

Earth Observation Applications for Wildfire Monitoring and Risk Reduction

Dr Marios Tzouvaras
Research Coordinator
Coordinator of the UN-SPIDER Cyprus Regional Support Office

marios.tzouvaras@eratosthenes.org.cy

3rd Euro-Mediterranean High-Level Workshop on Fire Risks

06-08 May 2026, Paphos, Cyprus



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TROPIS
Leibniz Institute for
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European Centre for
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CYRIC



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This project has received funding from the European Union's "Horizon 2020 Research and Innovation Programme" under Grant Agreement No 857510".



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This project is co-funded by the Cyprus University of Technology.

EXCELSIOR – The establishment of the ERATOSTHENES Centre of Excellence

- **Funded under H2020 & Republic of Cyprus**
- **Pillar:** Spreading Excellence and Widening Participation
- **Work Programme Year:** H2020-2018-2020
- **Call:** H2020-WIDESPREAD-2018-2020
- **Topic:** WIDESPREAD-01-2018-2019 Teaming 2
- **Type of action:** CSA (Coordination and support action)
- **Grant Agreement number:** 857510, Acronym: EXCELSIOR
- **Total Budget:** >38,000,000 € (15 millions from EC+ 15 from Republic of Cyprus+ 8 millions from CUT, etc.)
- **Duration:** 7 Years (EC) + 8 years (Republic of Cyprus/RC)
- **Start:** 1 October 2019 / End: 31 December 2027 (EC) / 30 September 2034 (RC)



For more information visit: <https://excelsior2020.eu/> and <https://eratosthenes.org.cy/>

Mission and vision

- **Our mission:**

To enhance the understanding, monitoring and management of natural resources and infrastructures by conducting cutting-edge basic and applied research, while providing innovative application services aligned with the latest advancements in **Earth Observation, remote sensing and geospatial technologies**.

- **Our vision:**

To become a **self-sustained, internationally recognized European Centre of Excellence in Earth Observation and geospatial information** in the **Eastern Mediterranean**, with a strategic focus in the **Middle East and North Africa (EMMENA region)**.

- The Digital Innovation Hub will create an ecosystem which combines **state-of-the-art remote sensing, data management and processing technologies**, cutting – edge research opportunities, targeted education services and promotion of entrepreneurship. In order to be dynamic and innovative, the Digital Innovation Hub will be based on two major infrastructures, which are a Satellite Ground Receiving Station and a Ground-based atmospheric remote sensing station. ERATOSTHENES Centre of excellence is paving the way for Cyprus to enter the space arena.

The ECoE consists of three Departments:

- **Environment and Climate**

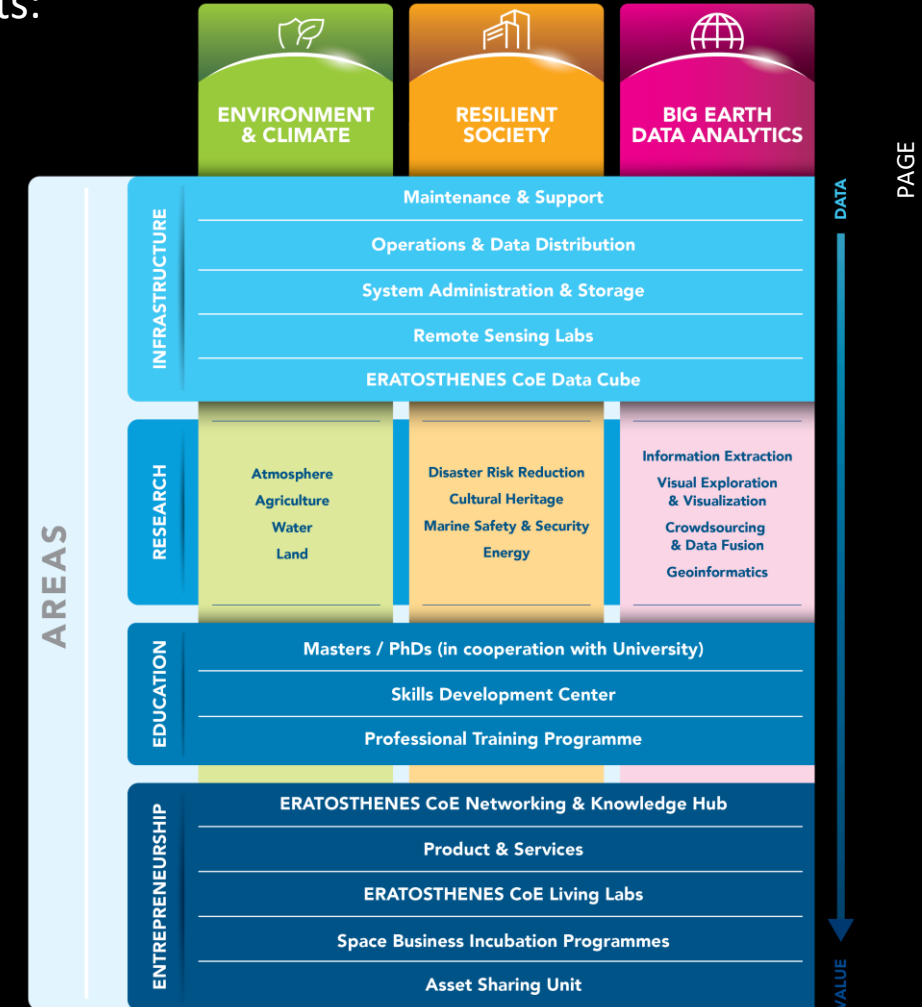
- Atmosphere
- Agriculture
- Water
- Land

