



WORKSHOP

EMERGENCY

**MANAGEMENT
CLUSTER**



Funded by
the European Union

UNICORN



Copernicus emergency Applications for Resilience addressing businesses' needs and policy making

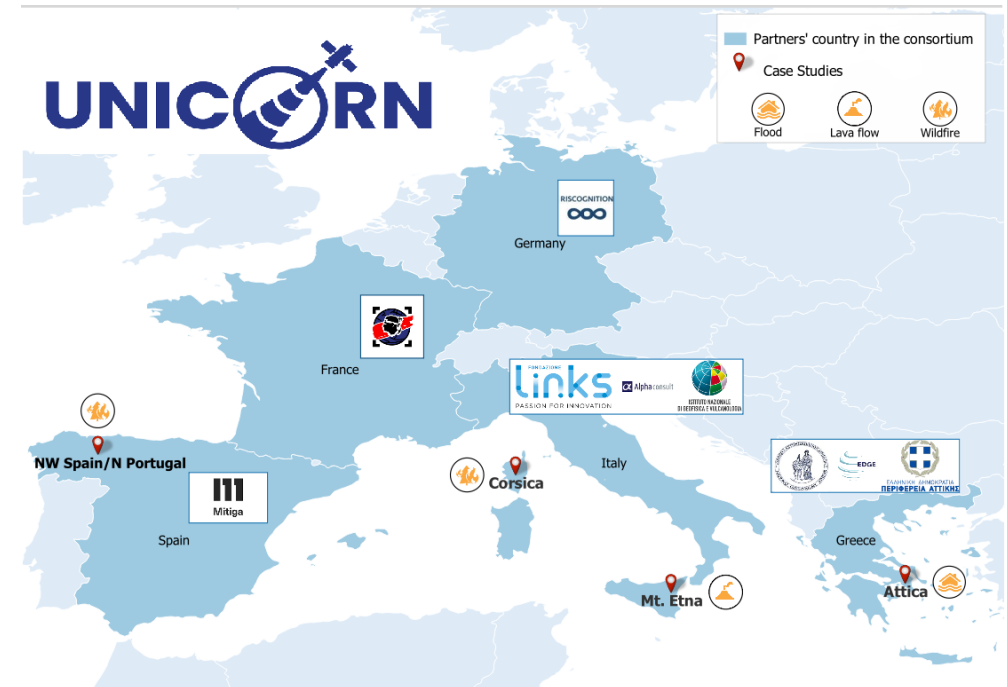


Project funded in the Horizon Europe Programme HORIZON-EUSPA-2023-SPACE under Grant Agreement 101180172



Project

- **Call topic:** HORIZON-EUSPA-2023-SPACE-01-43: Copernicus-based applications for businesses and policy making
- **Project type:** Research and Innovation Action (RIA)
- **Starting date:** October 1st, 2024
- **End date:** March 31st, 2027
- **Project duration:** 30 months
- **Total budget:** 2.000.000 €



Project

UNICORN aims to contribute to building resilience against climate risks by developing Earth Observation-powered tools for early warning, forecasting, and hazard monitoring, empowering businesses and communities, and boosting emergency management.

By providing a suite of services that can be integrated into current systems, and leveraging cutting-edge tech and Copernicus data, UNICORN empowers communities and authorities to proactively anticipate and prepare for natural hazards through improved forecasts of **floods, wildfires, and volcanic eruptions**.



Vision

UNICORN envisions a future where advanced Earth Observation technologies provide critical tools for predicting and mitigating natural disasters, ensuring that societies and industries are better equipped to handle the impacts of climate change. We aim to develop Copernicus based applications that integrate scientific knowledge into emergency management policies, improving forecasting, preparedness, and response at local, regional, and national levels.

UNICORN seeks to be a leading force in advancing disaster resilience strategies through collaboration, innovation, and technology, empowering stakeholders to face an uncertain climate future with confidence.



