The Greek Observatory of Forest Fires (gOFFi)

New developments & outlook

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History

NOF: National Observatory of Forests

gOFFi: Greek Observatory of Forest Fires

2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

NOFFi National Observatory of Forest Fires

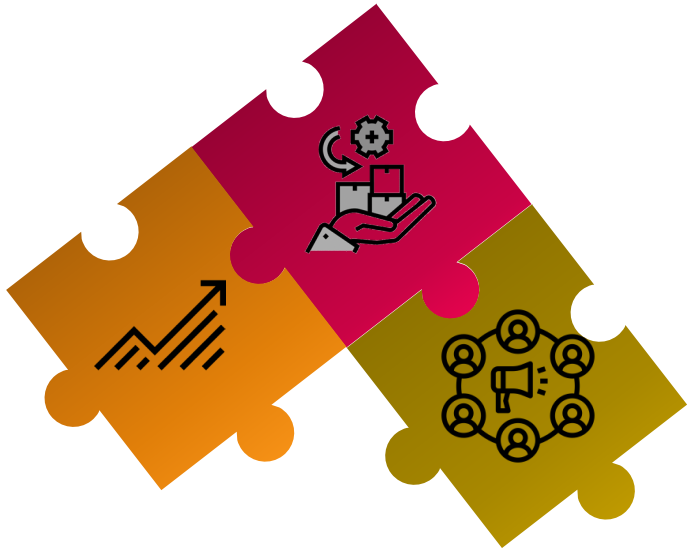
Operational burned area mapping service for Greece's Forest Service

Objectives

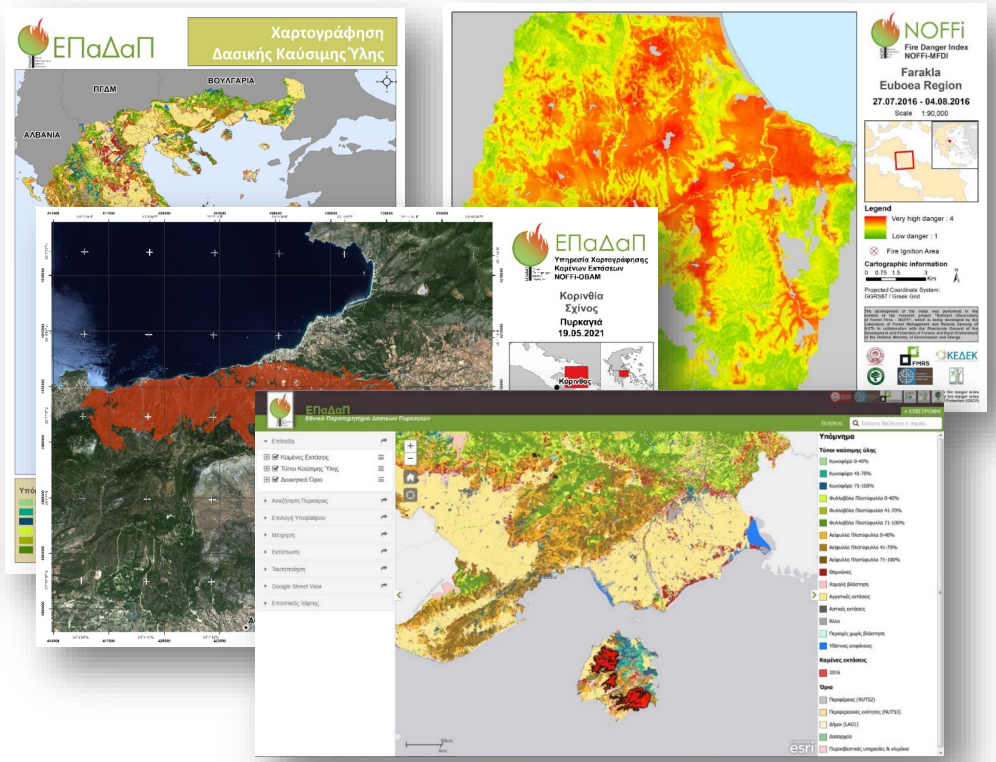
Develop **products** and **services** useful for increasing **preparedness** against wildfires and assessing their environmental **impact** 01

Continuously **improve** the services and develop new **validated** **science-based** solutions for pre- and post-fire planning 02

Disseminate the results and transfer knowledge to neighboring countries 03

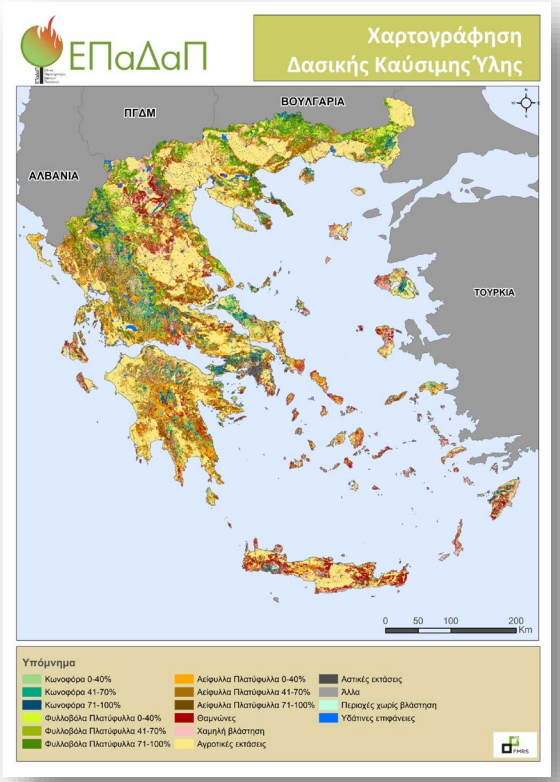


NOFFi's services



- Fuel type mapping (NOFFi-FTM)
- Midterm fire danger index (NOFFi-MFDI)
- Burned area mapping service (NOFFi-OBAM)
- WebGIS platform (NOFFi-WebGIS)