- **Resilient Society**

- Disaster Risk Reduction
- Cultural Heritage
- Access to Energy
- Marine Safety and Security

- **Big Earth Data Analytics**

- Information extraction
- Visual exploration & visualization
- Crowd sourcing & data fusion
- Geoinformatics



ERATOSTHENES CoE in numbers

- Established through the **EU H2020 Teaming Phase 2 Project EXCELSIOR**, funded by the **EU** with €15M, by the **Ministry of Finance of the Republic of Cyprus** with €15M, and by the **Cyprus University of Technology** with €7M.
- 6 years** of life
- >110 employees**
- 2 critical infrastructures** (GBS & DAS)
- > 300 publications** in journal and conference proceedings
- > 60 research projects** (22 as coordinator & 38 as partner)
- > €16 M€** from research projects & services
- Collaborations with **> 600 Organizations**
- Member in **> 10 European and International networks**



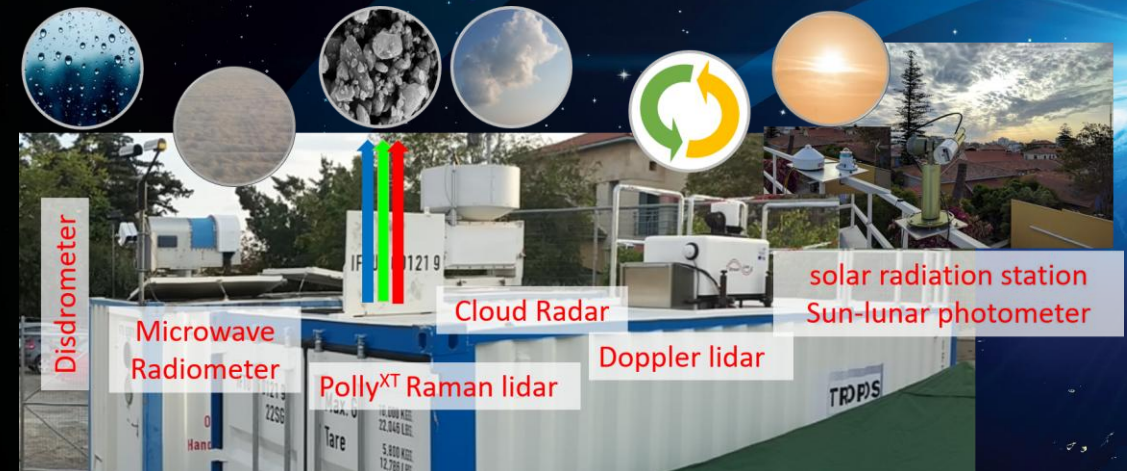
Infrastructure - EO Data Acquisition Station

- ERATOSTHENES has established **the first EO DAS in Cyprus**, hosted on one of **CYTA's** fully developed teleports.
- Equipped with a **three-band feed** and capabilities (S, X and Ka) making it suitable to support current as well as future missions.
- Consisting of **state-of-the-art facilities** for acquisition, processing and storage of data.
- Data can be securely transported through Cyta's extensive fiber network, offering **interconnectivity to major Global Hubs**.



