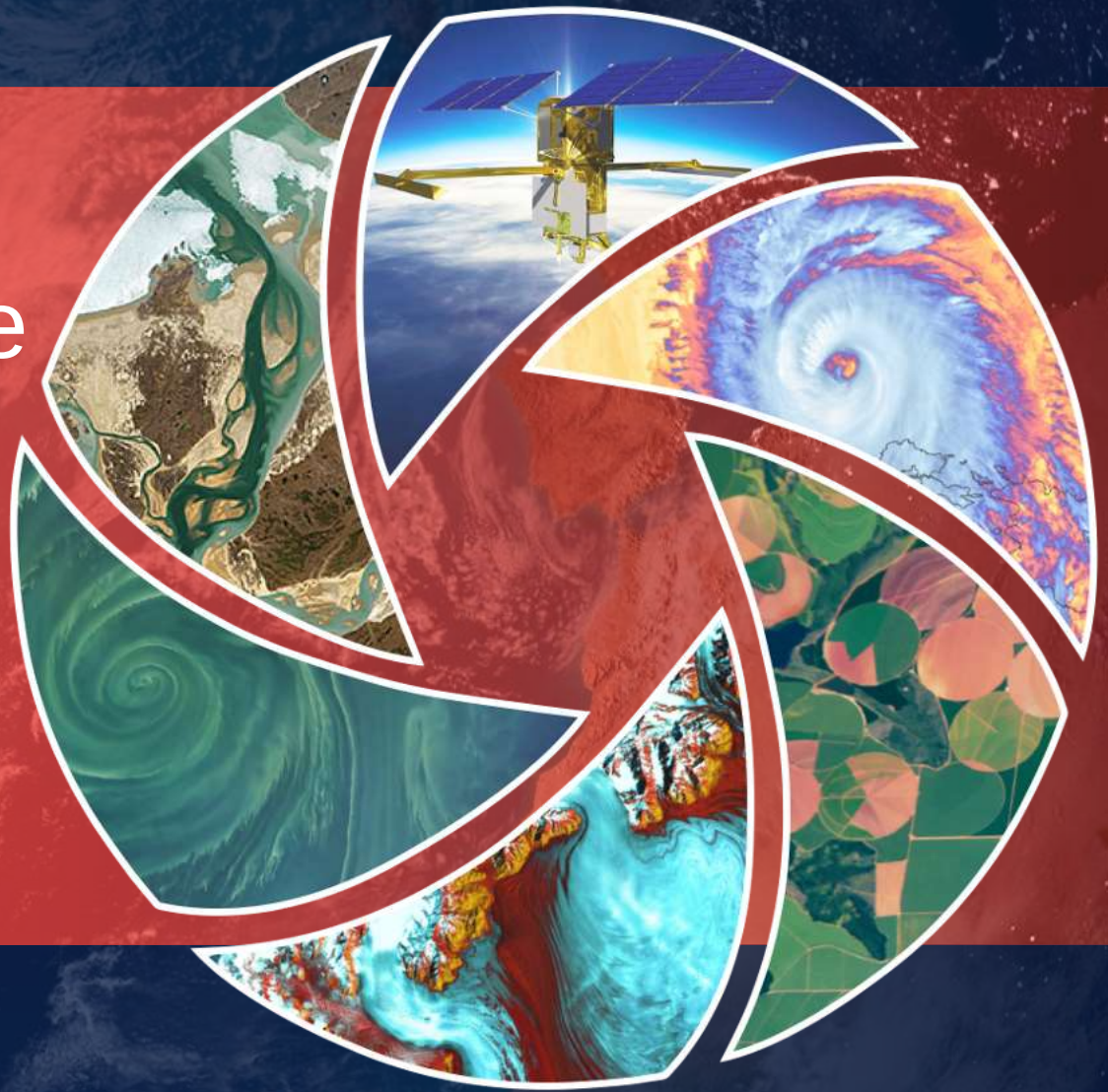
Informing Wildfire Needs: the Expanded User Interface of NASA's Fire Information for Resource Management System (FIRMS)



AMS 2024: Session – Wildfire and Its Impact II

Tuesday, 30 January 2024

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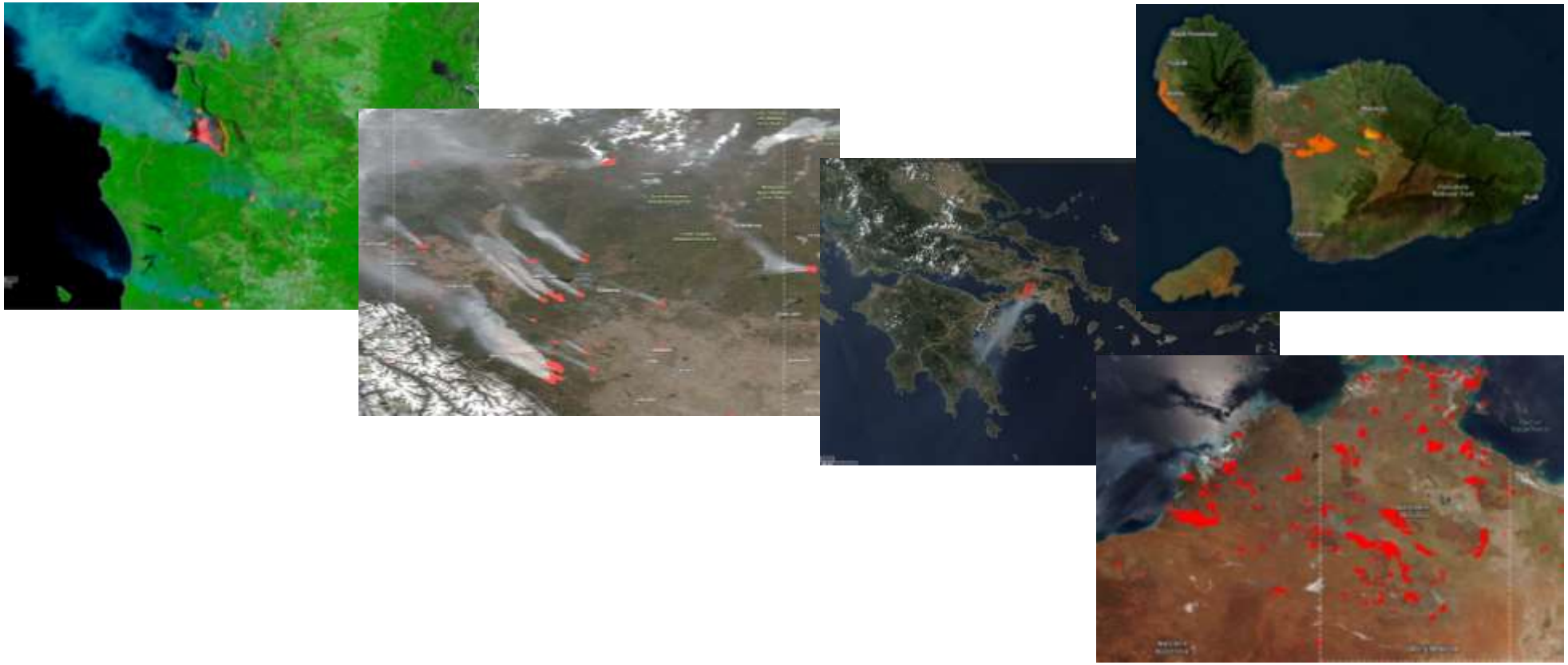
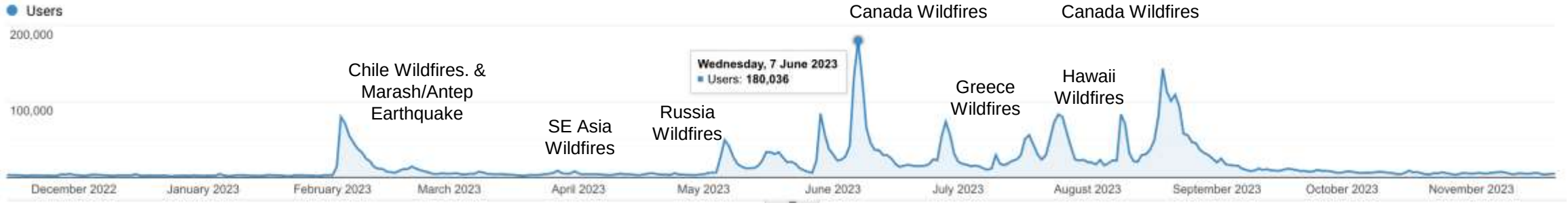
Outline

