Platform for high-resolution rapid assessment of burnt areas

TREEADS

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ΕΘΝΙΚΟΝ ΑΣΤΕΡΟΣΚΟΠΕΙΟΝ ΑΘΗΝΩΝ
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SQUAREDEV

Need for rapid burnt area assessment

- ✓ **Help emergency responders** understand fire extent → better **allocation of resources**.
- ✓ **Estimate impact** on infrastructure, agriculture & natural resources → guide **immediate relief efforts**.
- ✓ Identify areas at **risk of erosion** due to vegetation loss → **timely intervention**.
- ✓ Facilitate **damage claims** for landowners & businesses.
- ✓ Locate **affected habitats** & prioritize actions for **ecosystem recovery**.
- ✓ Support **reforestation & land rehabilitation** programs.

Why burnt area mapping with satellite data and ML?

- ✓ **Large-Scale Coverage**
- ✓ **Rapid Data Acquisition & Processing** – many satellites provide frequent revisits (e.g., Sentinel-2 every 5 days, MODIS multiple times daily)
- ✓ **Cost-effectiveness** – free, open-access satellite data (e.g., Sentinel, Landsat, MODIS, VIIRS)
- ✓ **Long-term monitoring** - satellite archives allow for historical analysis to study trends
- ✓ **Automated processing workflows with ML** accelerate mapping

TREEADS solution

Burnt Area Mapping Platform offering two main services:

- ✓ Asynchronous **high-resolution mapping of all recent wildfires** in **Spain** and **Greece**
- ✓ The rapid mapping of user-defined **newly burnt areas in a medium spatial resolution**

Burnt Area Mapping services

✓ Service A: **scheduled service** that runs every week

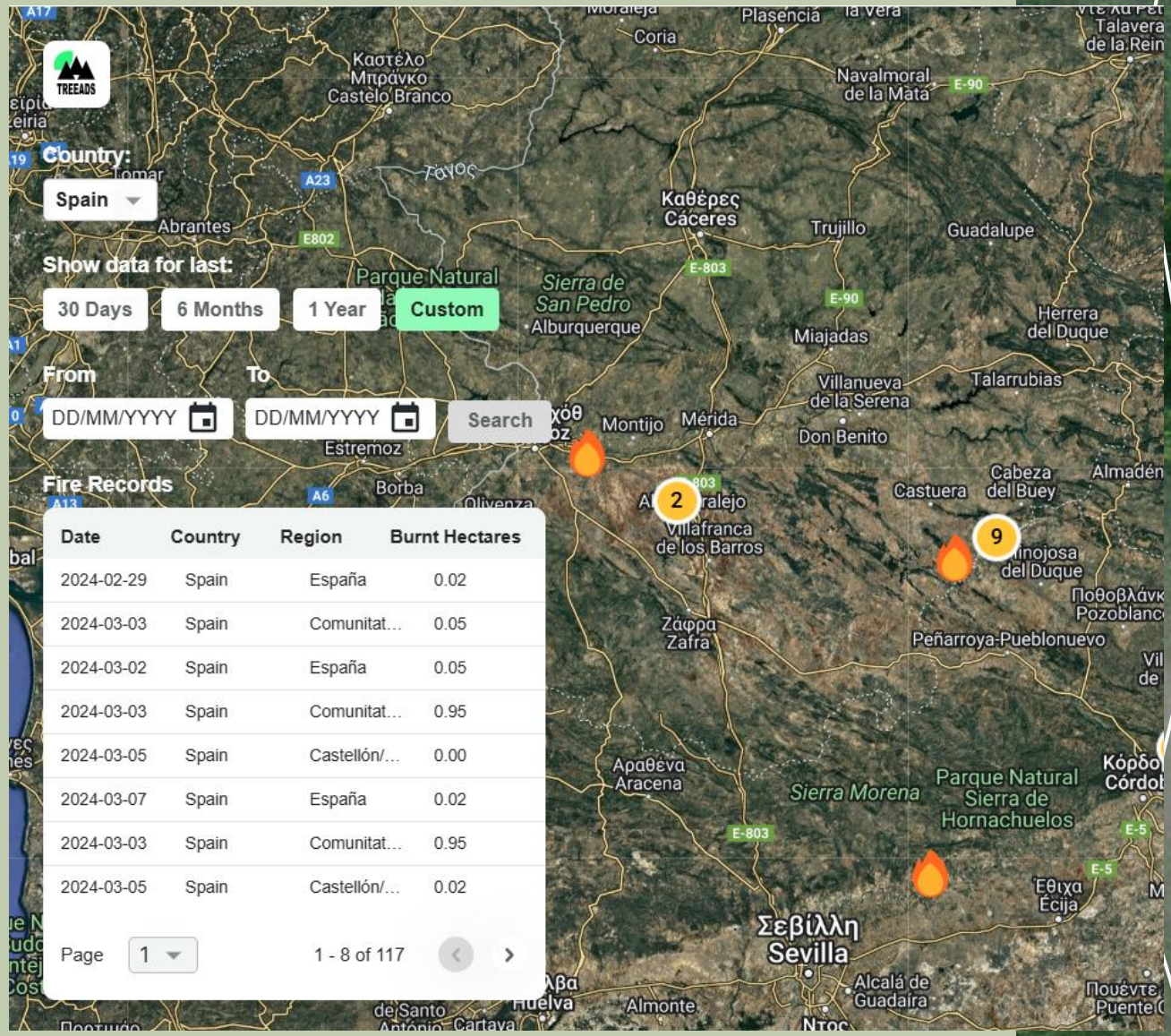
- Uses **Sentinel-2 satellite imagery**, provided by the Copernicus programme, and feeds it to a **novel DL model** that produces a **fine-grained map** of the burnt area at **20 meters** resolution.