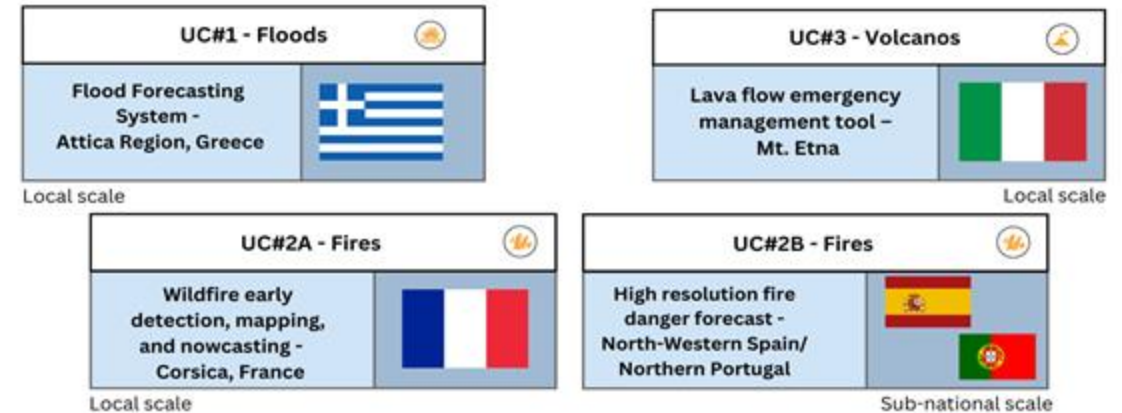
Unicorn Use Cases

Copernicus Emergency use cases with public and private end-users

UNICORN's foundation is laid on the development of four strategically selected Copernicus emergency applications corresponding in 4 use cases which incorporate specific areas, regions, and countries from the Mediterranean area of Europe that have a long history of natural hazards and extreme events.

These use cases through which the applications are implemented, monitored, and validated in real-world conditions are diverse due to the scale of operation (local, regional, and sub-national), the hazards, the type of engaged stakeholders, and the applied technologies.

UNICORN's Use Cases



Impact on End Users





Use Case #1

Flood Forecasting integrating Copernicus data and weather forecast fusion, Mandra river basin, Greece

Severe flood event in November 2017 with **24 recorded fatalities**, extensive million-euro damages to property and landslides; **the deadliest flood in Greece in the last 40 years.**