- ❑ Context & Background
- ❑ FIRMS Expanded User Interface Objectives
- ❑ Modes: Basic, Burned Area, Aerosols/Smoke, Advanced
- ❑ Other tools within FIRMS: Web services, Fire Academy, Tutorials

Context
Living in a Changing Environment – Wildfire in 2023

- Chile
- Canada
- Greece
- Maui, HI
- Australia



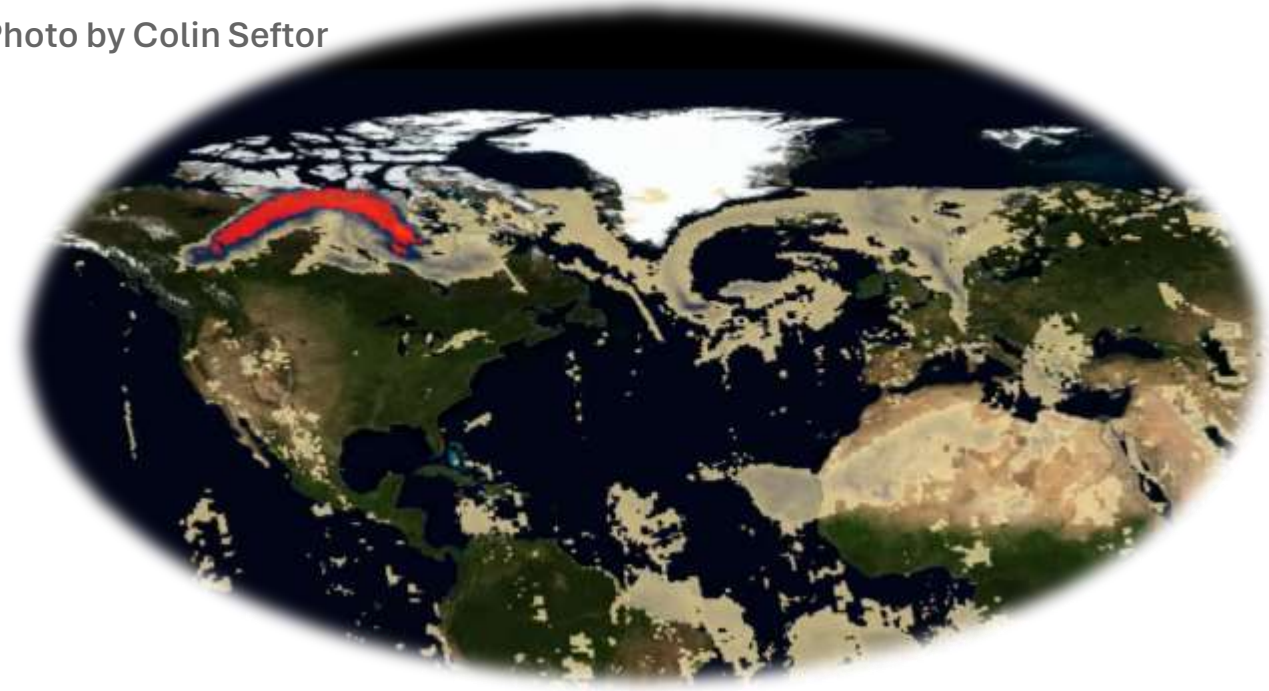


Context
Associated Impacts

- Canada: ~18.4 million hectares
- 142 confirmed **pyroCb events**
  - Another 3 were probable and 7 uncertain
  - The OMPS Aerosol Index (AI) can be used to both detect and confirm the occurrence of pyroCbs

Photo by Colin Seftor

- **Air Quality**
- Millions affected by poor air quality – NE US
- Europe was affected throughout the summer and early fall by smoke plumes from Canada that were transported across the Atlantic
- AI cloud: smoke plume from fires in Canada traveling to Europe
  - Occurred numerous times this year



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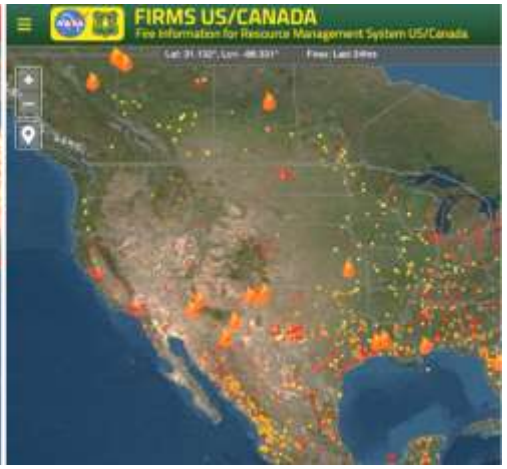
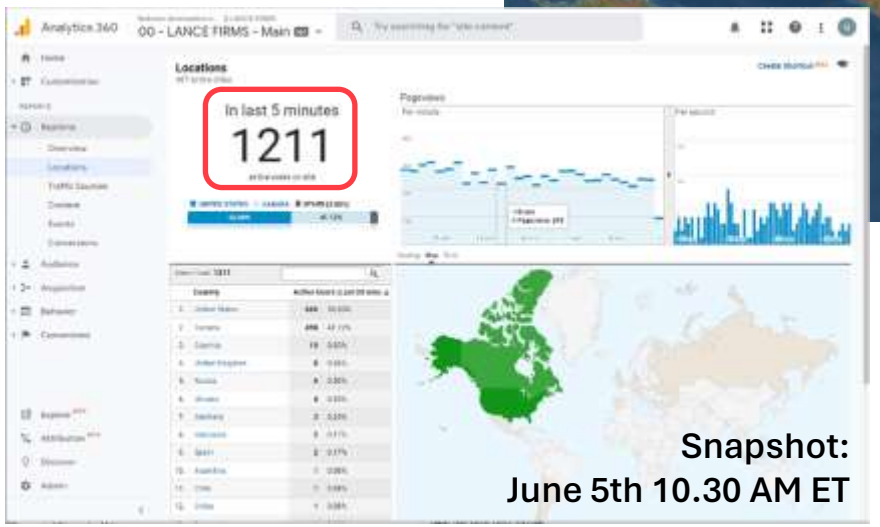
Background