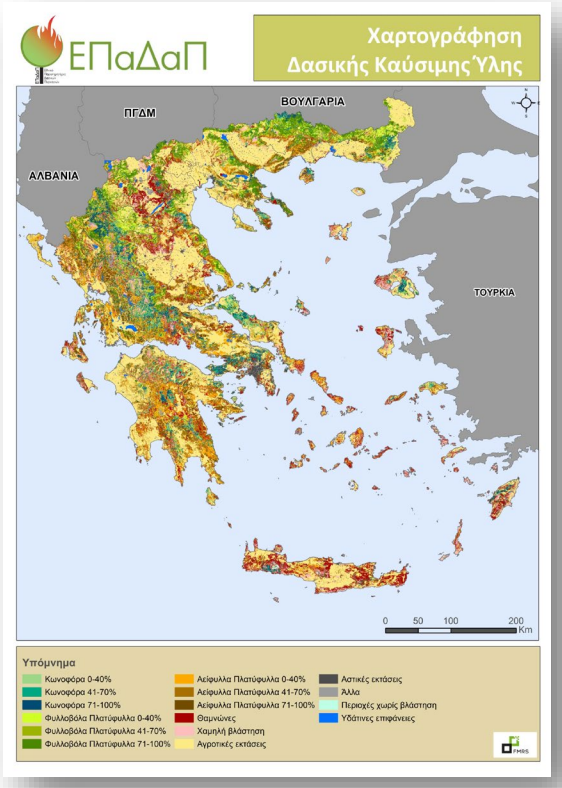
Fuel type mapping (NOFFi-FTM)

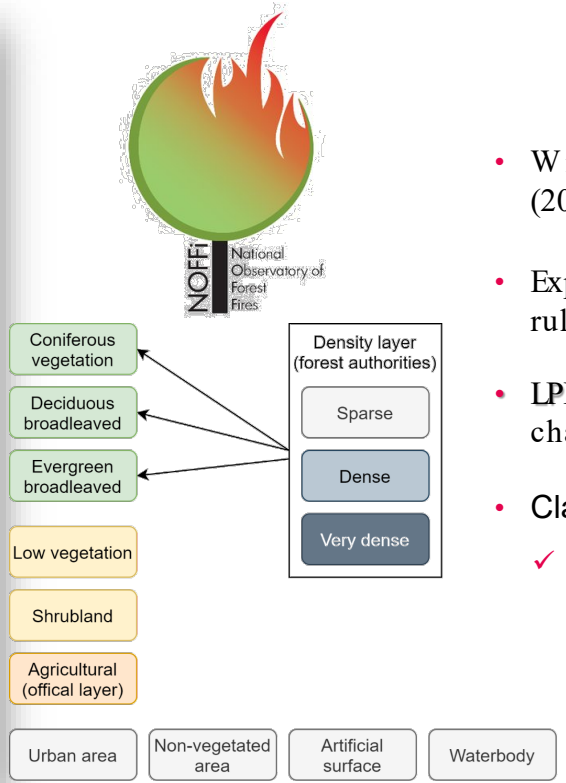


NOFFi National Observatory of Forest Fires

- Winter/summer pairs of Landsat 8 images (2015)
- Expert-based hierarchical classification rules
- LPIS ILOTS for agricultural & urban areas characterization

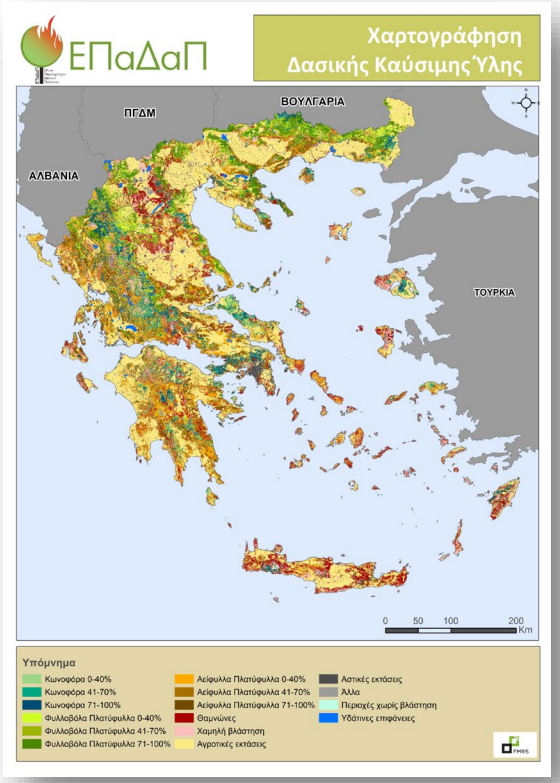
Fuel type mapping (NOFFi-FTM)





- Winter/summer pairs of Landsat 8 images (2015)
- Expert-based hierarchical classification rules
- LPIS-ILOTS for agricultural & urban areas characterization
- Classificationscheme:
  - ✓ Broad vegetation categories & vegetation density layer (source: central forest service)

Fuel type mapping (NOFFi-FTM)



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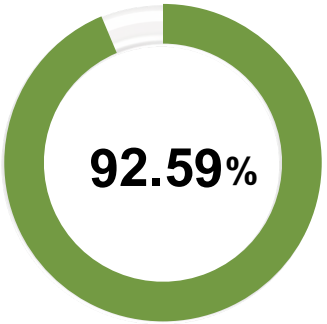
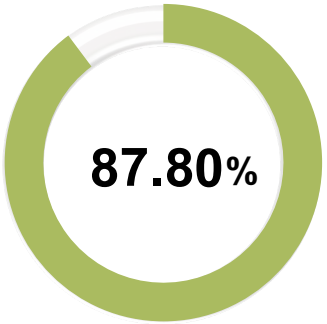
Accuracy assessment based on LUCAS 2013 dataset

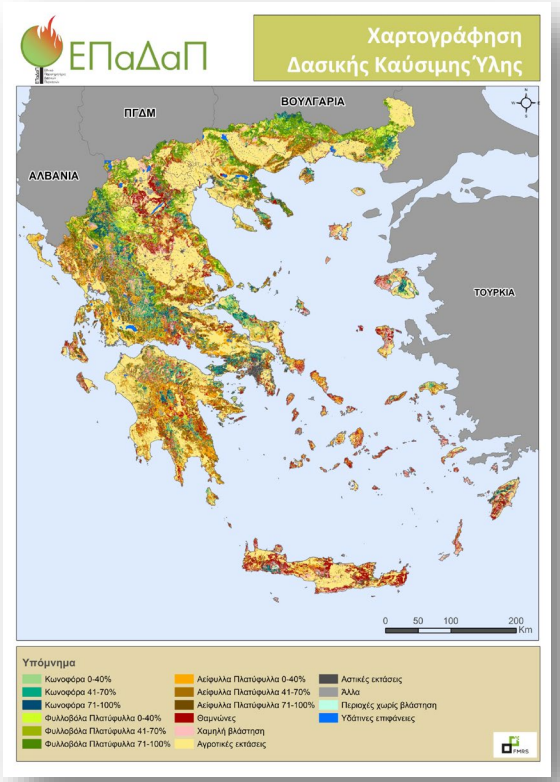


Overall accuracy of final map



Overall accuracy of final map without the agricultural & urban areas derived from ILOTS