Infrastructure - Cyprus Atmospheric Remote Sensing Observatory

- **GBS:** ECoE has acquired a series of **high-quality instruments** to obtain long-term measurements of cloud and aerosol properties, precipitation, and related atmospheric characteristics in diverse climate regimes of Cyprus.
- ECoE coordinates **CARO**, a **national facility** consists of a multi-instrument platform that is **unique** with the latest modern standards and is **only available in few regions globally**.



Relevant Projects and Services

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OUR PROJECTS

Green HIT



Green-HIT

A Green – Holistic IoT platform for Forest Management and Monitoring



Smart forest monitoring



Data-driven decision making



Sustainability & green growth



RESEARCH
& INNOVATION
FOUNDATION

ReSENSE



ReSENSE

Remote Sensing Technologies Training



Upskilling & reskilling



Bridging education & industry



Modern digital competences



Erasmus+



Pre-FACED

Enhancing Preparedness Capacities for Multi-Hazard Effects through the Fusion of Geospatial and AI Technologies



EO, GIS & AI integration



Multi-hazard risk assessment



Stronger preparedness & EU cooperation



Co-funded by
the European Union



NotifyMesh

Proactive Emergency Notification System based on Household Data.



Real-time data collection



Early alerts on multiple platforms



Protecting lives & communities



RESEARCH
& INNOVATION
FOUNDATION

AI-OBSERVER



AI-OBSERVER

Scientific excellence and innovation capacity through Artificial Intelligence in the field of Earth Observation on environmental hazards.



Advanced EO data analysis



AI & machine learning for insights



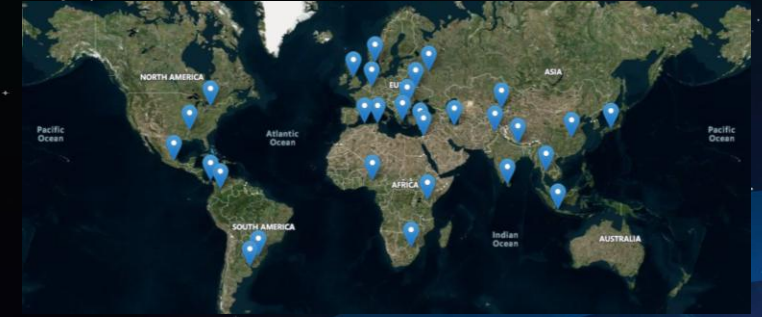
Supporting sustainable & informed decisions



Funded by
the European Union

Cyprus Regional Support Office of UNOOSA/UN-SPIDER

- **UN-SPIDER:** United Nations Platform for Space-based Information for Disaster Management and Emergency Response
- **Promote the use of space tools for disaster risk reduction for:**
 - Emergency response.
 - Disaster risk reduction and management.
 - Capacity-building on space-based technologies for disaster management.
 - Technical advisory support.
 - Dissemination of methods and results from EO.



Cyprus Regional Support Office



UNITED NATIONS
Office for Outer Space Affairs

UN-SPIDER

www.un-spider.org

Remote Sensing for Wildfires

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Introduction

- **Accurate, reliable, and timely information** is essential for **effective wildfire management**.
- **Remote sensing** provides a **powerful tool to monitor, assess, and support decision-making** before, during, and after wildfire events.

Pre-Fire

- Fire Risk Mapping
- Early Warning
- Fuel Load
- Vegetation monitoring
- Drought & Climate Monitoring