✓ Service B: runs **upon user request**

- Uses **Sentinel-2 pre-event** and **MODIS post-event** satellite images to **predict the burnt area** upon user request at **60 meters** resolution.

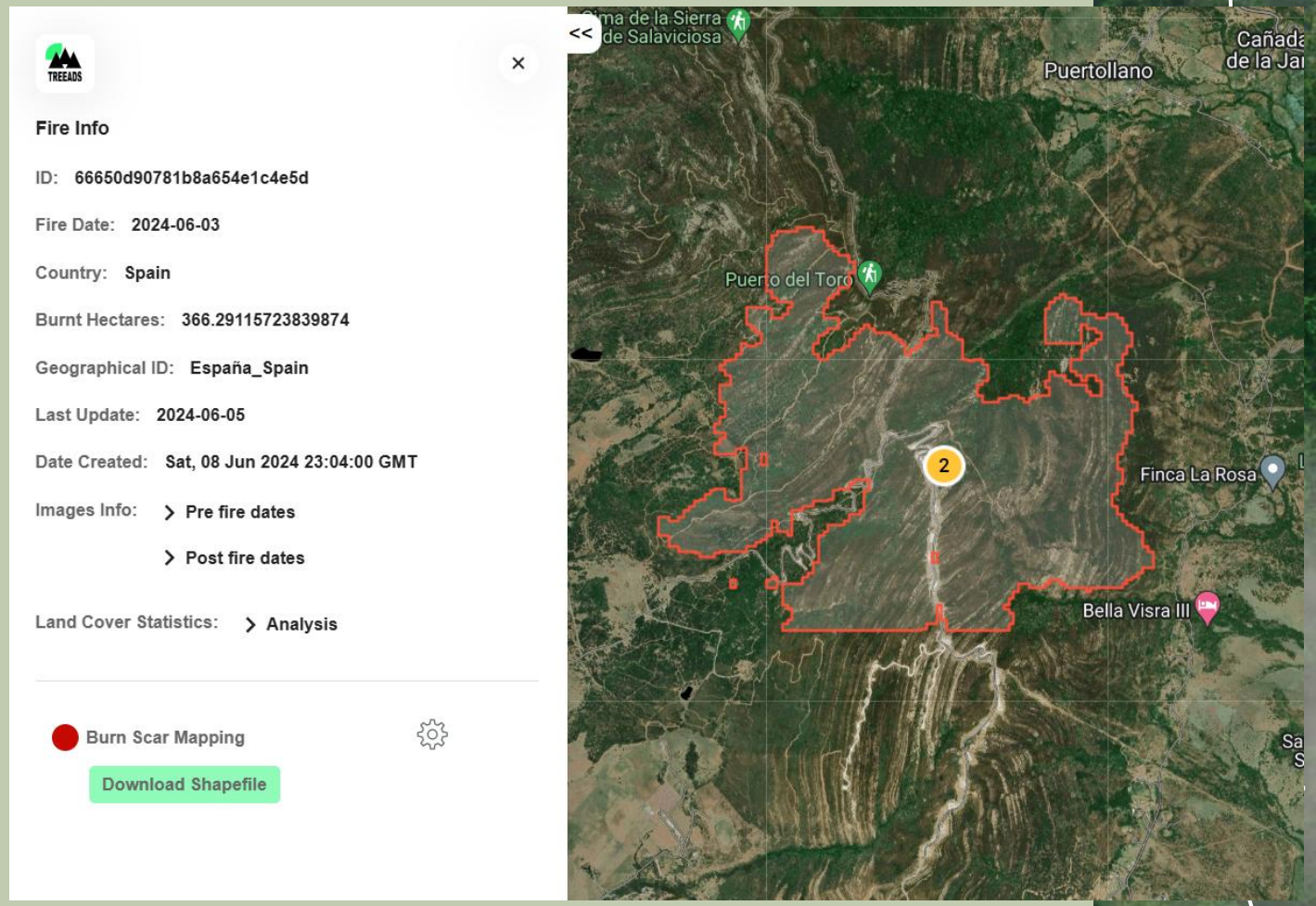
How to use the application

- ✓ Interactive map showing all wildfires mapped by the asynchronous service.
- ✓ User can **zoom in/out** and **explore events of the last 30 days, 6 months, or 1 year,** or define **custom date range** using filters.
- ✓ User can select **wildfire event from the Fire Records pane** and the display will focus on that event.
- ✓ Selected event details provided: **unique identifier, date of the fire, country, last update, total burnt area in hectares**.



