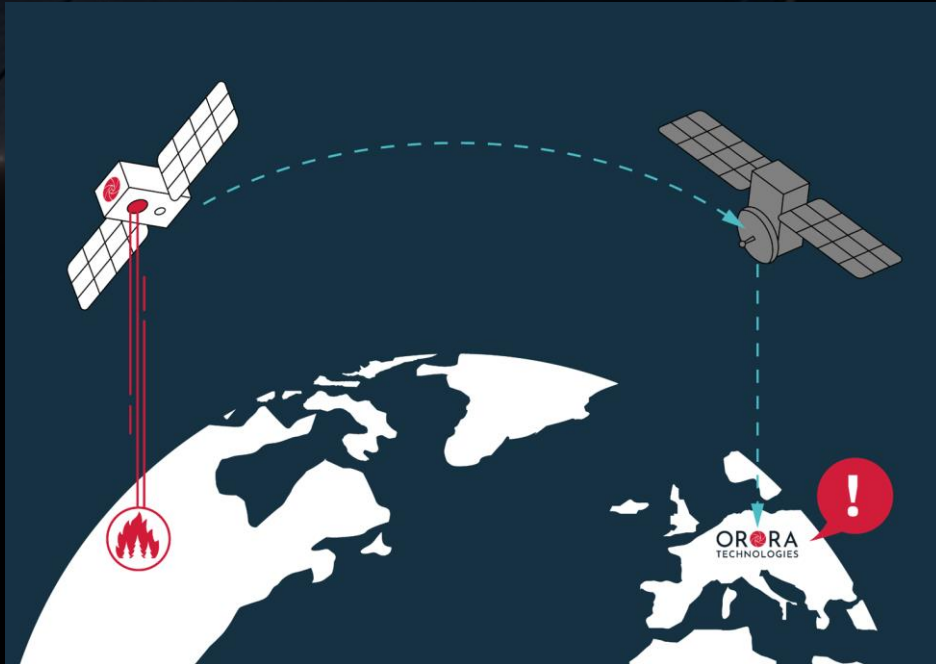
1. Record frames

2. Execute Fire Detection Algorithm & Compress Fire Information on-board

3. Send it via Inter-Satellite-Link**

4. Forward information to customer through OroraTech's integrated Wildfire Solution (incl. API)

→ no need to downlink raw data

→ no more waiting for ground station overpasses

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

Challenges

Limited compute power and power budget

Data is raw

Limited Upload

Use combination of Python, C++ and Cuda

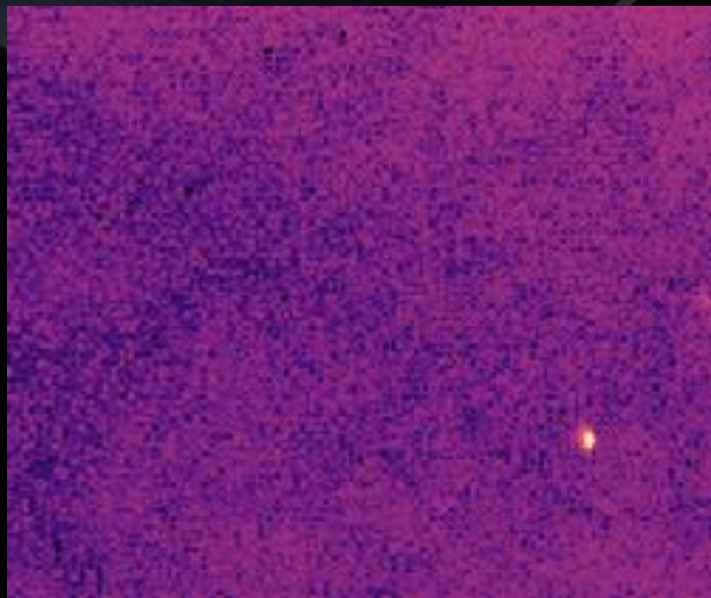Decide which processing steps are really needed (and in which order)