Active Fire

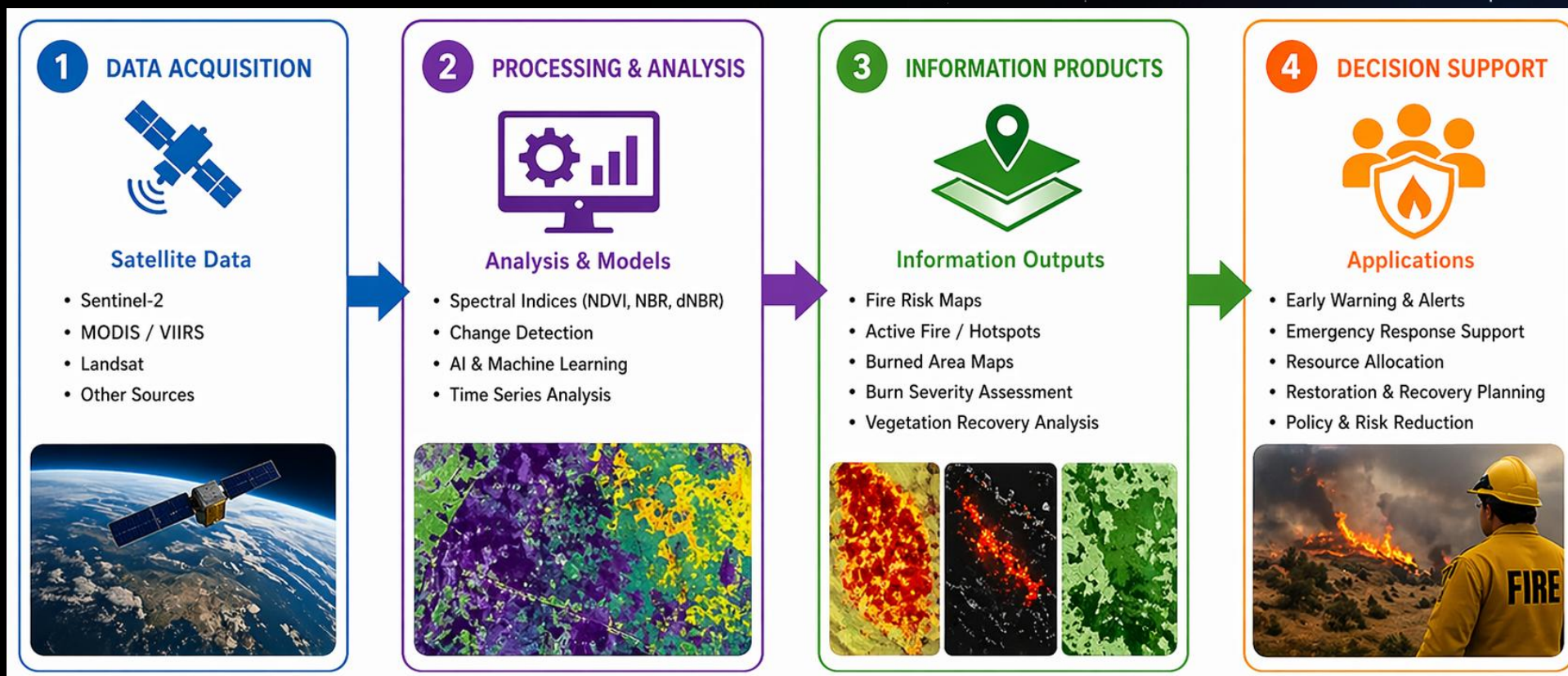
- Active Fire Detection (Hotspots)
- Smoke & Air Quality Monitoring
- Support to Emergency Response
- Fire Spread Tracking
- Near Real-Time Monitoring

Post-fire

- Burn severity (e.g. NBR / dNBR)
- Burned area mapping
- Damage assessment
- Vegetation Recovery Monitoring
- Restoration Planning

From Earth Observation to Decision Making

Turning satellite data
into actionable
information for effective
wildfire management



Applications by the ERATOSTHENES Centre of Excellence

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Pre-fire applications for wildfire risk assessment