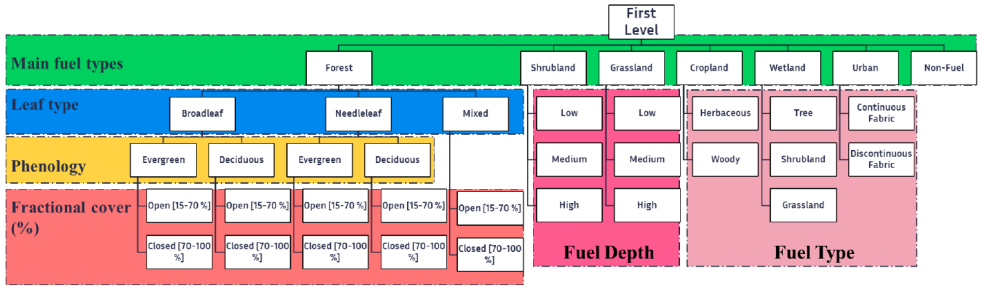
Fuel type mapping (NOFFi-FTM)



gOFFi

- gOFFiupdates:
  - Transition to Sentinel-2
  - Alignment with FirEURisk's fuel type scheme (more detailed; alignment with Scott & Burgan fuel models)
  - Machine learning classification
  - Shrublands' & grasslands' fuel depth estimation
  - Annual updates (burned areas)

(Updated) Fuel type mapping (gOFFi-FTM)



- Full alignment with FirEUrisk fuel type classification scheme

Aragoneses, E., García, M., Salis, M., Ribeiro, L. M., and Chuvieco, E.: Classification and mapping of European fuels using a hierarchical, multipurpose fuel classification system, Earth Syst. Sci. Data, 15, 1287–1315, https://doi.org/10.5194/essd-15-1287-2023, 2023.

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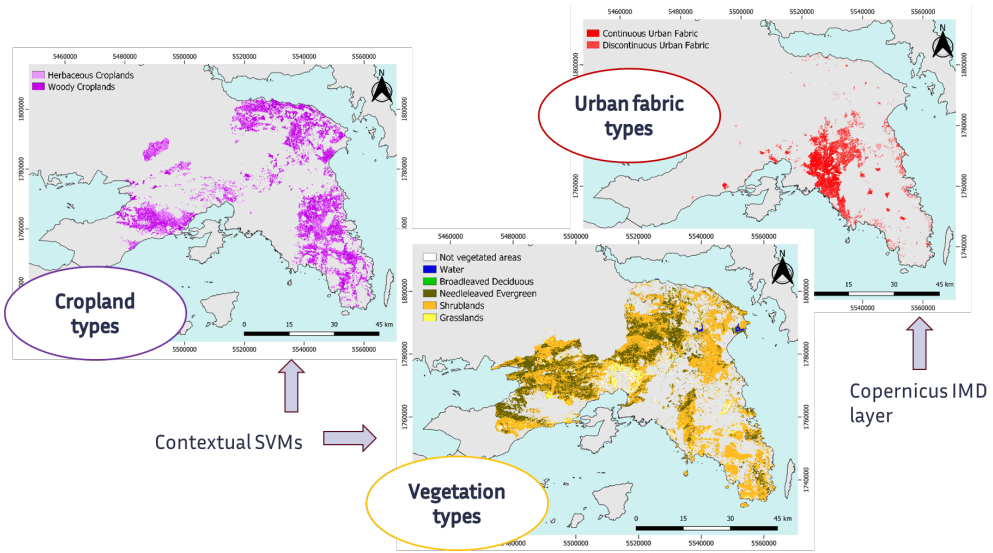

- Full alignment with FirEUrisk fuel type classification scheme
- Urban fabric types classification (via Copernicus Imperviousness product)
- Clopland types & vegetation types classification (SVM classifiers, Sentinel-2 time series)

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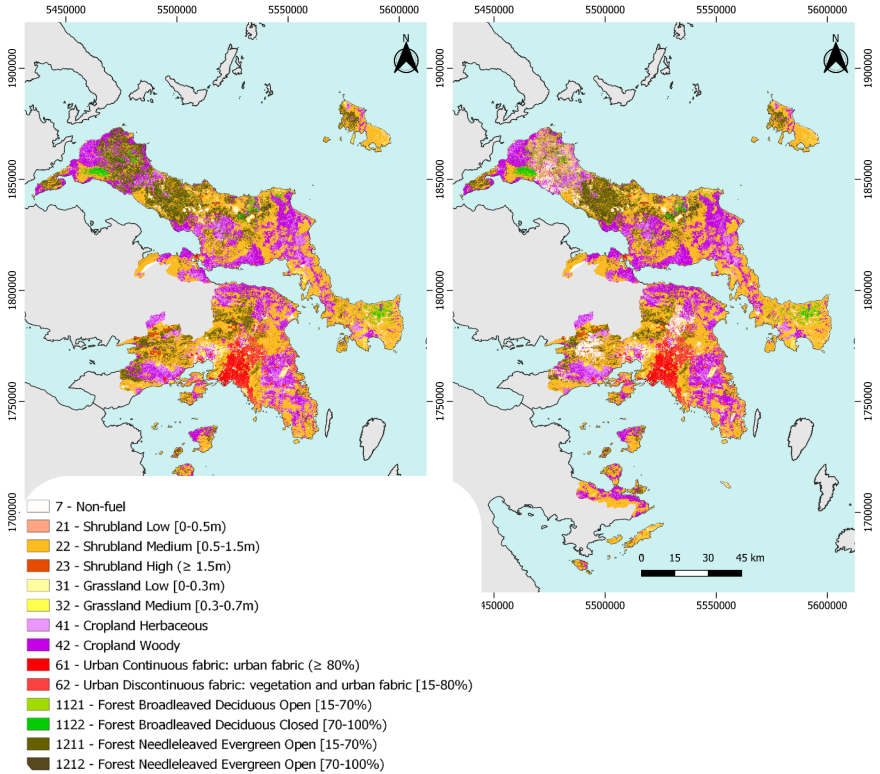