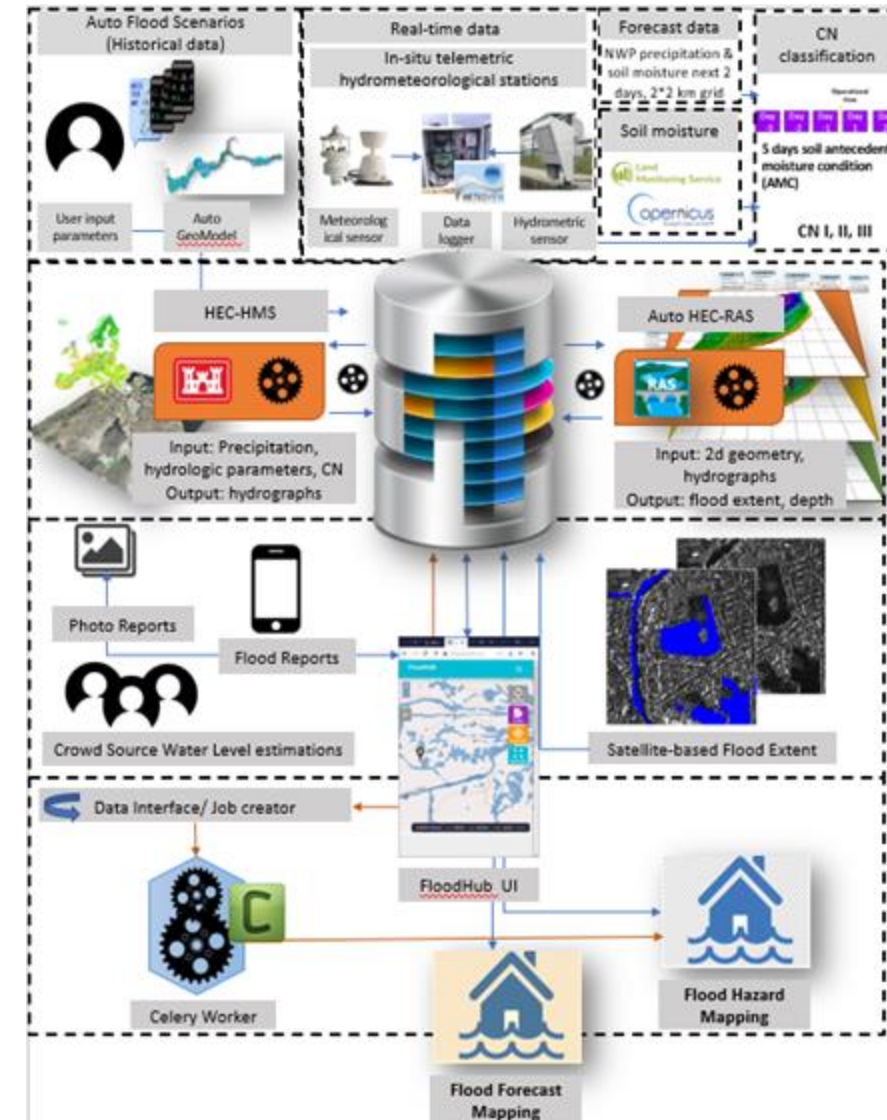
Use Case #1

An integrated **near-real-time flood monitoring and forecast system:**

- hydrologic/hydraulic modeling, multi-source EO and crowdsourced data
- fully scalable and transferable modular architecture
- operational awareness picture of the crisis every 5 mins to all the relevant authorities (near real time)
- reliable flood forecast for the next 2 days.

Near-real-time **ingestion and assimilation of:**

- hydrometeorological parameters measured at 3 in-situ telemetric stations (installed at 3 critical locations)
- crowdsourced data (collected via the dedicated crowdsourcing platform)
- satellite data (e.g. from high resolution Sentinels collected from the Hellenic Mirror Site)





Use Case #1

Stakeholders:

- i. Public authorities
- ii. Insurance sector
- iii. Private businesses and Industry

Expected impact:

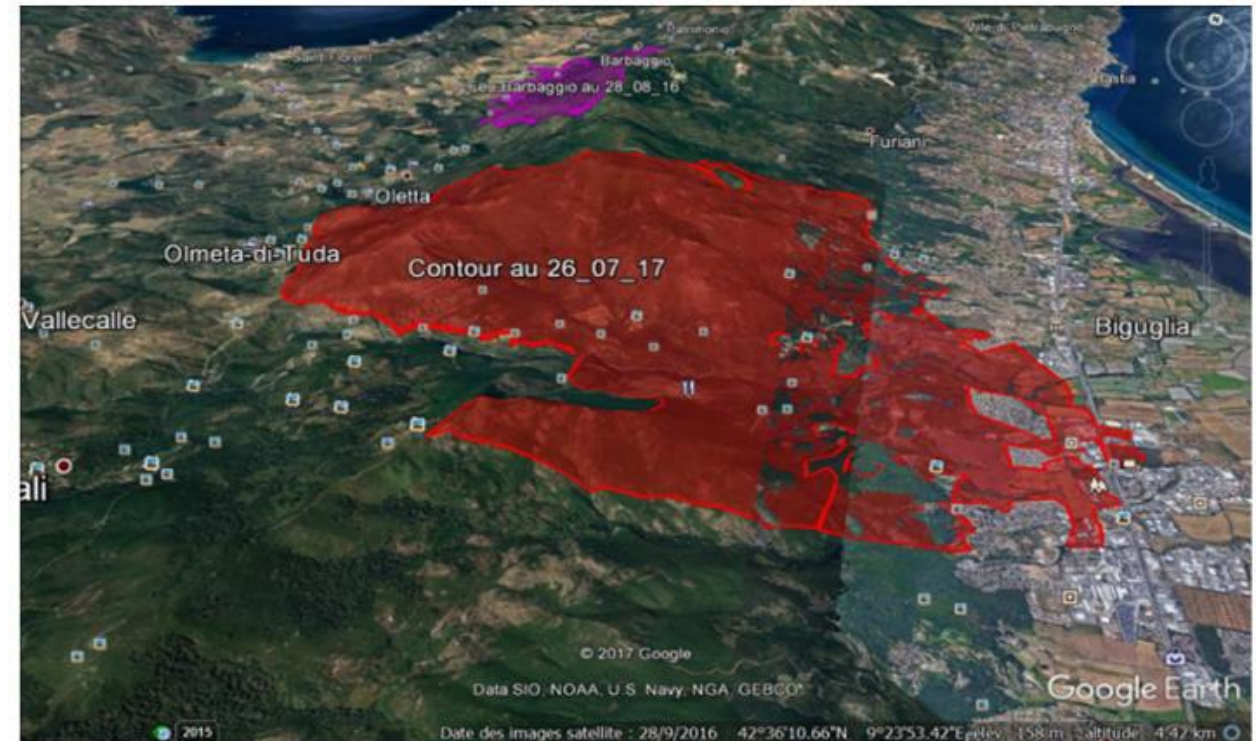
- i. Enhance early warning capabilities and reducing response times
- ii. Enable authorities to predict potential flood events with greater accuracy and lead time
- iii. Implement targeted preparedness measures e.g., evacuation alerts, mobilizing resources, reinforcing infrastructure.