1. Fire Risk Assessment

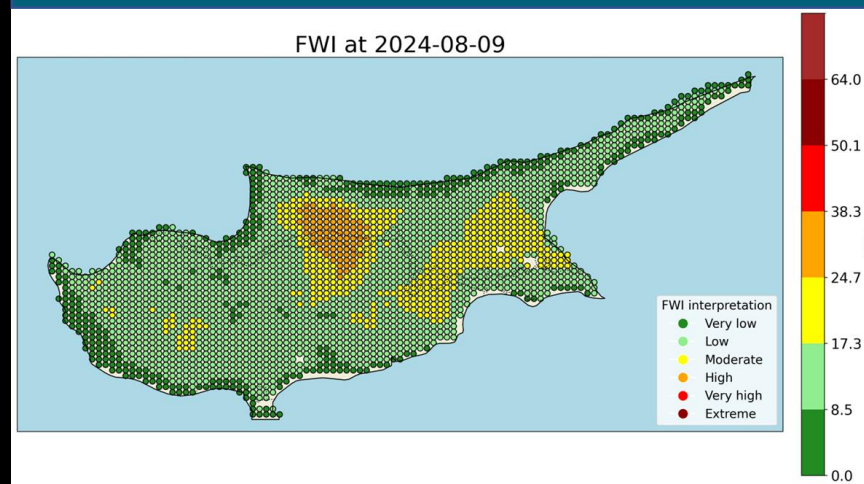
NADI-RISK Natural Disaster Risk Assessment Tool



Satellite-based wildfire risk mapping

2. Fire Danger Forecasting

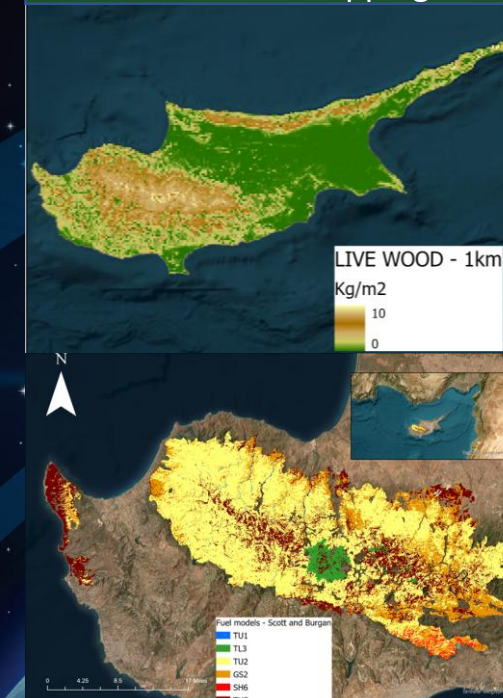
Canadian Fire Weather Index



Daily fire danger prediction based on weather conditions

3. Fuel Mapping

Vegetation Fuel Load and Fuel model Mapping



Vegetation fuel estimation using AI/ML



Prevention planning



Early Warning



Resource allocation

Supports



FIRMS

Fire Information for Resource Management System

Active Fire Hotspots



500 km

500 mi

Wed Jul 02 2020

Active Fire Detection

- *Near real-time detection of active fires using satellite thermal observations*



THERMAL ANOMALIES / ACTIVE FIRES

Detection of hotspots and thermal anomalies indicating ongoing fires



MODIS (on Aqua & Terra)

- ~1 km spatial resolution,
- updated every 3 hours



VIIRS (on Suomi NPP and NOAA-20)