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- Forest density (via Copernicus Density High-Resolution product)
- Shrublands' & grasslands' fuel depth estimation (via thematic layers, meteorological data, empirical rules and machine learning models) (*ongoing*)

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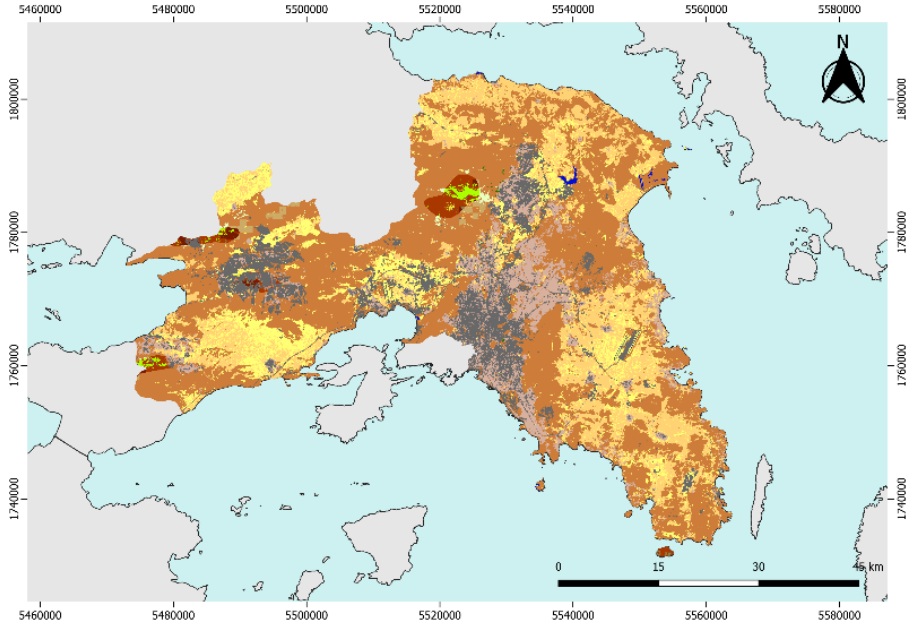

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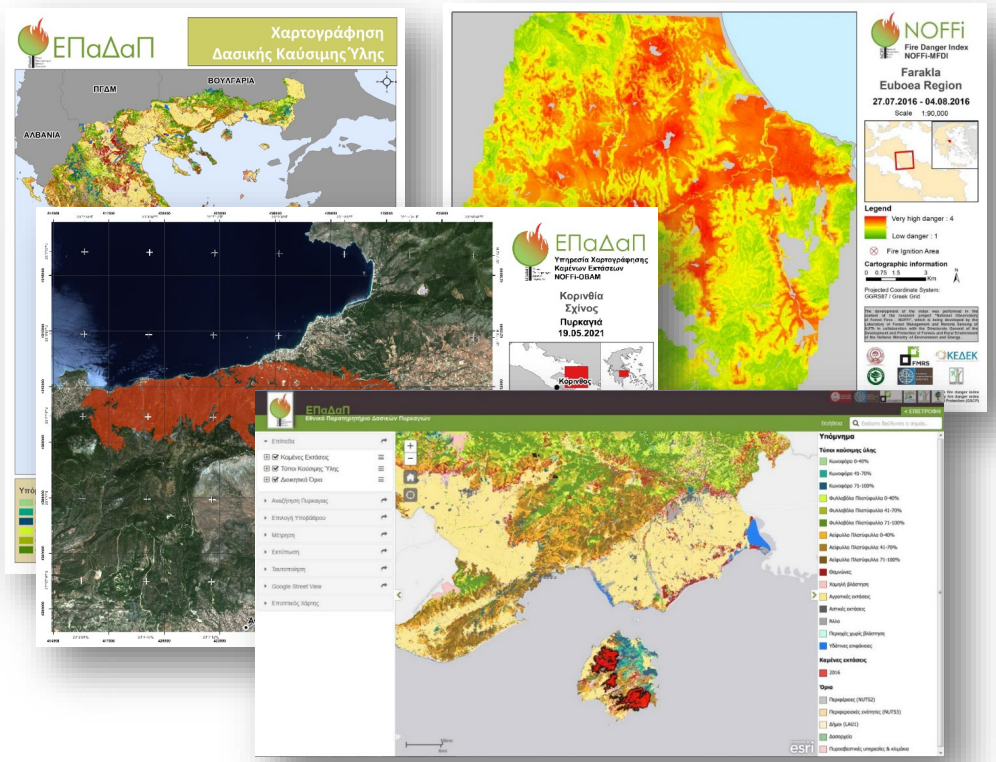
- Shrublands' & grasslands' fuel depth estimation (via thematic layers, meteorological data, empirical rules and machine learning models) (ongoing)
- Assignment of fuel types to Scott & Burgan fuel models (FBFM40)