Install larger packages before the launch

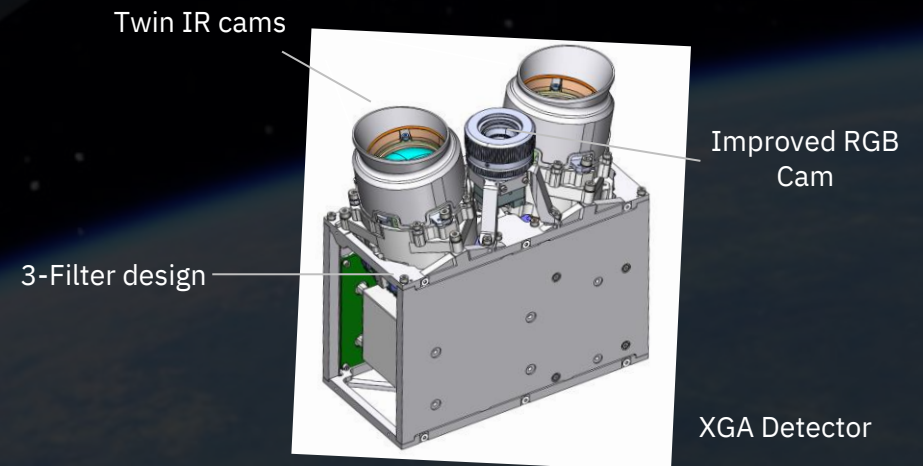# Technological Breakthrough (01/23)