- Early 2000s (MODIS Land Rapid Response System)
  - Response to wildfires (USFS)
- Developed at UMD
- Transitioned to NASA in 2012
- Continued evolution
- ⬆ Use ⬆ diversity of users
- Facilitating Open Science

Photo by John McColgan, Bureau of Land Management, Alaska Fire Service. Source https://commons.wikimedia.org/wiki/File:Deerfire_high_res.jpg





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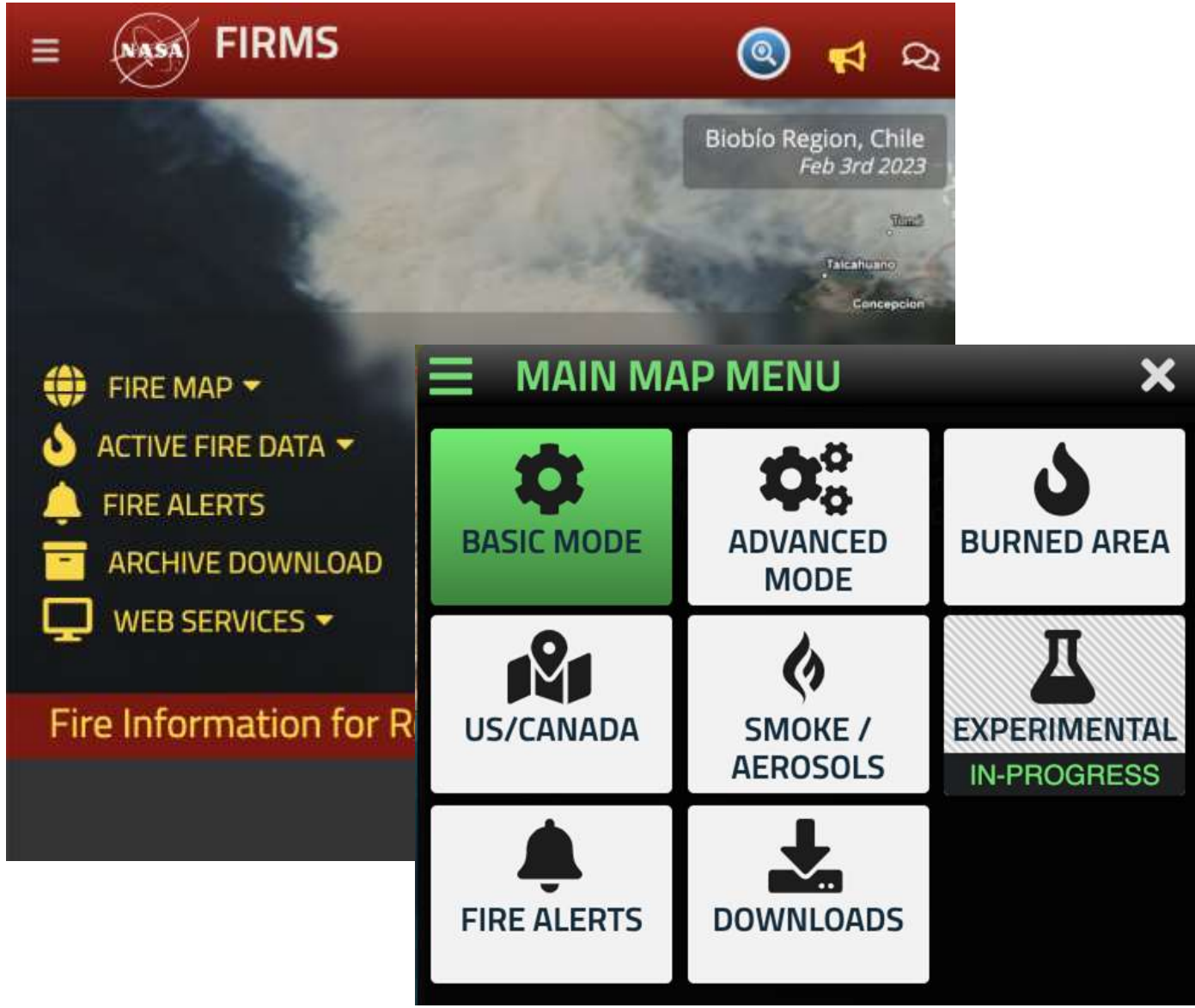
FIRMS Expanded User Interface (UI) Objectives

- Support an increasingly diverse set of users
- Increase visibility/access to other FIRMS products/services
- Maintain distinctive UIs for user levels, use cases & prototype products
- Enhance ability to filter and visualize data



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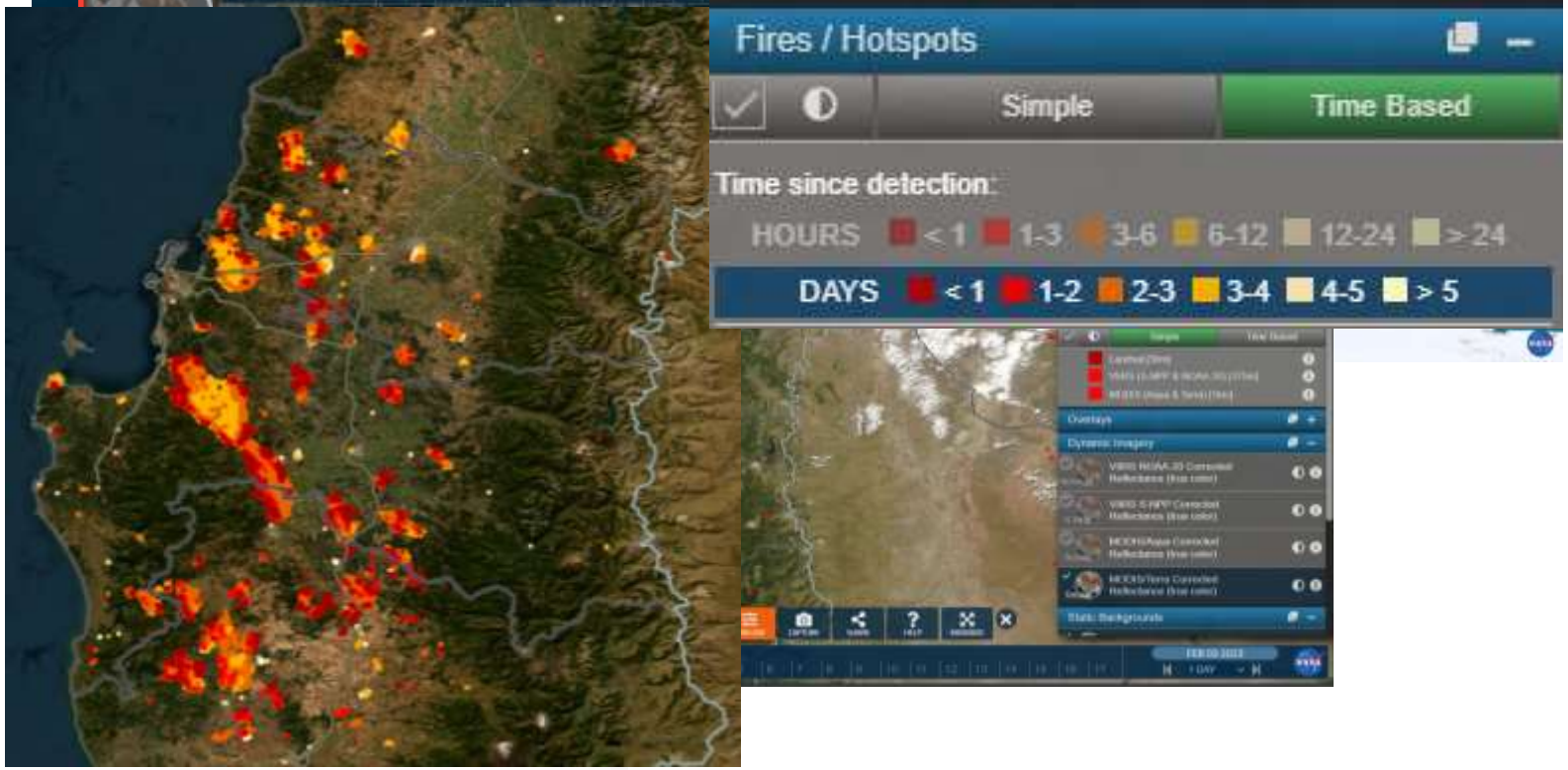
BASIC MODE