NOFFi's services



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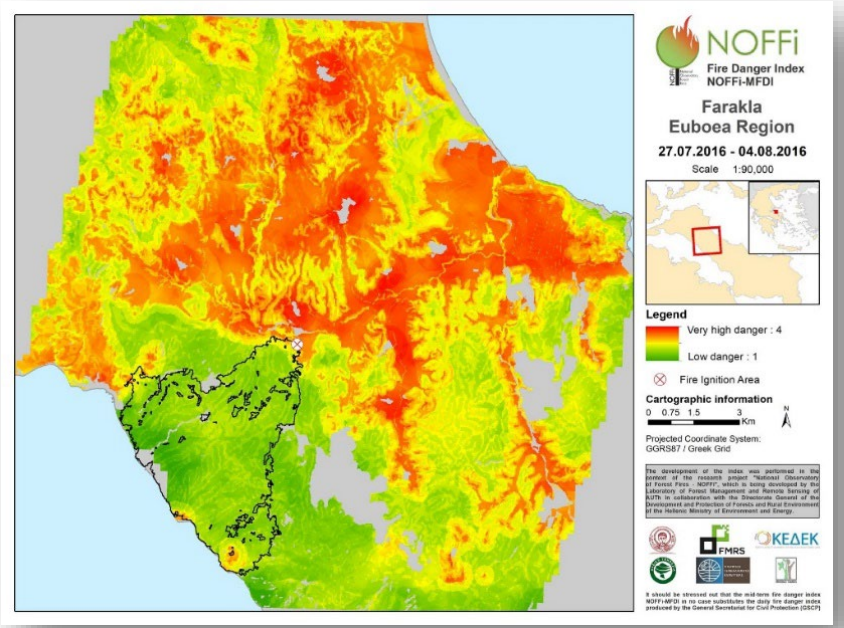
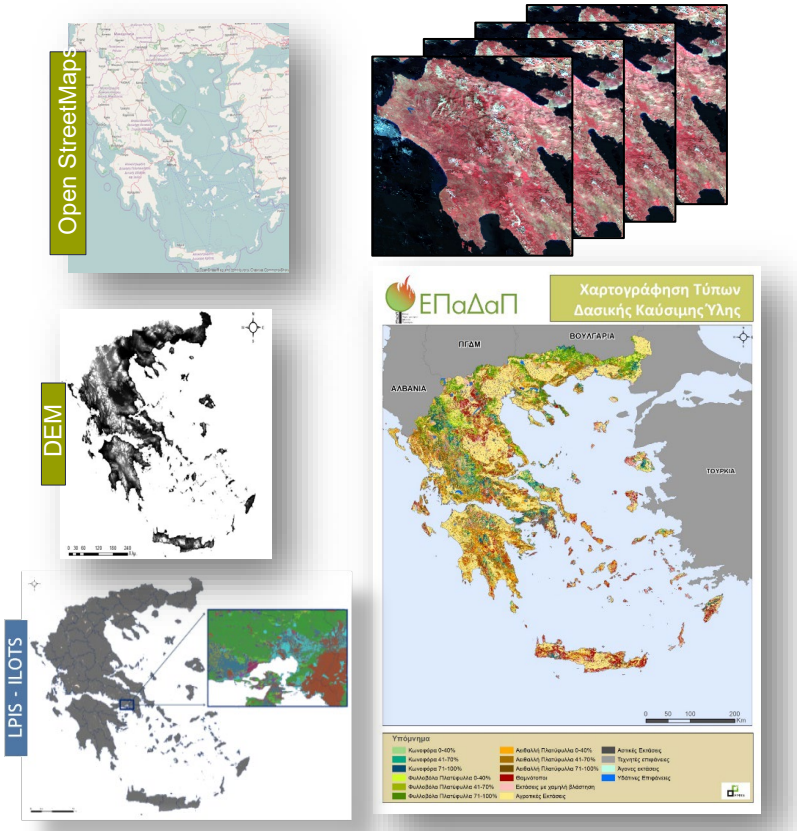
Midterm fire danger index (NOFFi-MFDI)

- Midterm prediction of fire ignition (following 8 days)
- Modern approach based on optical satellite observations & auxiliary thematic layers (no meteorological predictions are employed)
- Use of satellite imagery for estimating vegetation dryness and, subsequently, dry fuel connectivity
- Auxiliary layers related to other fire ignition factors → all factors combined through multi-criteria analysis



Midterm fire danger index (NOFFi-MFDI)

- Data:
  - 10-year time-series of MODIS imagery [dry fuel connectivity estimation]
  - Fuel type map (FTM)
  - LPIS (ILOTS) [distance from croplands & urban areas]
  - Digital Elevation Model (ASTER GDEM) [for altitude, slope, exposure]
  - Road network (OpenStreetMap – OSM) [distance from roads]
- *Future* transition to Sentinel-3



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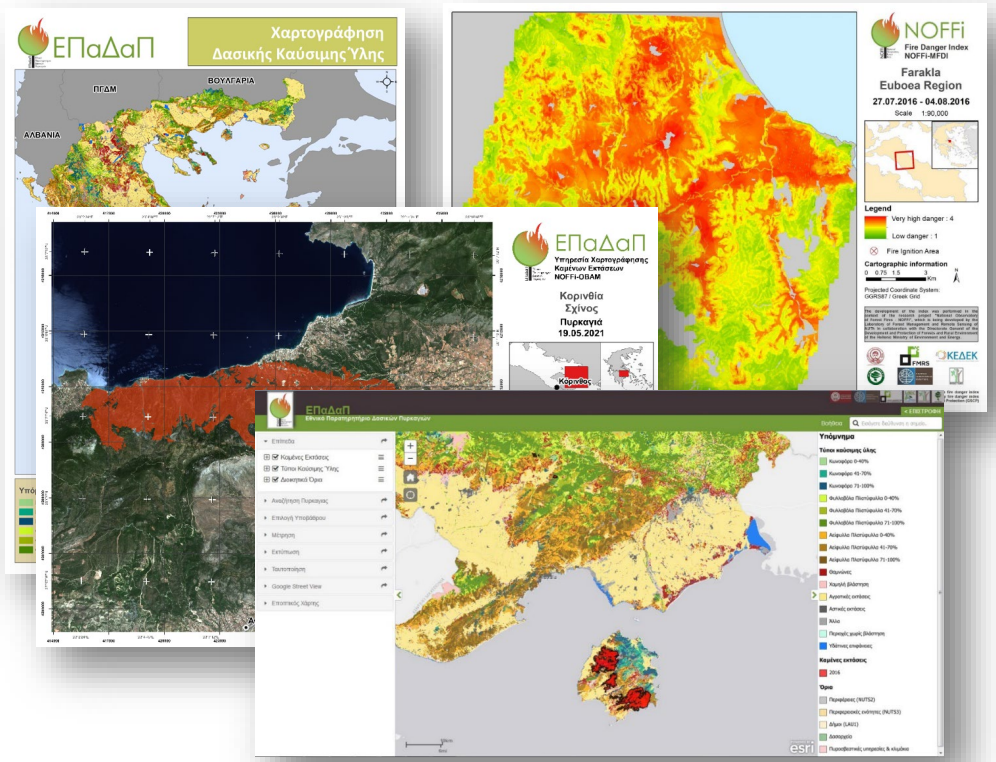