Use Case #2A

Copernicus-based wildfire early detection, mapping and nowcasting, Corsica Island, France

Severe fire event in 2017. Both coastal areas and mountainous zones, with fire risk heightened during the dry summer months.





Use Case #2A

Active Fire Detection (Hotspots)

- i. Satellite-based Hotspot Detection
- ii. MSG SEVIRI Data
- iii. Crowdsourced Intelligence

Nowcasting

- i. Meteorological data
- ii. Land cover
- iii. Topographic data

Burned Area Mapping

- i. Sentinel-2 Based Mapping
- ii. Fire Severity Assessment
- iii. Temporal Monitoring
- iv. Automated Processing Chain



Use Case #2A

Stakeholders:

- i. First responders
- ii. Forest services
- iii. Local authorities
- iv. Emergency management services
- v. Insurance and re-insurance companies
- vi. Critical infrastructure operator

Expected impact:

- i. Enhanced precision of wildfire mapping
- ii. Enhanced accuracy of propagation simulations
- iii. Fast alert activations
- iv. Optimized allocation of firefighting resources
- v. Improved overall emergency response outcomes



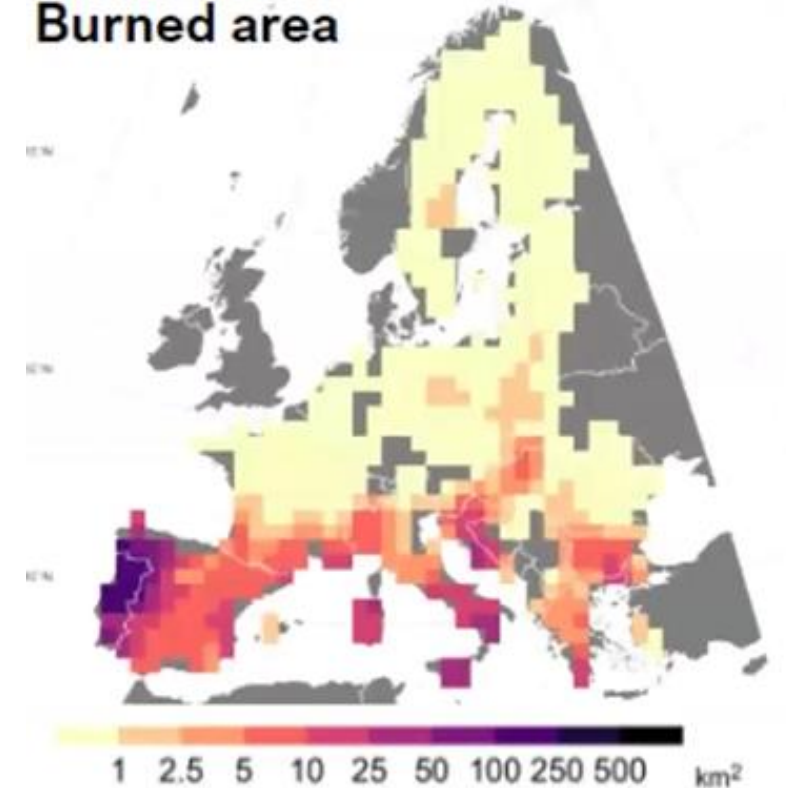
Use Case #2B

High-resolution fire danger forecast, North-Western Spain/Northern Portugal

North-western region of Spain - regions of Galicia, Asturias, Leon, and northern Portugal.