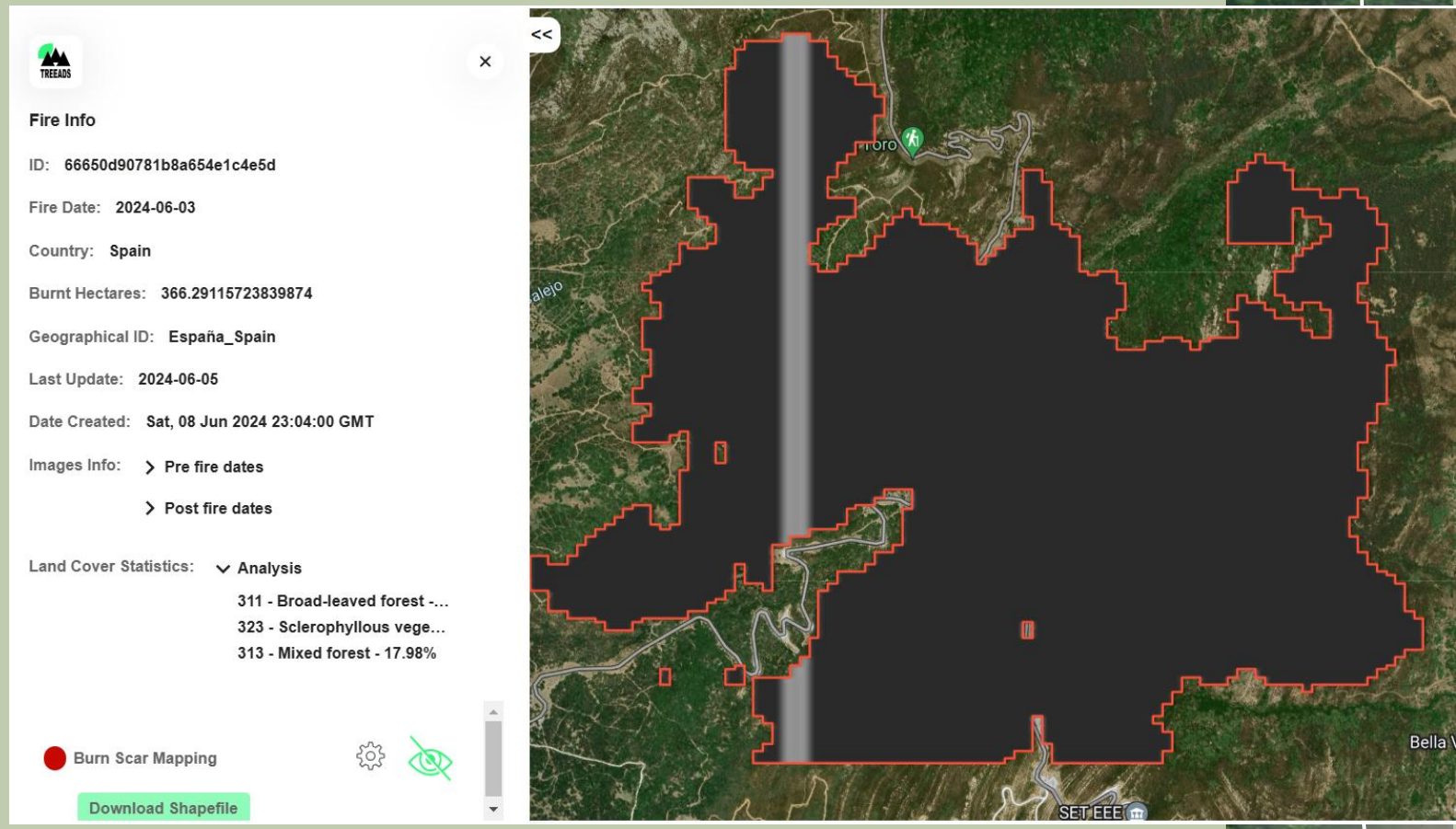
Fire event information

- ✓ Burnt area perimeter in vector format (shown in red on the map).
- ✓ User can retrieve info on satellite imagery used by the DL model & land cover statistics of the burnt area.
- ✓ Each mapping saved into a database and can be downloaded as shapefile vector file.
- ✓ “Last Update” field shows date of the latest mapping. The asynchronous service runs once per week and performs mapping based on previous week’s active hotspots.
- ✓ Mapping of a fire event repeated and updated weekly until there are no more active hotspots.