- ~375 m resolution,
- every 3 hours





Golden Twins Fire



Fire Events



🔥 Agios Therapon 📅 2025-07-23



Satellite Image © Airbus, Pléiades Neo

🕒 Last Update : 2025-08-10

© Developed by Geosystems Hellas SA 🔗 Version 0.1 🗺️ © Mapbox

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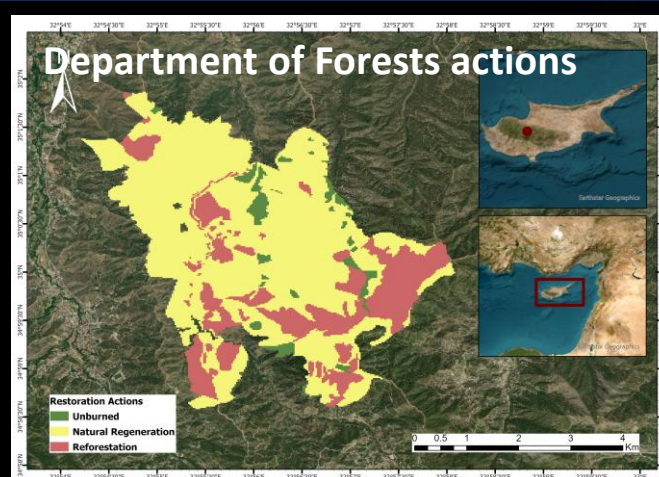
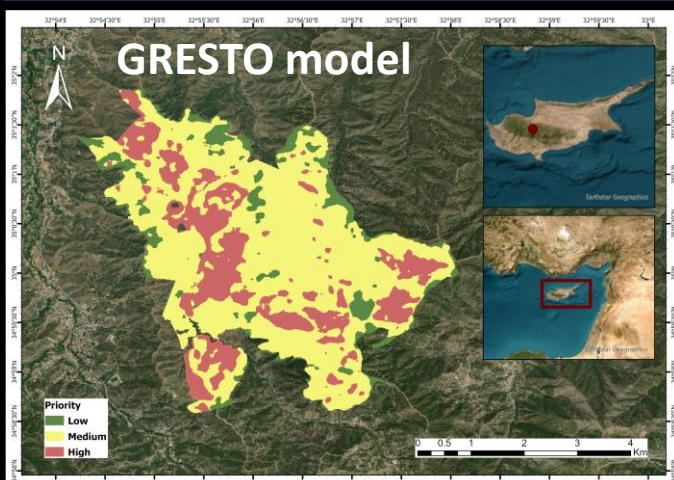


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Post-fire Applications For Wildfire Impact Assessment