- Introduction for new users
- Readily navigable
- Most used data/products

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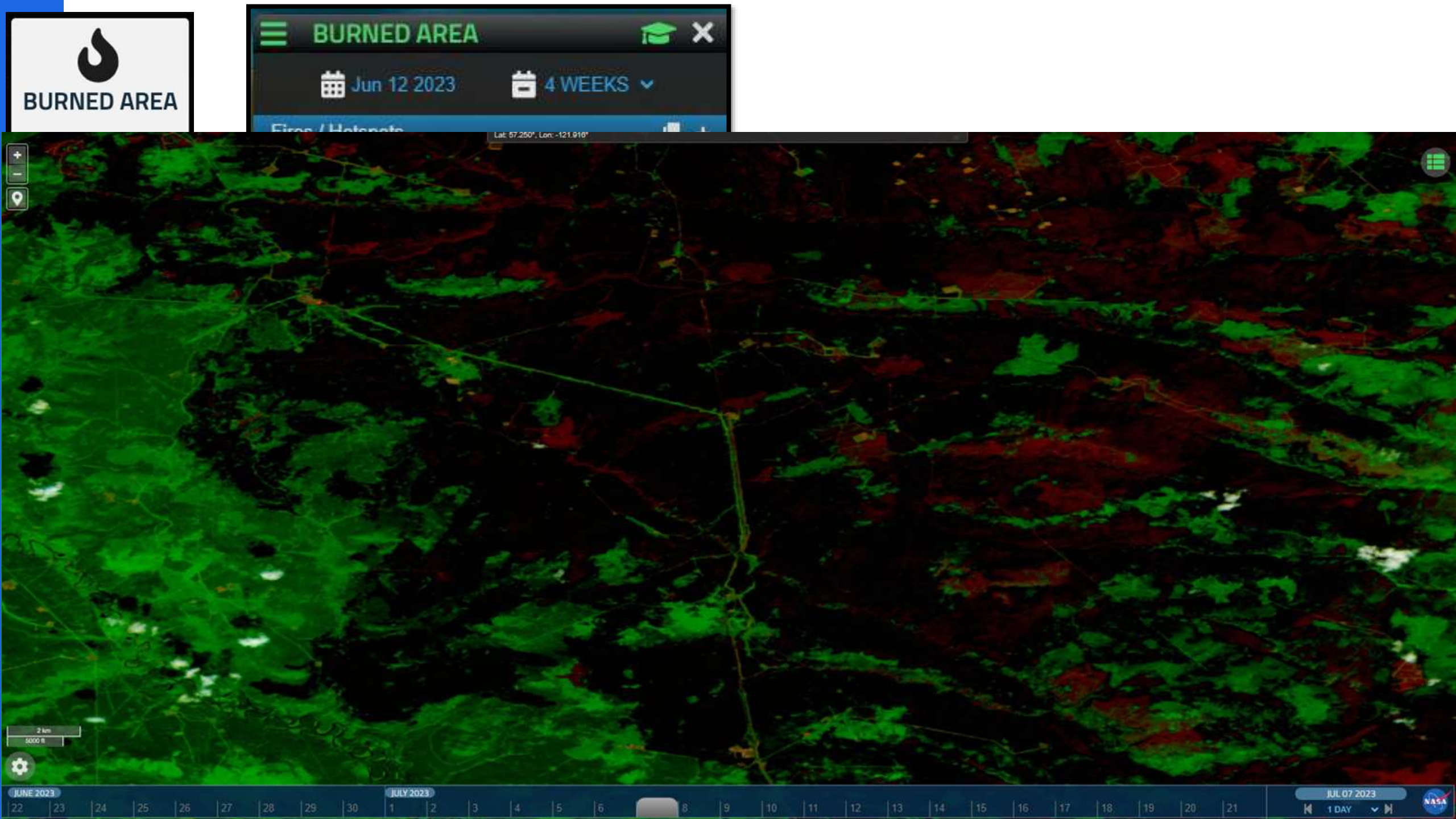
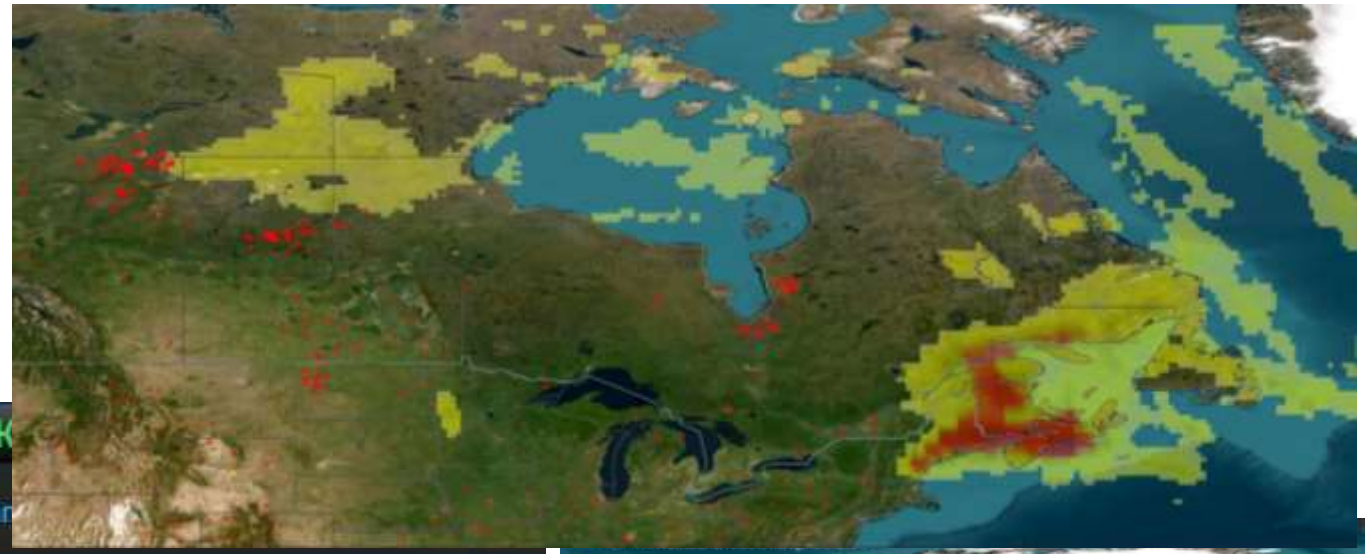
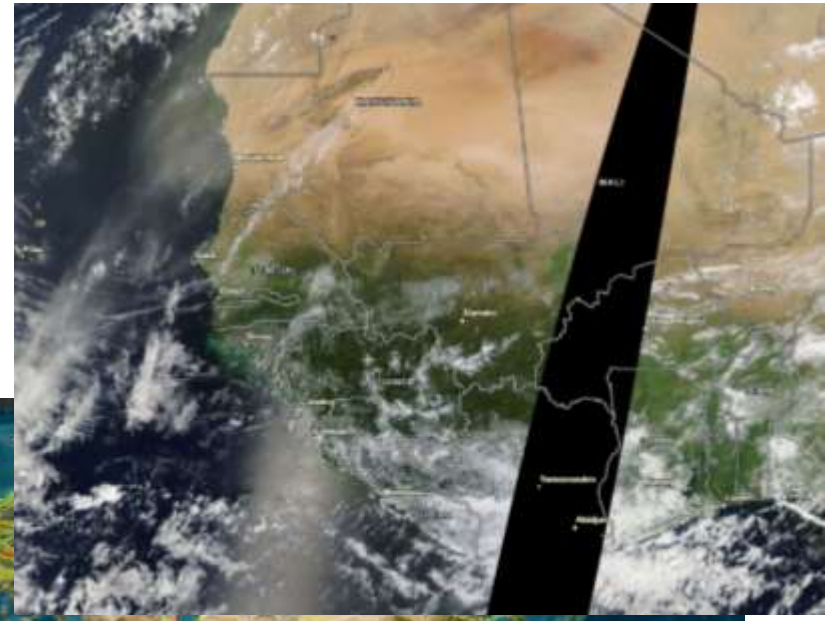