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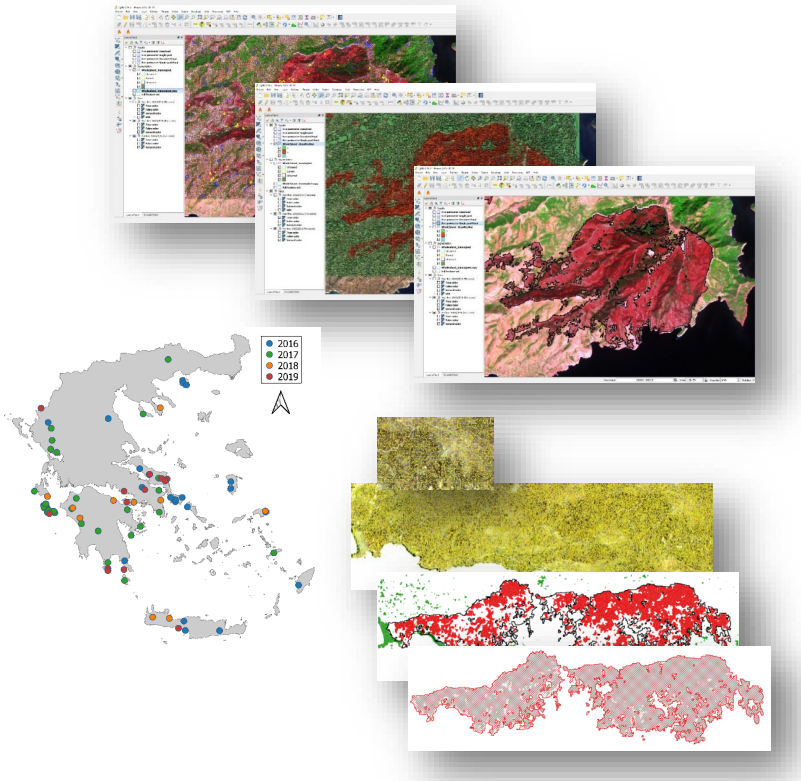
Burned area mapping service (NOFFi-OBAM)

- Algorithm evolution:
  - Sentinel-2 based methodology
  - Initially: Python / QGIS plugin methodology (object-based supervised learning approaches)
  - Later: pairs of Sentinel-2 images & newer machine learning approaches
  - Currently: fully automated processing
- Fully operational service, with direct communication with the local forest offices



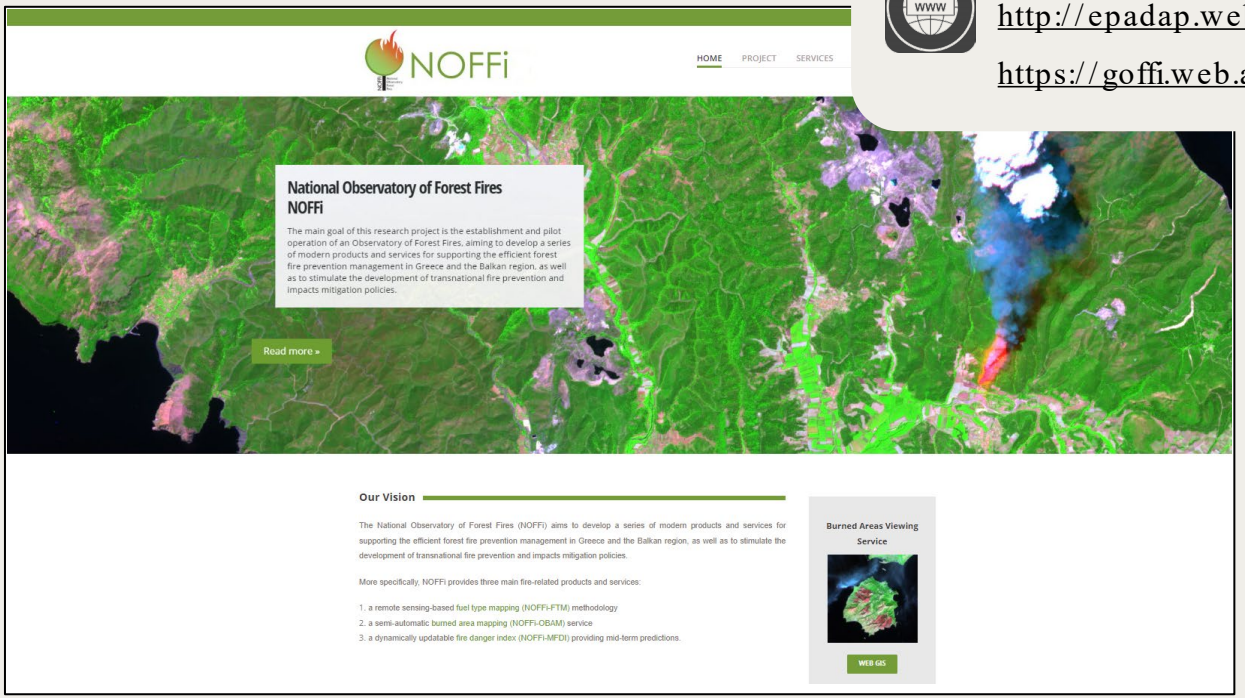
Burned area viewing service

Viewing service accessible via:

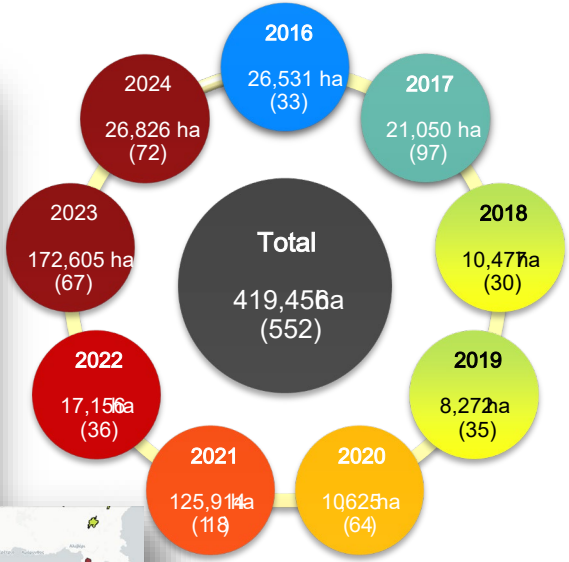
http://fmrsvm.for.auth.gr

http://epadap.web.auth.gr/?lang=en

https://goffi.web.auth.gr



Burned area mappings



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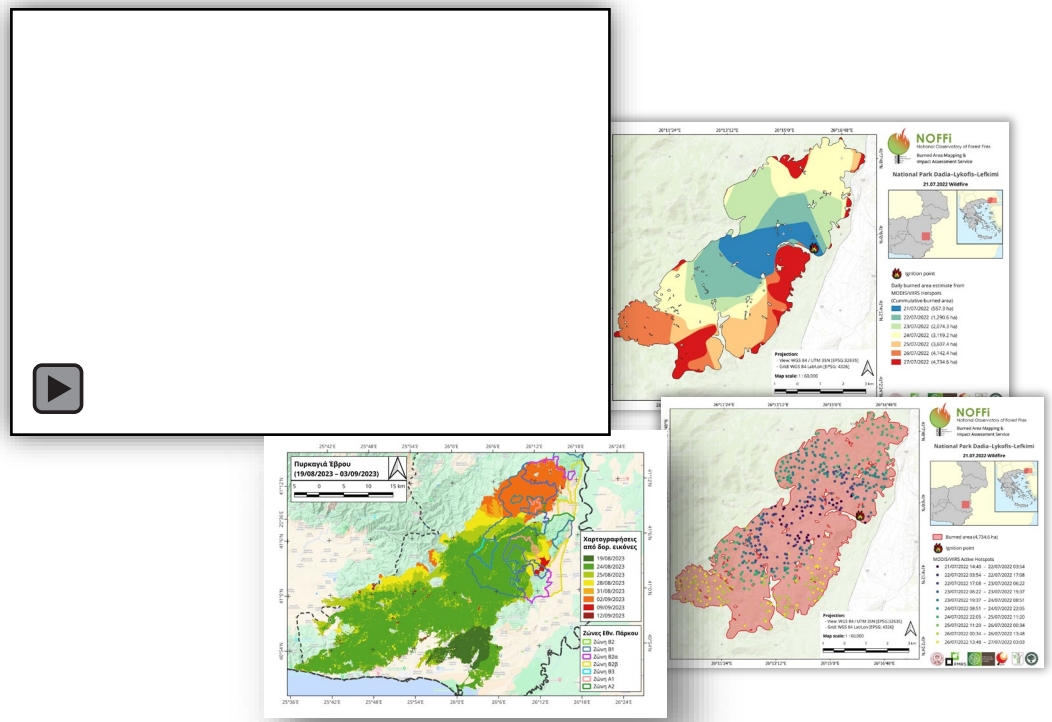

- Additional products provided:
  - Progressive burned area estimated via NASA FIRMS (testing of Sentinel-3 FRP underway)

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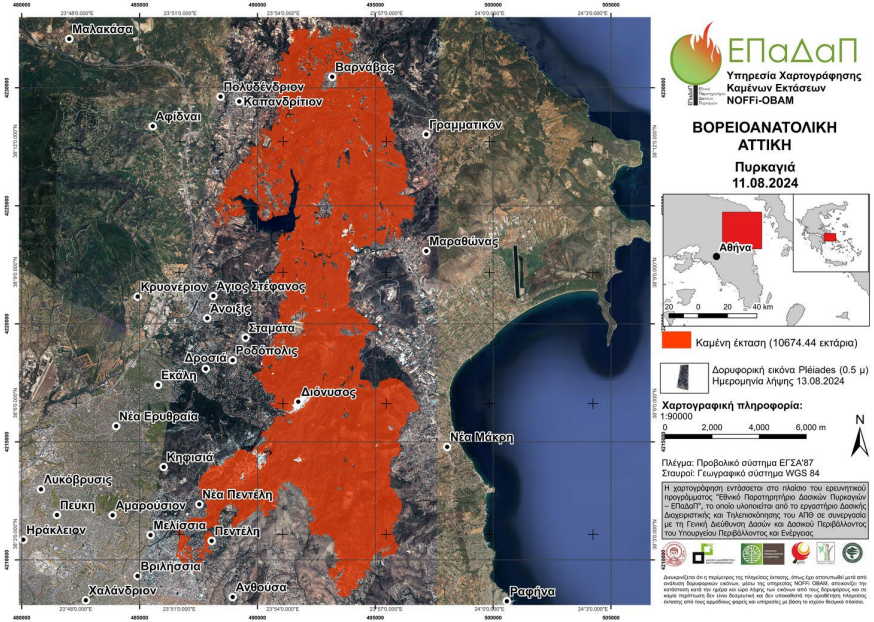

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  - Rapid detailed mapping via commercial imagery (Pléiades, PlanetScope, etc.)

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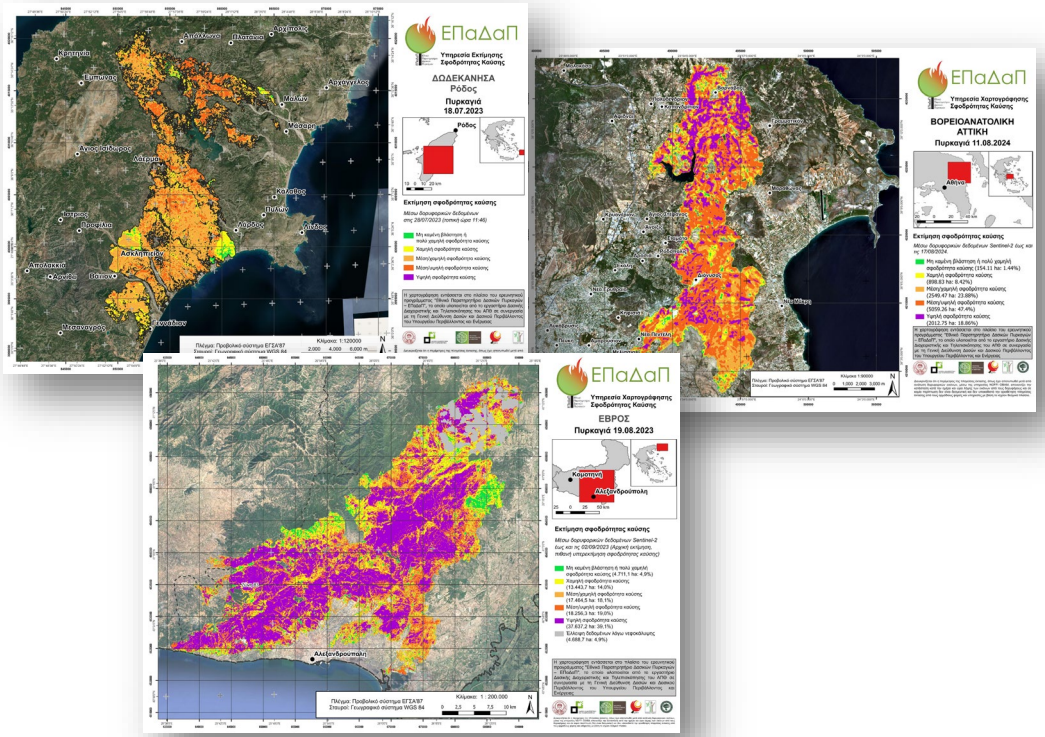