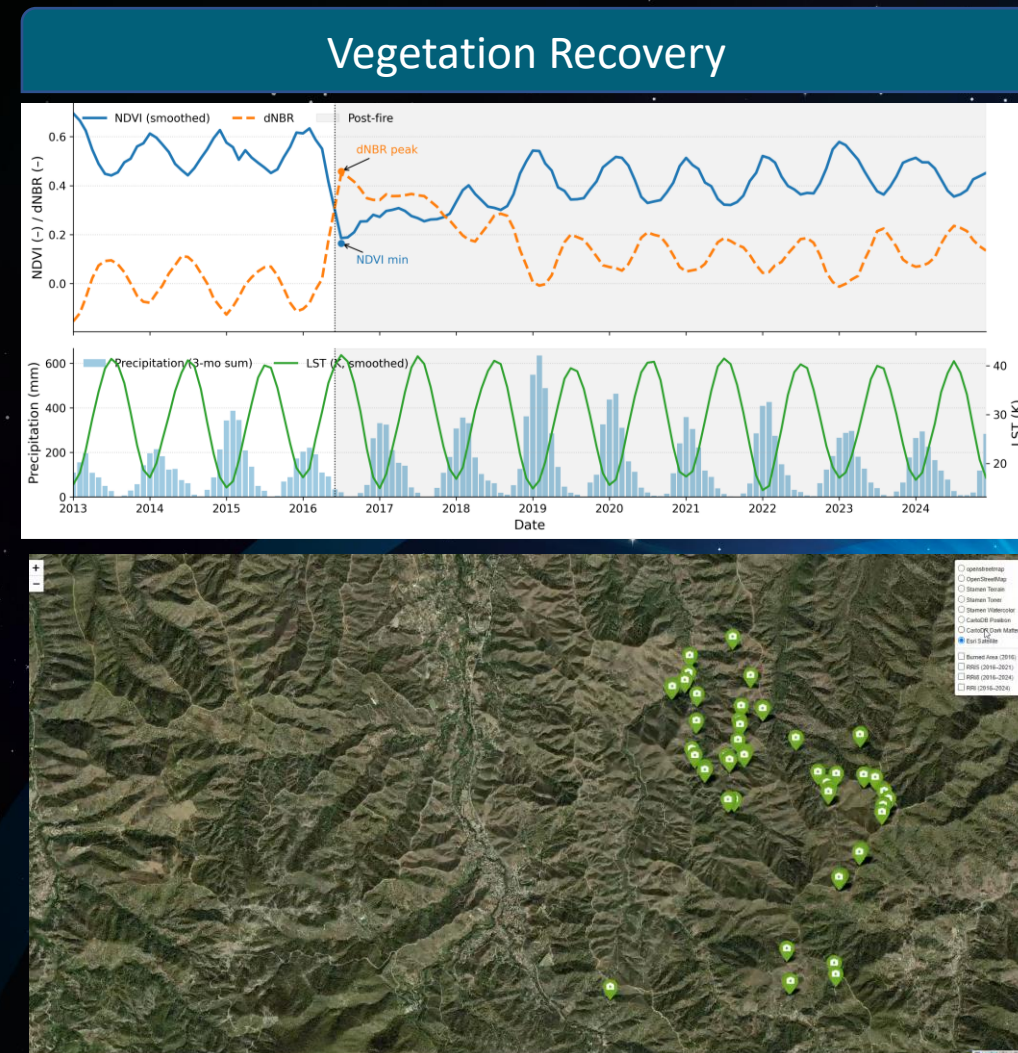
2. Post-fire management

Support restoration planning



Comparison between model-based prioritization and actual restoration actions

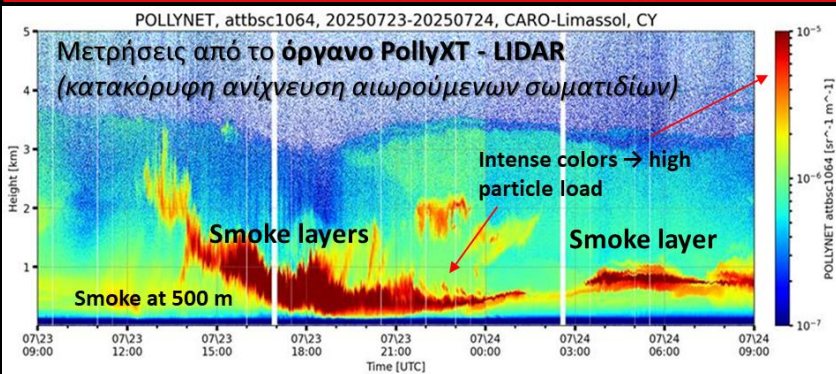
Time series for post-Fire Vegetation Recovery using Multi-Source Data



Post-fire Applications For Wildfire Impact Assessment

3. Atmospheric effects

Air pollution- Smoke detection



Detection of smoke particles from 16:00 local time based on PollyXT- LiDAR

Impact of Wildfire Smoke on Solar Radiation



Impacts air quality and energy balance

From Fire Monitoring to Operational Readiness: The Data Acquisition Station (DAS)

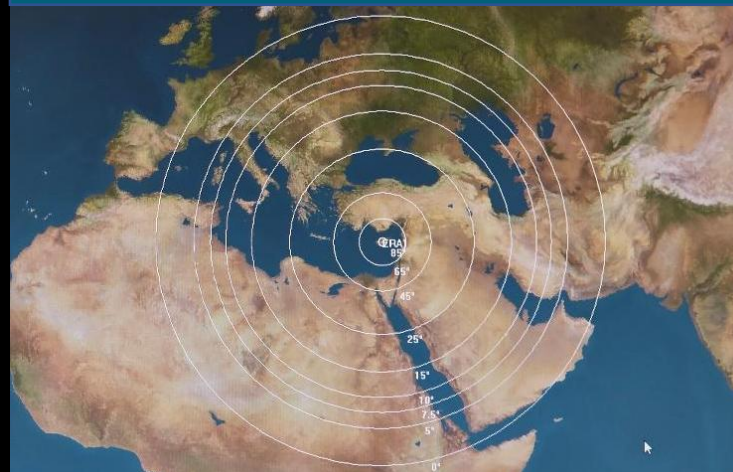
Transition from monitoring to proactive wildfire management

Current Limitations

- Delays in satellite data acquisition
- Limited near-real-time capabilities
- Dependency on external data providers
- Low temporal resolution



Solution: DAS



EO DATA ACQUISITION STATION (DAS)

- Direct reception of EO satellite data
- Near real-time data availability
- Independent data access
- Operational services

Solution: DAS

- Faster data access (near real-time)
- Enhanced early fire detection
- Improved monitoring of fire spread
- Support for AI-based prediction models
- Strengthened decision-making capacity





Conclusions

- Remote sensing enables end-to-end wildfire management, from risk assessment to post-fire recovery monitoring.
- Integration of multi-source EO data (satellite, in-situ, atmospheric) enhances accuracy and operational reliability.
- Near real-time observations support early detection, rapid response, and improved situational awareness.
- Enables assessment of damage and ecosystem recovery.
- Supports effective planning of restoration actions.

Thank you!

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