Very first fire on-orbit...

```
y,x,mwir
437,609,9171.028173995493
438,609,9297.753986800499
438,610,9125.496833846482
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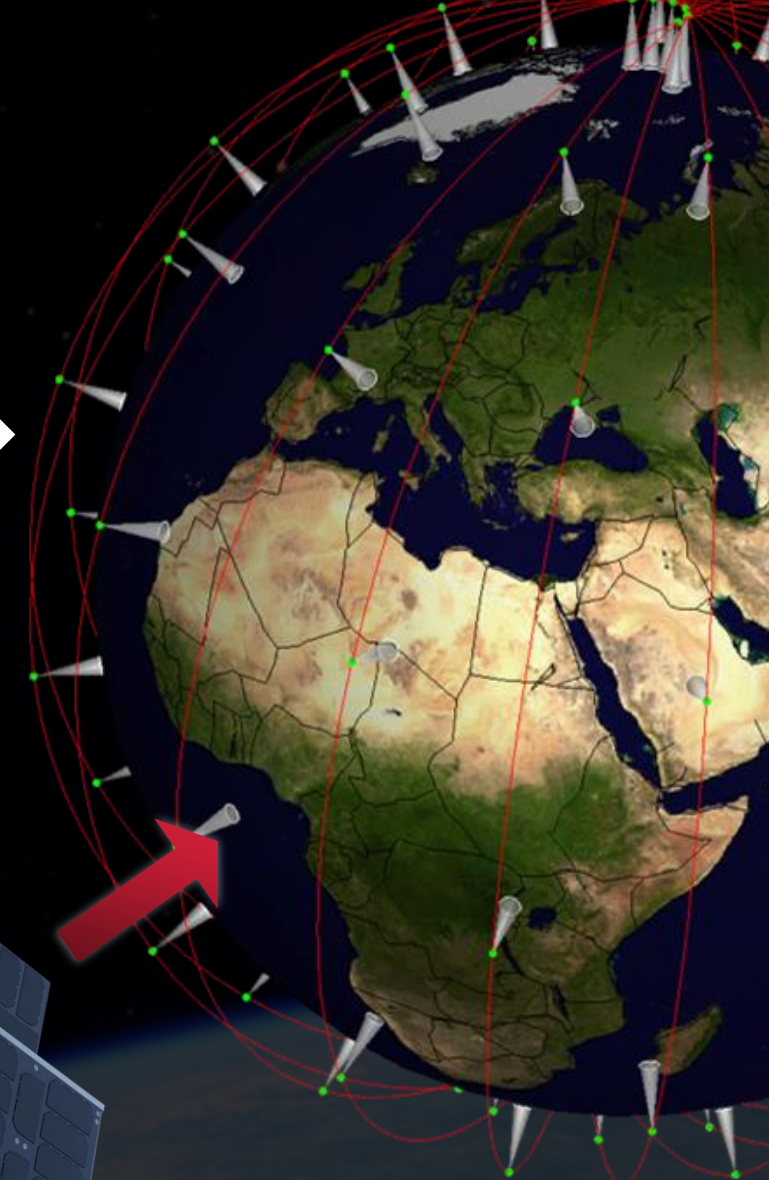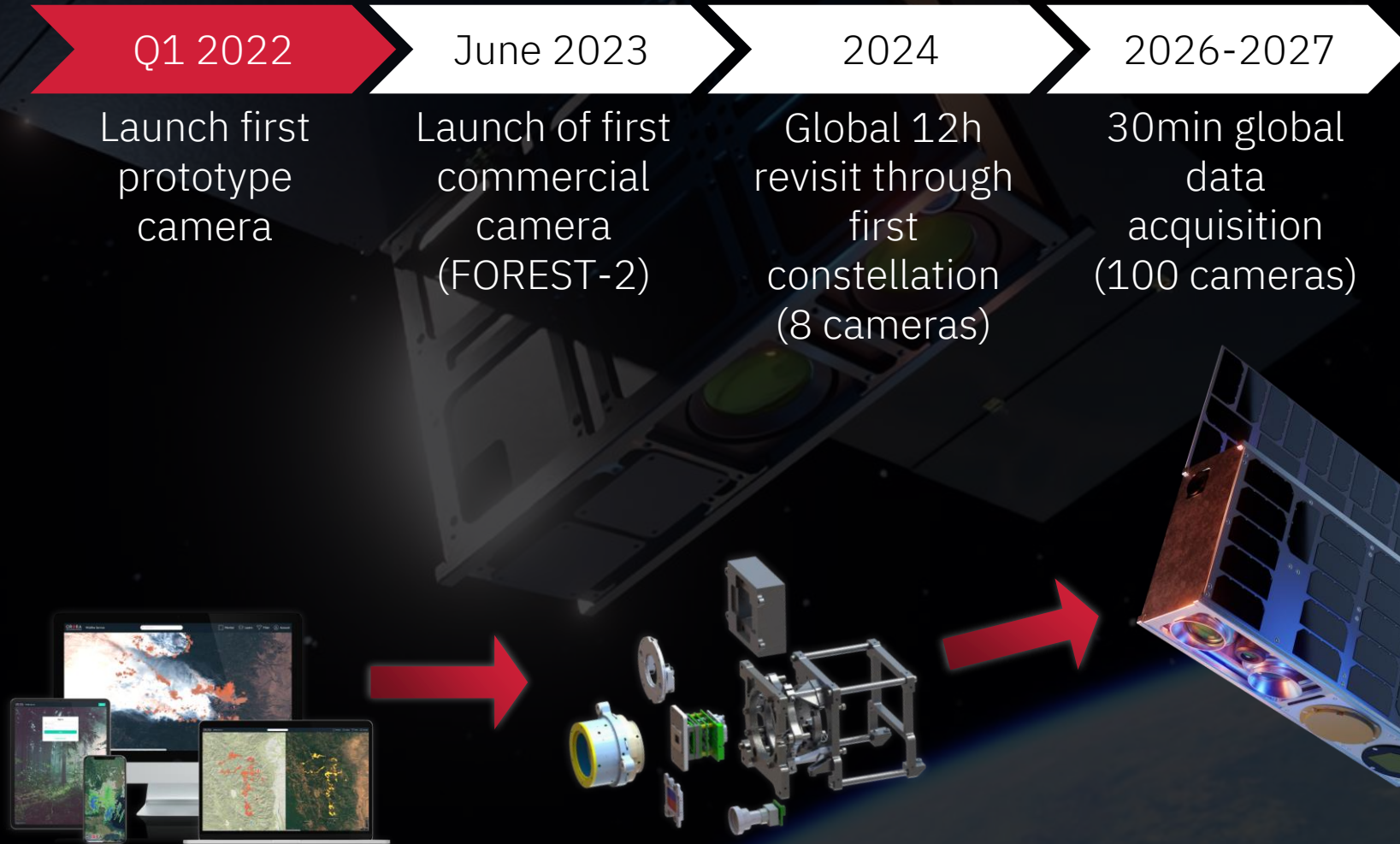
Since then a lot of improvements.
To be continued...

FOREST-2: Our 2nd gen. Satellite

- Launch in June 2023

- Increased swath x4 410km

- Improved ground resolution
  (200m @550km SSO, 50m supersampling)

- Two LWIR channels (+1), one MWIR

- Prepared everything for on-orbit fire detection

Twin IR cams

Improved RGB Cam

3-Filter design

XGA Detector

Developing the constellation for continuous monitoring

Q1 2022	June 2023	2024	2026-2027
Launch first prototype camera	Launch of first commercial camera (FOREST-2)	Global 12h revisit through first constellation (8 cameras)	30min global data acquisition (100 cameras)

Detect fires every 30 minutes within 3- 10 minutes

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