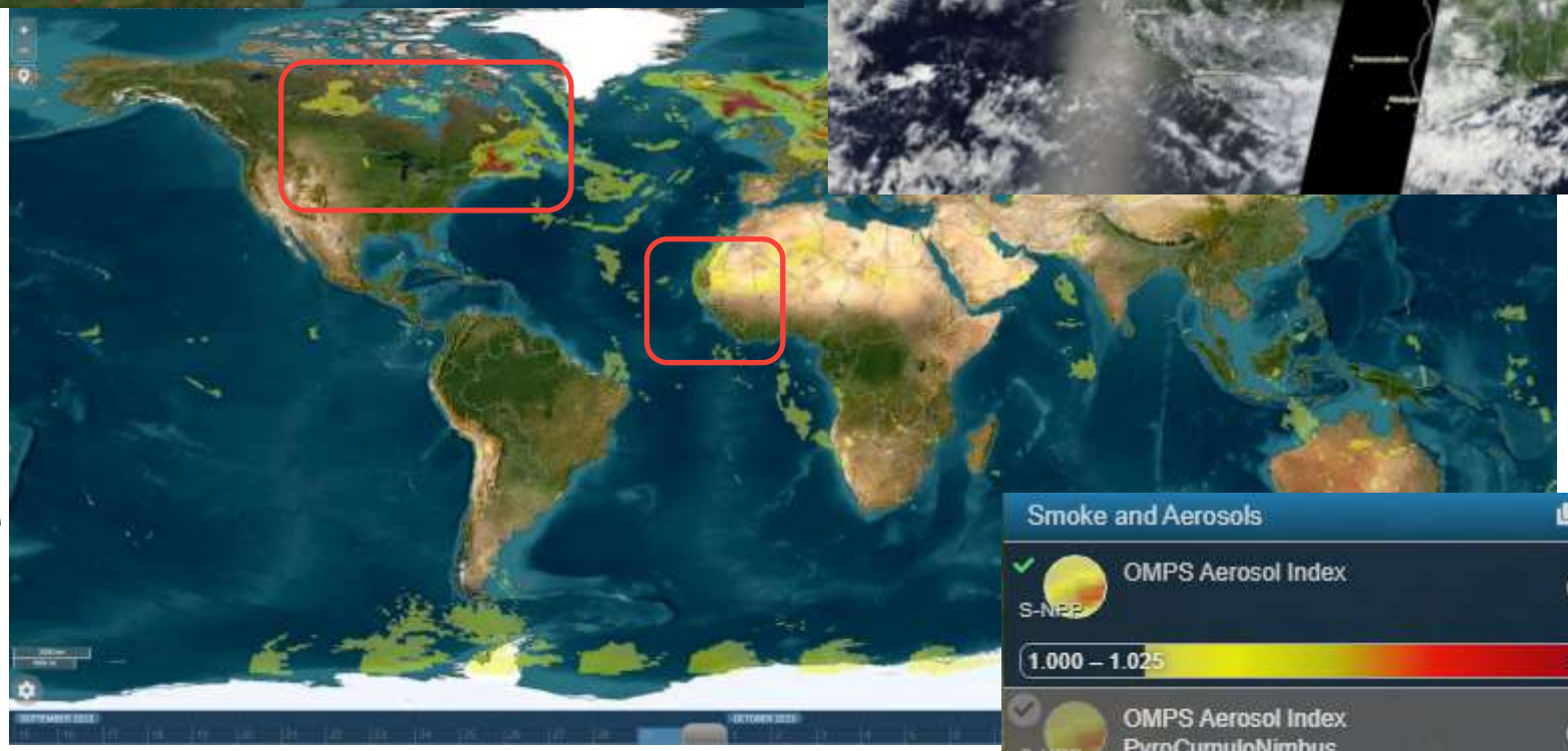

BURNED AREA
BURNED AREA
Jun 12 2023
4 WEEKS
Lat: 57.250°, Lon: -121.916°
2 km
5000 ft
JUNE 2023
JULY 2023
22 23 24 25 26 27 28 29 30 1 2 3 4 5 6 8 9 10 11 12 13 14 15 16 17 18 19 20 21
JUL 07 2023
1 DAY