Mean annual Burned area

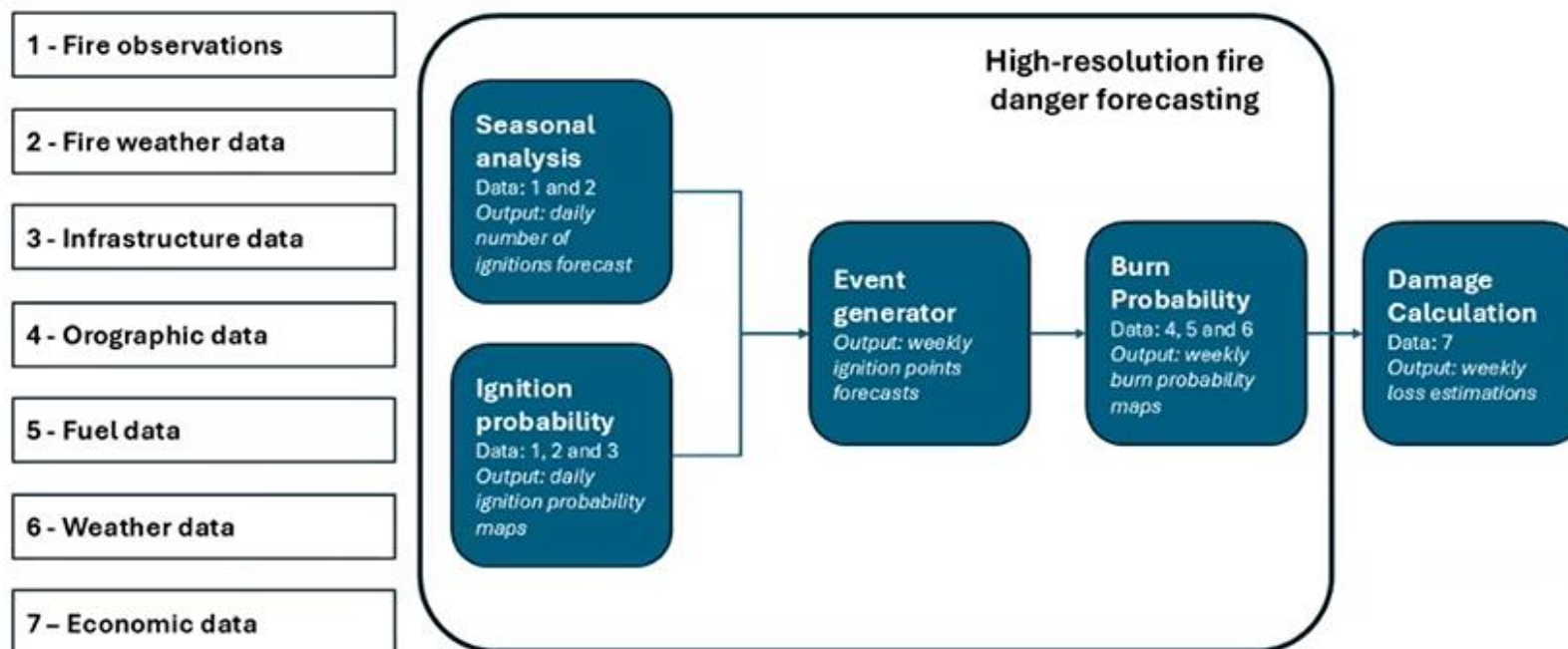


Gincheva, A., Pausas, J.G., Edwards, A. *et al.* A monthly gridded burned area database of national wildland fire data. *Sci Data* 11, 352 (2024). <https://doi.org/10.1038/s41597-024-03141-2>



Use Case #2B

- Danger of fires to occur
- How the fire will spread





Use Case #2B

Stakeholders:

- i. Insurance company
- ii. Local governments

Expected impact:

- New parametric insurance techniques for the forestry sector
- Incentivizing risk mitigation measures by forest owners



Use Case #3

**Lava flow emergency management tool based on Copernicus data merged with numerical modelling,
Sicily Island, Italy**

Etna volcano in Sicily is one of the most active volcanoes on this planet, with frequent explosive and effusive eruptions.