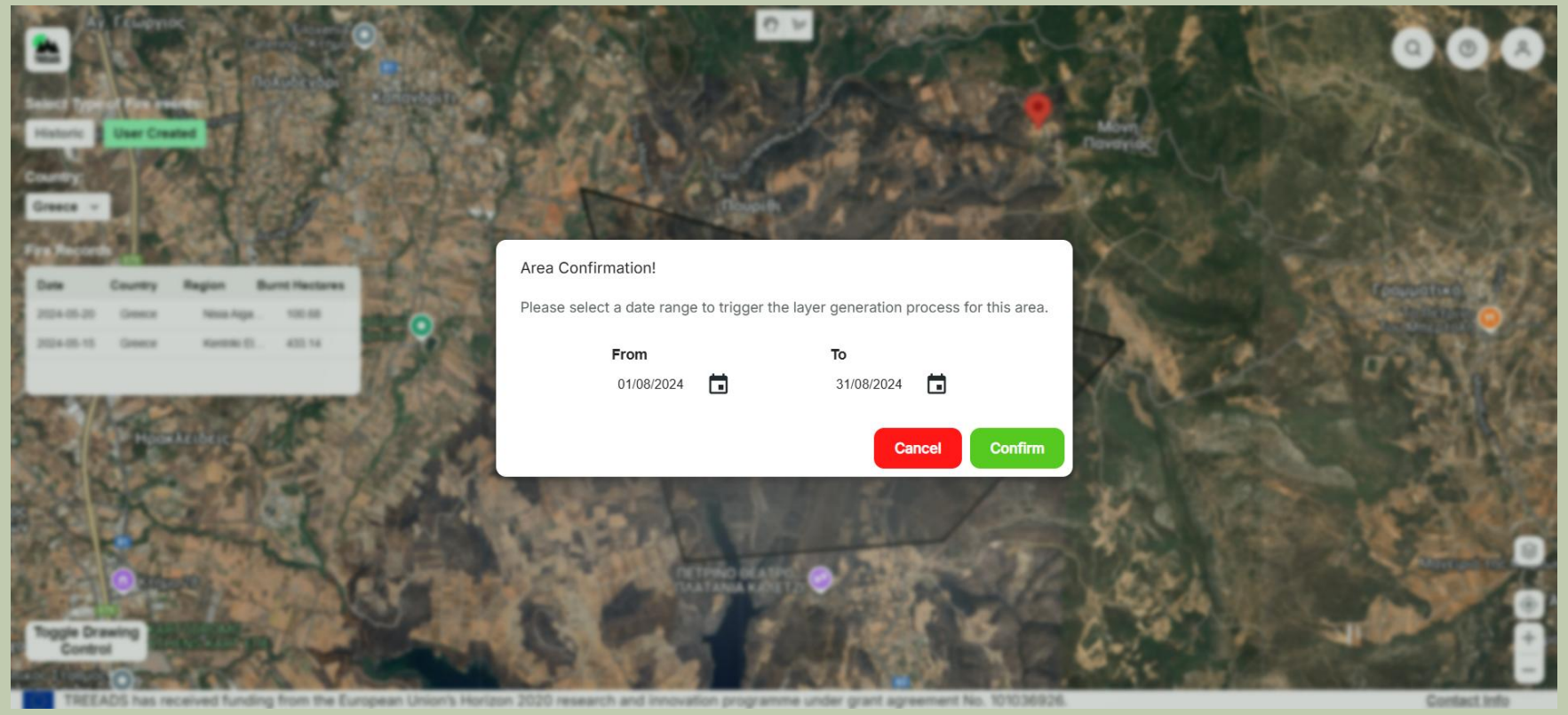
Burn scar layer

- ✓ User can select the burn scar layer and load it in tiff format → displays entire burnt area in black and perimeter in red.
- ✓ User can download the burn scar map as shapefile, which contains details, i.e., full names of the image files and coordinate reference system (CRS) used for calculation of the total burnt area.



User-created events

- ✓ **Service B** runs by user request and is **only available for authenticated users**.
- ✓ User defines area for **rapid assessment** & range of dates corresponding to the start and end of the fire event.

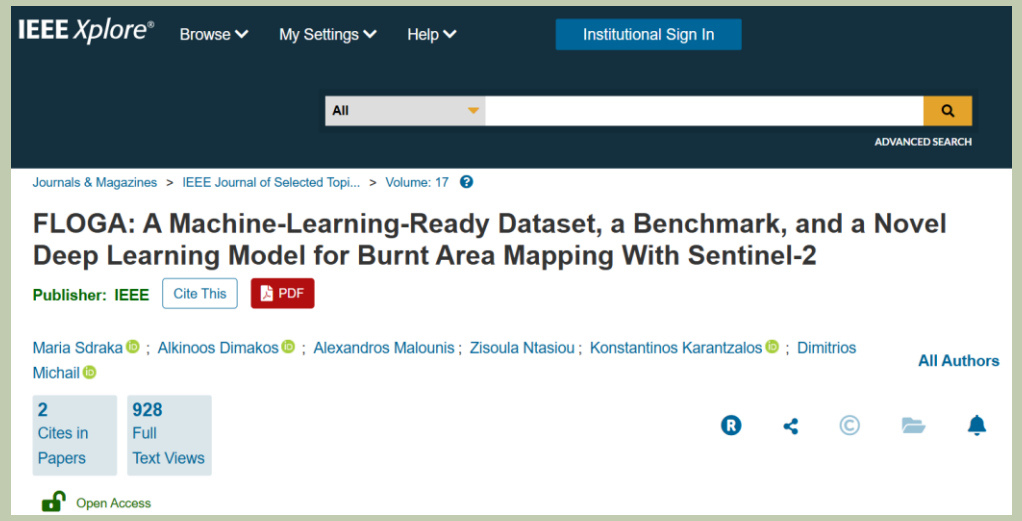


User-created events

- ✓ In the backend, the tool downloads the satellite imagery, which includes pre-event high-resolution Sentinel-2 image and post-event low resolution MODIS image
- ✓ The images are fed into a DL model that produces a **prediction of the burnt area in a medium** spatial resolution of **60 meters**.
- ✓ Rapid mapping offers a first assessment of a new wildfire so that emergency responders can **urgently develop a short-term relief & restoration plan**.

Explore our scientific results

- ✓ *FLOGA* – a **novel multiresolution benchmark dataset**, which contains a great number of fire events in Greece over the years 2017–2021.
- ✓ *BAM-CD* – our **novel DL model** automatic extraction of burnt areas, **outperforming all other methods** in terms of accuracy and robustness.
- ✓ https://ieeexplore.ieee.org/document/10479972 (Sdraka et al., 2024)



Burnt Area Mapping Platform demo

https://noa.treeads.app.squaredev.io/

Thank you!

National Observatory of Athens & Squaredev

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