SMOKE / AEROSOLS







- Tracking transport of smoke
- Also – volcanic ash, dust

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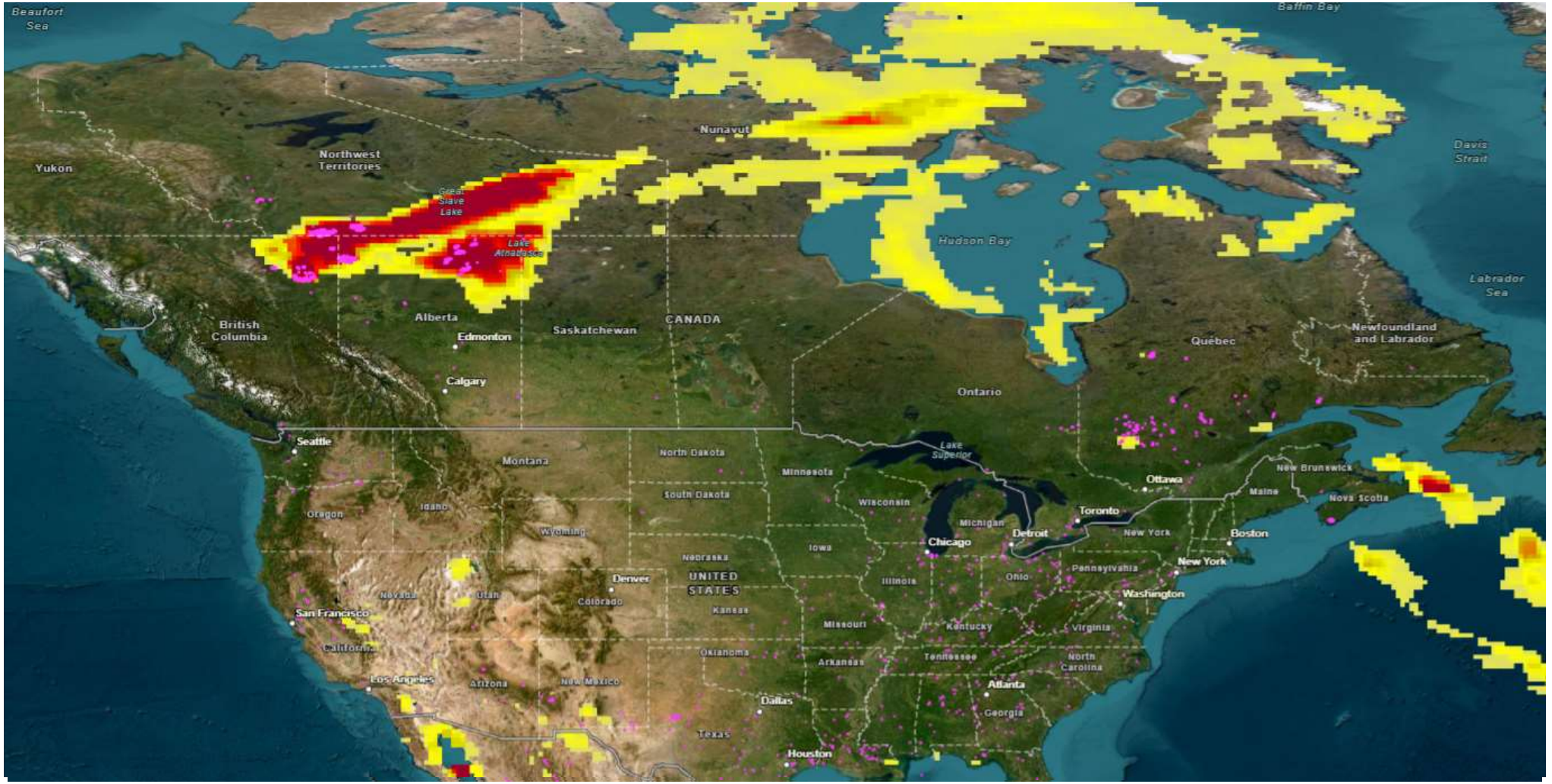
- Ability of the AI to detect and track aerosols over all land surfaces (including clouds) aids in monitoring development and movement of smoke, ash, and dust

Needs combining w previous slide



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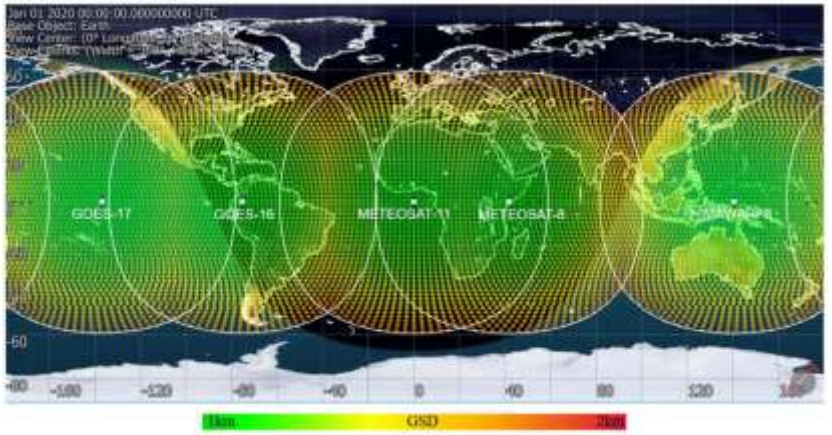
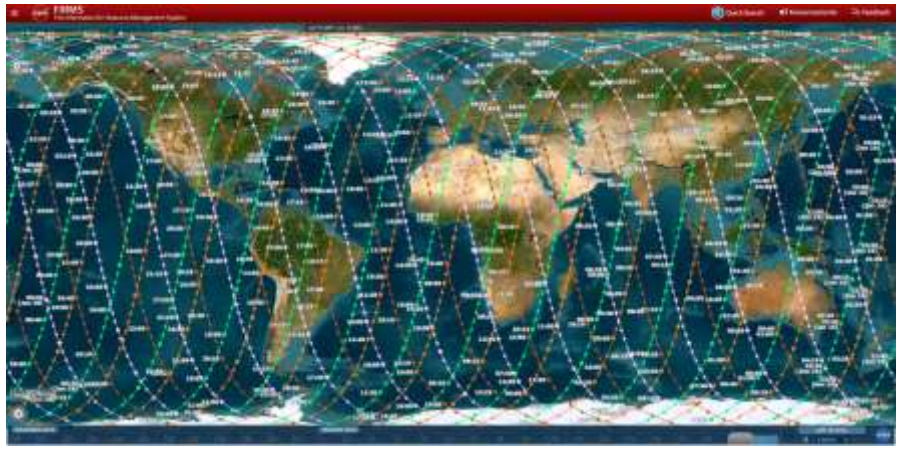
ADVANCED MODE

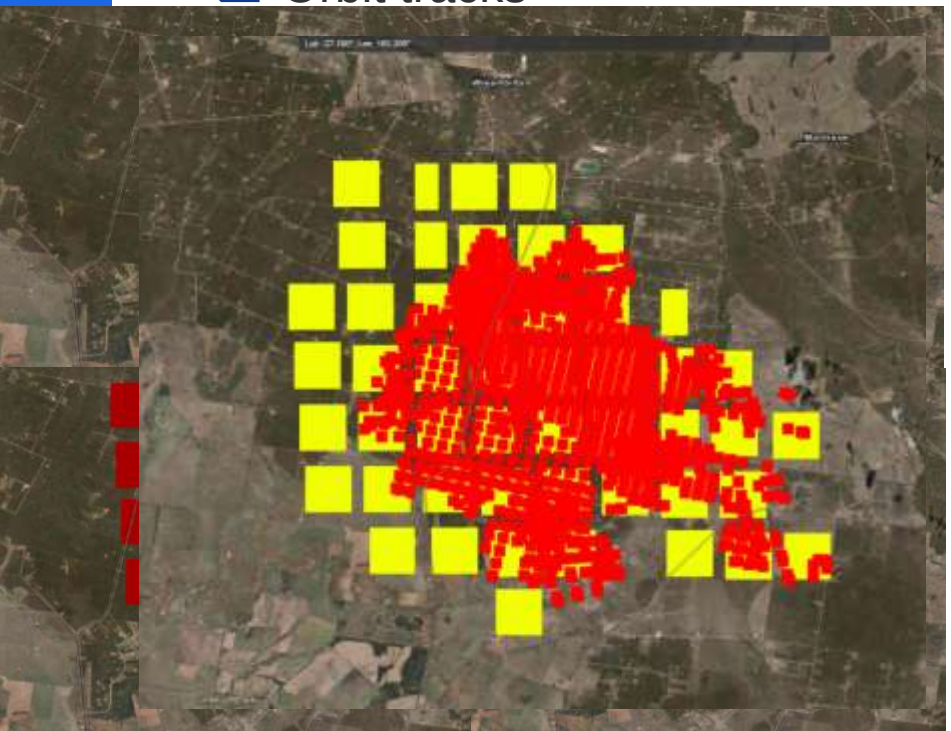
- *One stop shop* for existing users
- Emphasis: customization
- Enables user to build a narrative