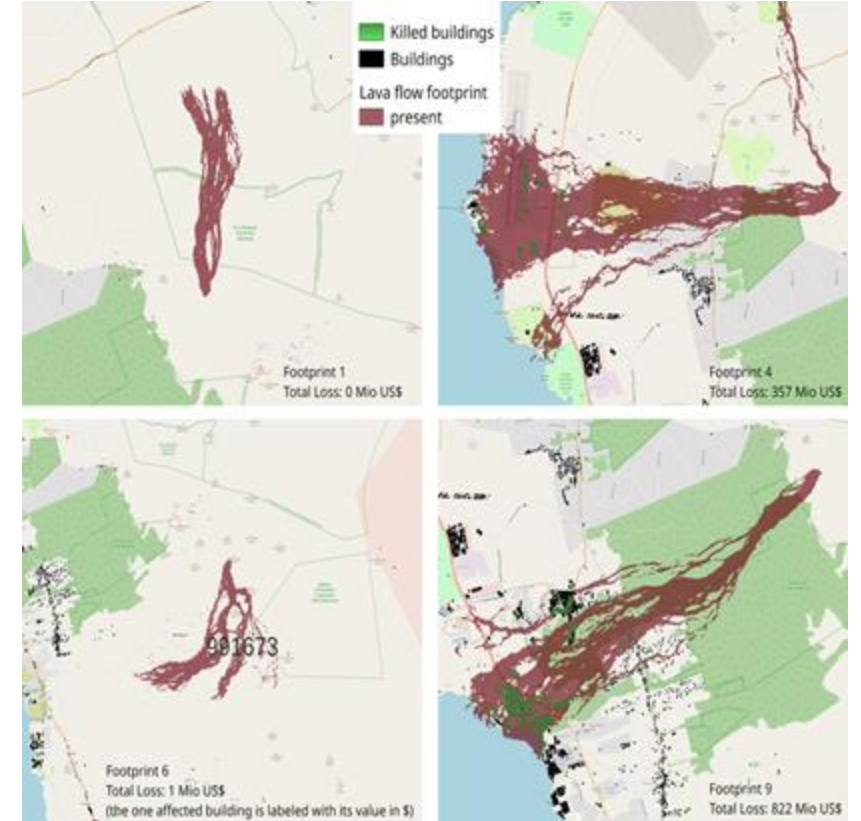
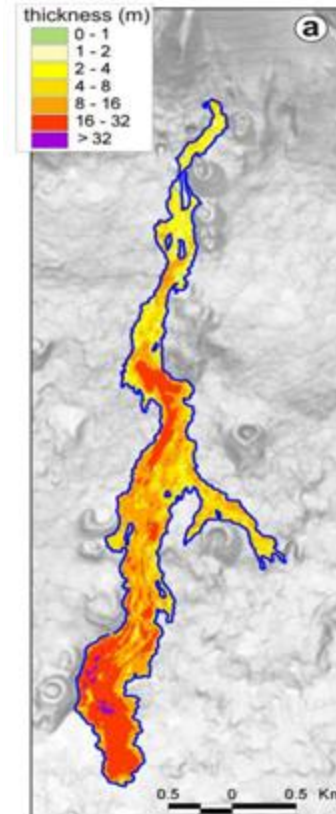




Use Case #3

Comprehensive lava flow emergency management tool that provides the user with:

1. Lava emission alerts
2. Forecasted lava inundation paths and lava flow simulators
3. Operational loss forecasting





Use Case #3

Stakeholders:

- i. Civil Protection & local governments
- ii. First responders
- iii. Local businesses
- iv. Land-use planning agencies
- v. Insurance and private sector
- vi. General public

Expected impact:

- i. Transferable state-of-the-art lava flow monitoring warning system
- ii. Use of application as calculation agent for cat bonds / parametric insurance

Results

Enhance the technologies that can help Responders and Private sector operators

Test and evaluate selected tools in the field, reaching high TRL levels

New services targeting the private sector

Exploitation activities among the SMEs involved in the Consortium

Define replicability scenarios and provide lessons learned



THANK YOU!

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Overwatch

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