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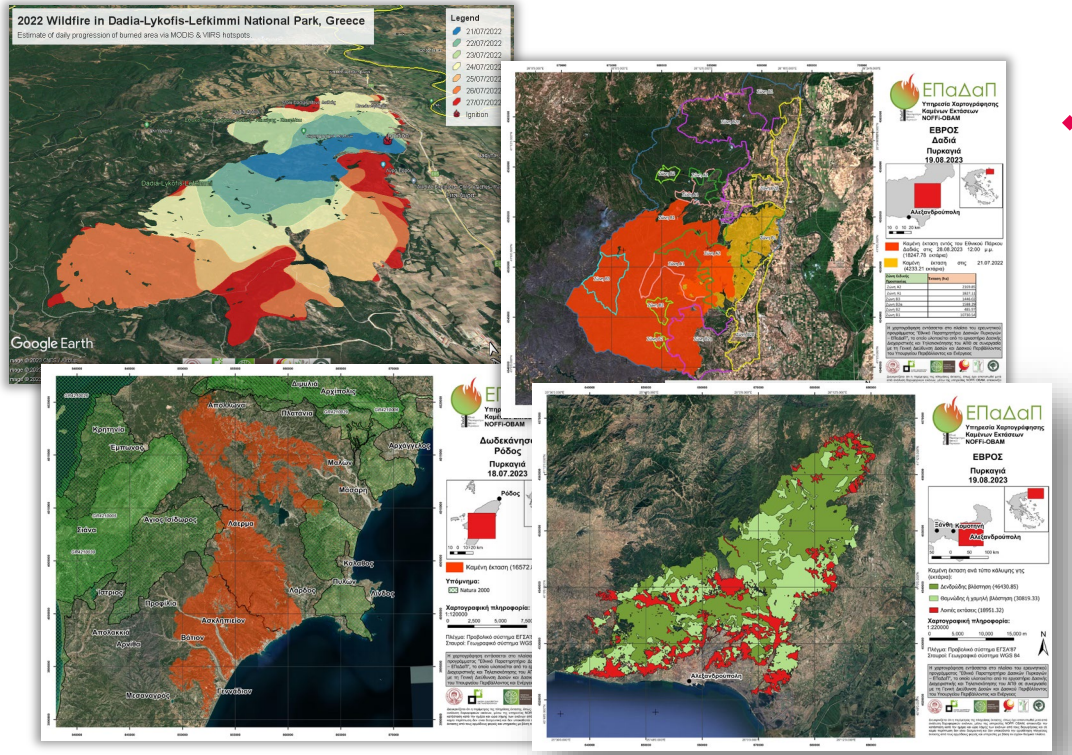

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  - Information products combining relevant thematic layers

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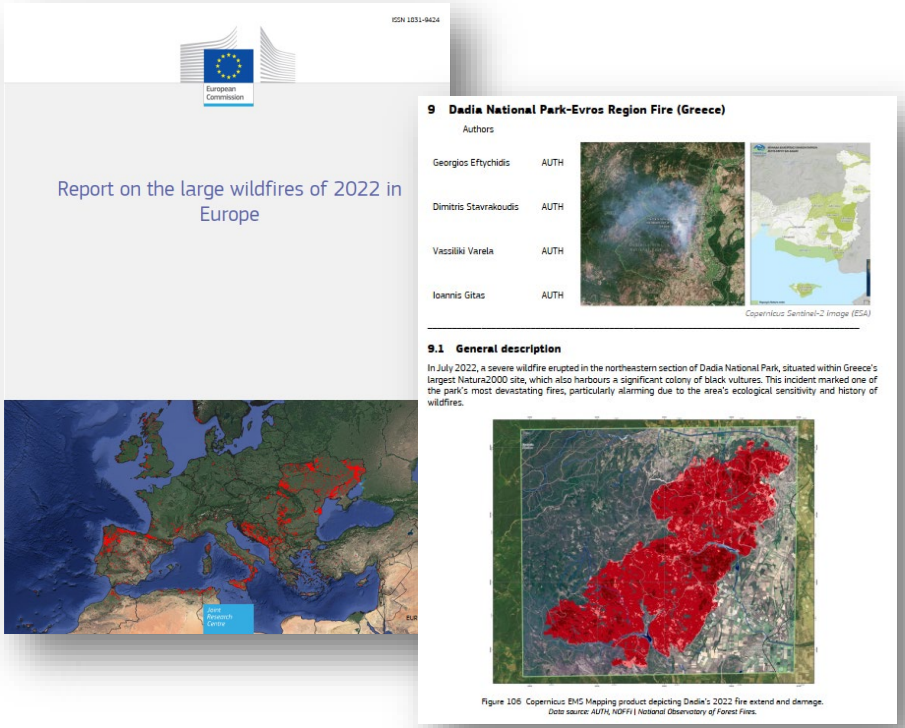

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  - Rapid detailed mapping via commercial imagery (Pléiades, PlanetScope, etc.)
  - Burn severity estimates
  - Information products combining relevant thematic layers
  - Analysis for the JRC large wildfires reports (2022 completed; 2023 ongoing)

Future gOFFi services

Additional products (ongoing work):

- ✓ Potentially **damaged infrastructure** / houses
- ✓ Estimation of dNBR-based **burn severity** classes in the **next growing season(related to tree mortality)** with information available immediately after the fire
- ✓ **Post-fire regrowth monitoring** for selected sites using Sentinel-2 (rate of regeneration, identification of areas requiring intervention)

Postscript

- Ecosystem station (flux tower) in Pertouli University forest (Trikala, Greece)
- Installed in 2021 by the University Forest Administration and Management Fund and Region of Thessaly
- Measurements of:
  - ✓ CO_2 & CH_4
  - ✓ Net & photosynthetic active radiation
  - ✓ SmartFlux unit
- Member of ICOS

Thank you!

Any questions ?

You can reach me at

- igitas@for.auth.gr