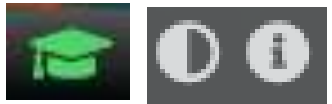
- Products
  - LFTA (8-16 day repeat; 30m)
  - URT MODIS/VIIRS (<5 min)
  - Geostationary (ev. 10 min)
  - HLS (2-3 day latency)
  - Orbit tracks



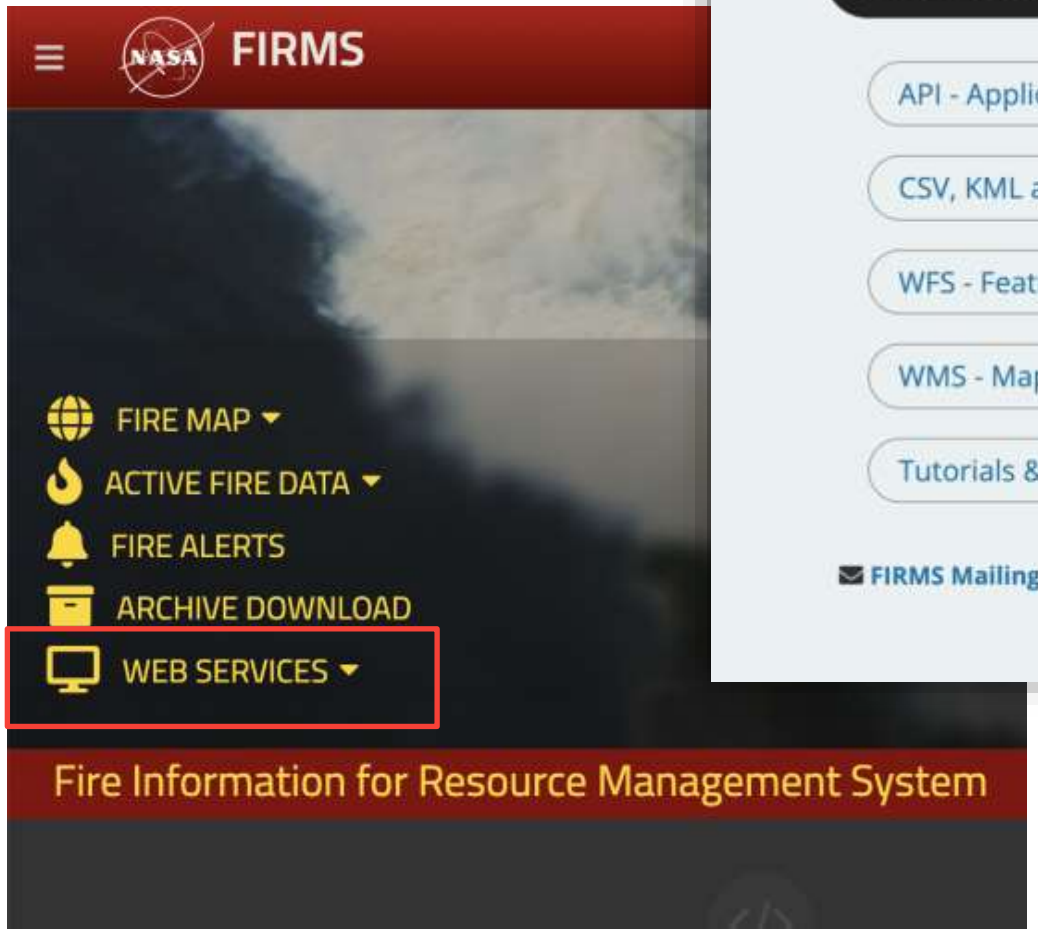
Credit: Cullingworth and Mueller, 2021; https://doi.org/10.3390/rs13050878

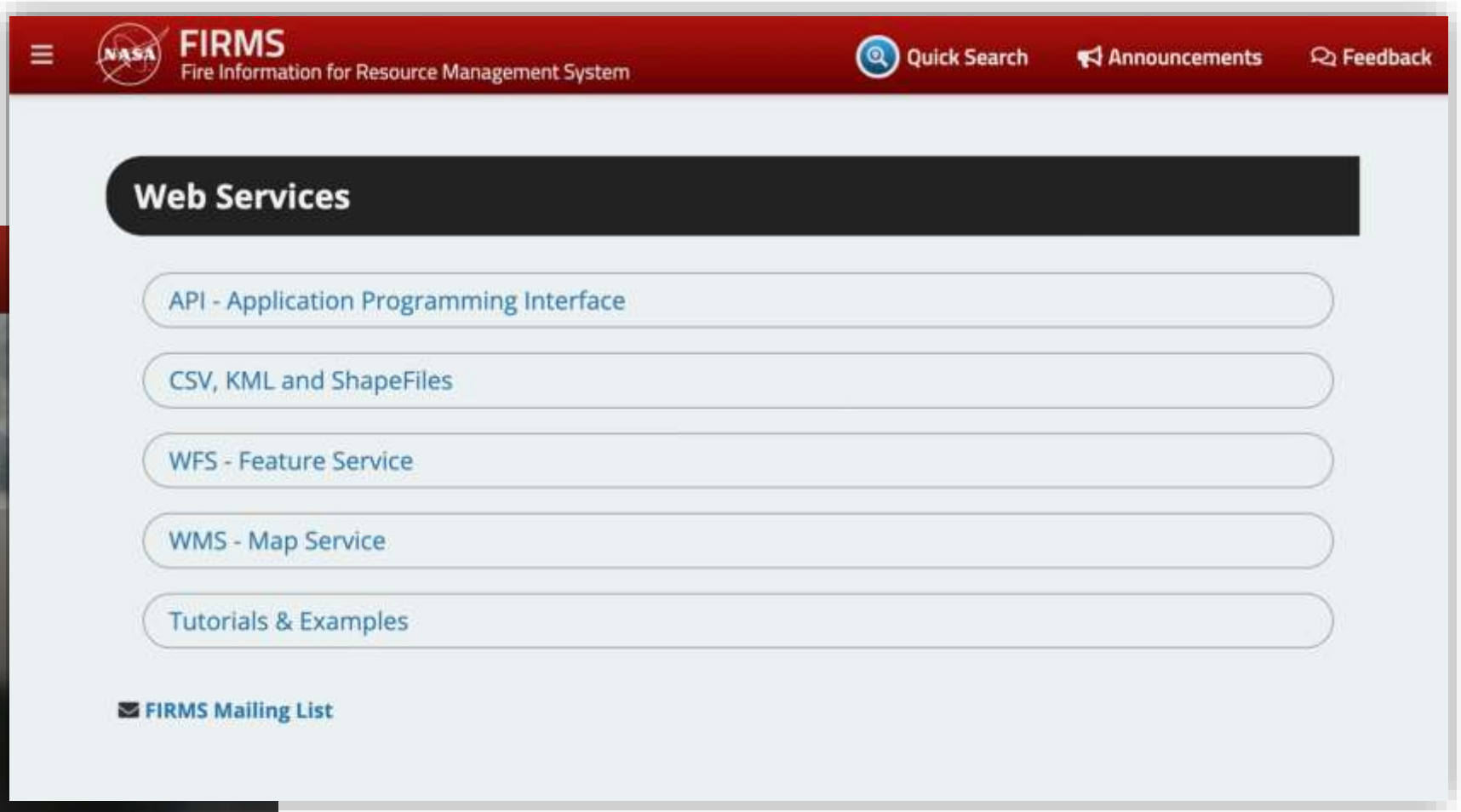






API & Web Map Services





Active Fire Data

Download active fire products from the Moderate Resolution Imaging Spectroradiometer (MODIS) , Visible Infrared Imaging Radiometer Suite (VIIRS) and Landsat Operational Land Imager (OLI) for the last 24, 48 hours and 7 days in shapefile, KML or text file formats.
Also available through FIRMS:

- **WMS and WMS-T**
- FIRMS **Archive Download** * for data older than 7 days
- Daily text files for the last two months via HTTPS: **https://firms.modaps.eosdis.nasa.gov/archive/FIRMS**

Register for an Earthdata Login to start downloading data

* Please note on the Archive Download, the NRT data is replaced with data extracted from the standard MODIS and VIIRS active fire products as it becomes available (usually after 2-3 months). Users intending to perform scientific analysis are advised to download the standard (science quality) data.

- MODIS C6.1 is available from November 2000 (for Terra) and from July 2002 (for Aqua) to the present.
- VIIRS 375 m (S-NPP) data are currently available from 20 January 2012 to the present.
- VIIRS 375 m (NOAA-20) data are currently available from 01 January 2020 to the present.
- LANDSAT 30 m OLI (8 / 9) data are currently available from 20 June 2022 to the present.

For more information about FIRMS and the active fire products.

Details about regional coordinates.

API

Service	Description
area	Fire detection hotspots based on area, date and sensor in CSV format
countries	List of supported countries
country	Fire detection hotspots based on country, date and sensor in CSV format
data_availability	Date availability of SP and NRT data
kml_fire_footprints	KML fire detection footprints
map_key	Setup MAP_KEY

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◂ Web Services / WMS

FIRMS fire-based maps (images) are offered through Web Map Service (WMS) and WMS with time support (WMS-Time).
Supported projections: Lat-long projection (EPSG:4326) and Web Mercator projection (EPSG:3857 or 900913).

To use the service request free MAP_KEY

Request FIRMS Map Key

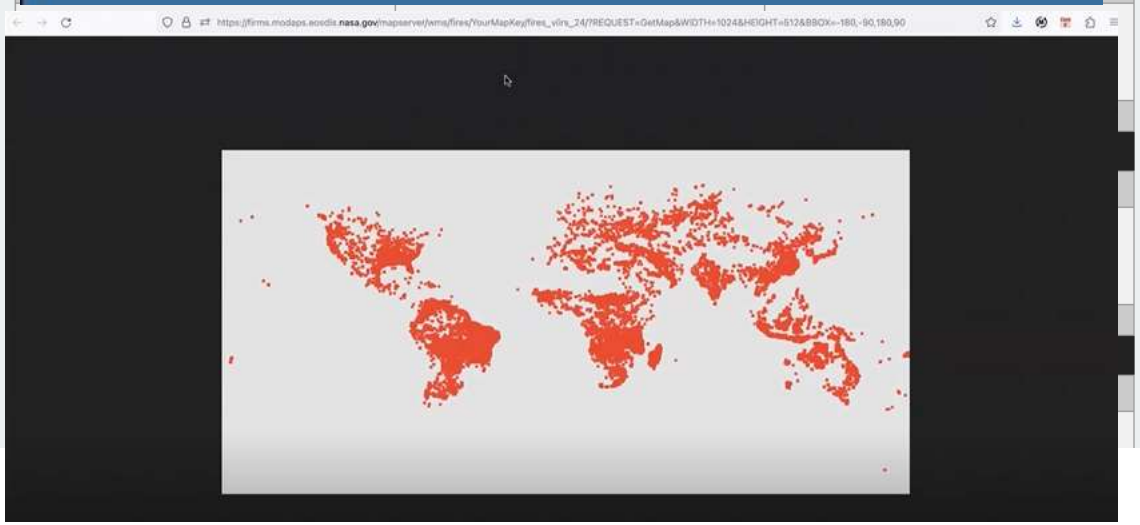
Due to heavy server resource demand when generating data, MAP_KEY is needed in order to process your request.

MAP_KEY limit is **1000 transactions / 10-minute interval**.
Larger transactions may count as multiple requests (ex. requesting 7 days).
Contact us if you need limit increase.

email address

Get MAP Key

Sign up for FREE Map Key for:
wms
wfs
api



Tutorials and Examples

/tutorials/

Tutorials & Examples

New Features and How to Use

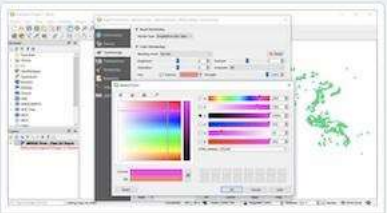
Blog
Visit Our Blog for Updates and Tips

YouTube Tutorial
How to use NASA's FIRMS.

FIRMS Story Map
Managing Wildfires with Satellite Data.

WMS

ArcGIS
Ingest FIRMS WMS into ArcGIS and Customize the Symbology



QGIS
Ingest FIRMS WMS into QGIS and Customize the Symbology

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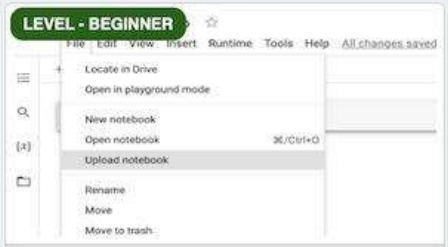
Fire Data Academy

/academy/

Google Colab

Google Colab - Setup
Create and connect to Google Colab - virtual python environment



Google Colab - Notebook Upload
Upload python jupyter noteboook file into Google Colab

FIRMS Python Code Examples

Follow these examples only if you have a working python environment. See Google Colab section if you need help.

Data Ingest and Manipulation
Intro to data ingest, timezones and data manipulation.

Use FIRMS API
Learn how to use FIRMS API

Data Visualization
Learn about projections, mapping and coloring dataset

Jupyter Notebooks
Google Colab
Python

- data ingest
- data manipulation
- visualization
- API examples

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FIRMS

include QR codes