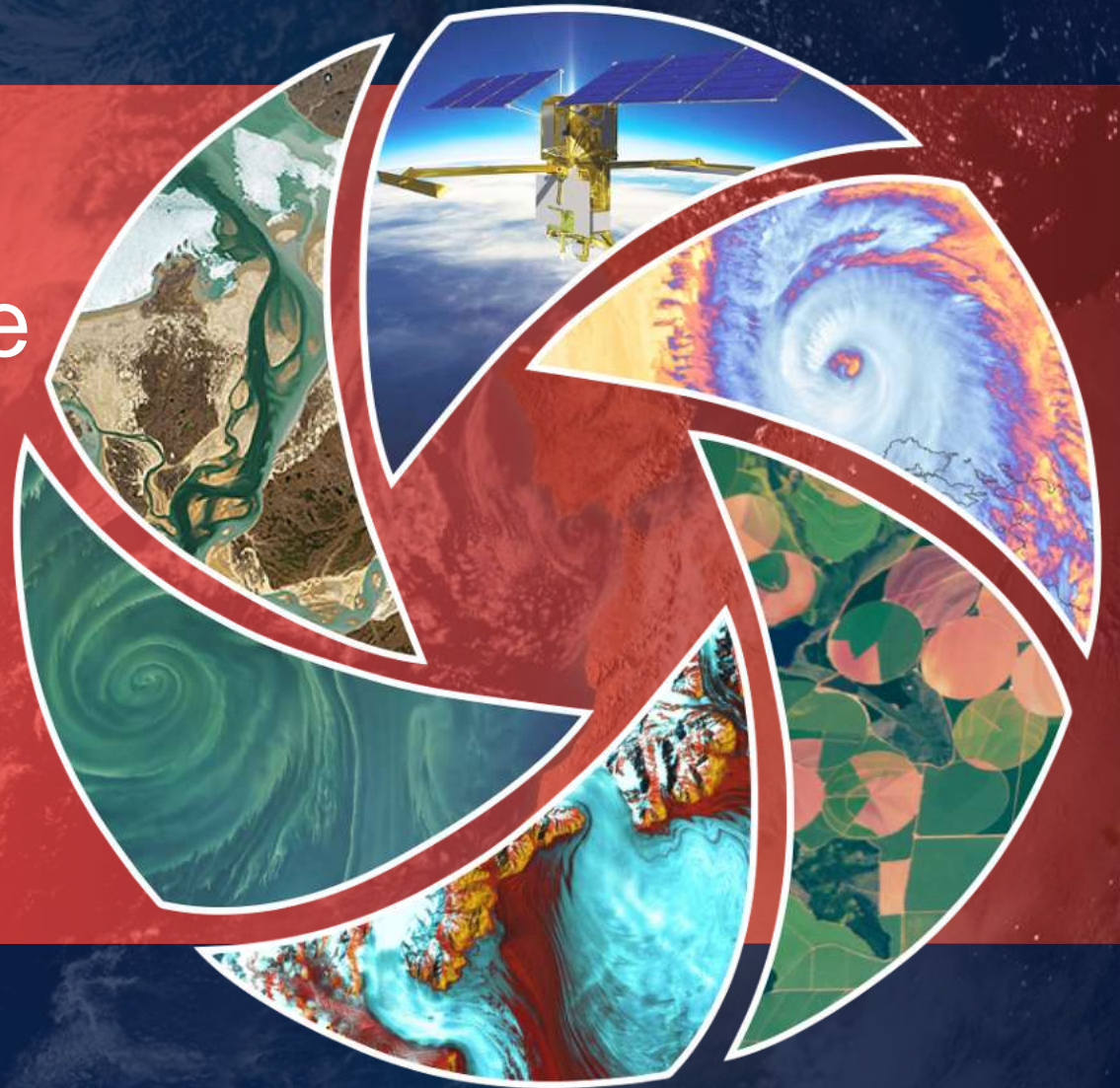


Informing Wildfire Needs: the Expanded User Interface of NASA's Fire Information for Resource Management System (FIRMS)

AMS 2024: Session – Wildfire and Its Impact II
Tuesday, 30 January 2024



Jenny Hewson¹, Diane Davies¹, Otmar Olsina¹,
Brad Quayle², Asen Radov³

Contributors:

Louis Giglio⁴, Joanne Hall⁴

¹NASA GSFC, ²USDA Forest Service, ³ESSIC/University of Maryland,

⁴University of Maryland



Outline

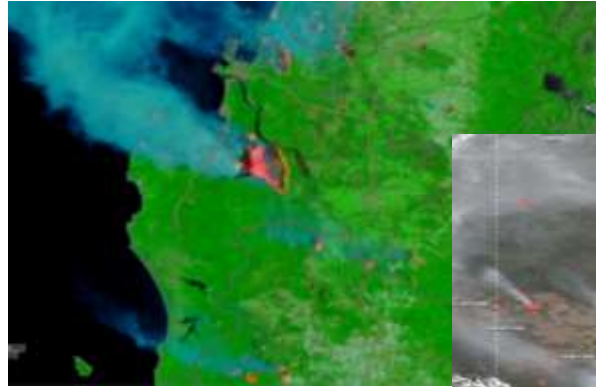
- ❑ Context & Background
- ❑ FIRMS Expanded User Interface Objectives
- ❑ Modes: Basic, Burned Area, Aerosols/Smoke, Advanced
- ❑ Other tools within FIRMS: Web services, Fire Academy, Tutorials



Context

Living in a Changing Environment – Wildfire in 2023

Chile



Canada



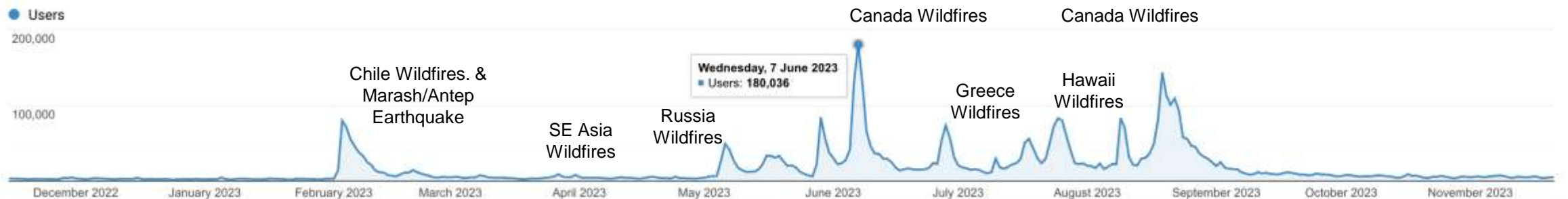
Greece



Maui, HI



Australia



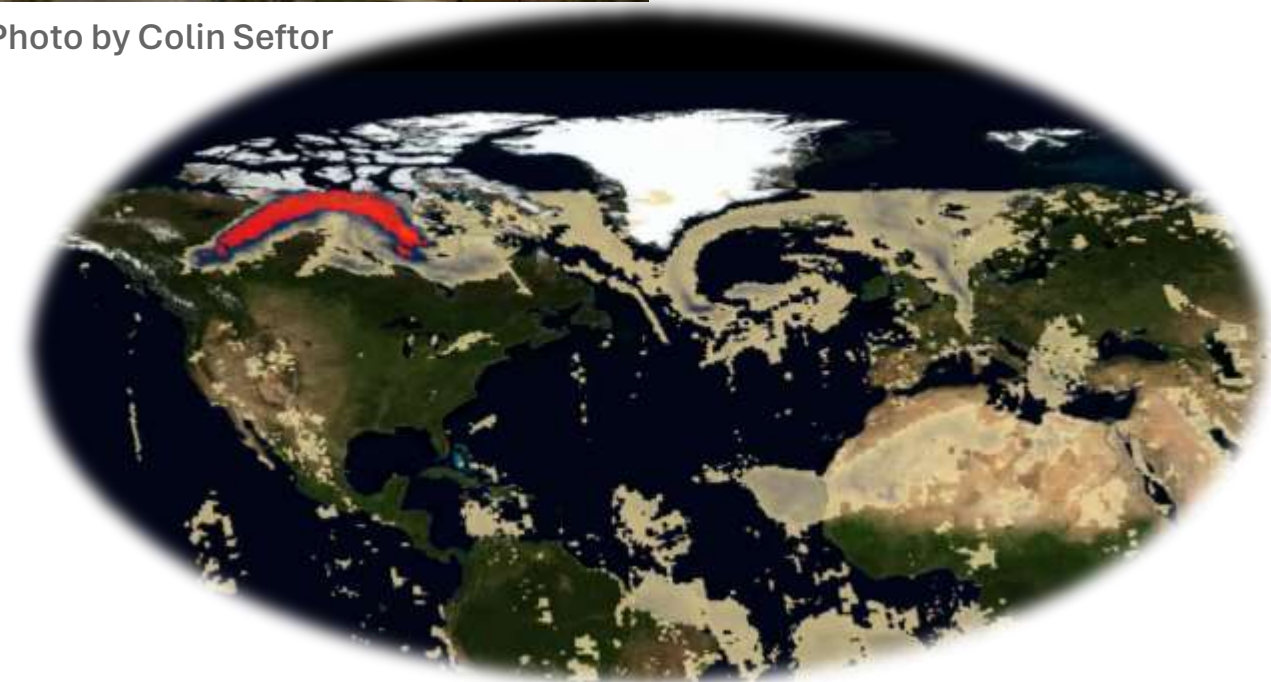
Context

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
- ❑ **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



Photo by Colin Seftor



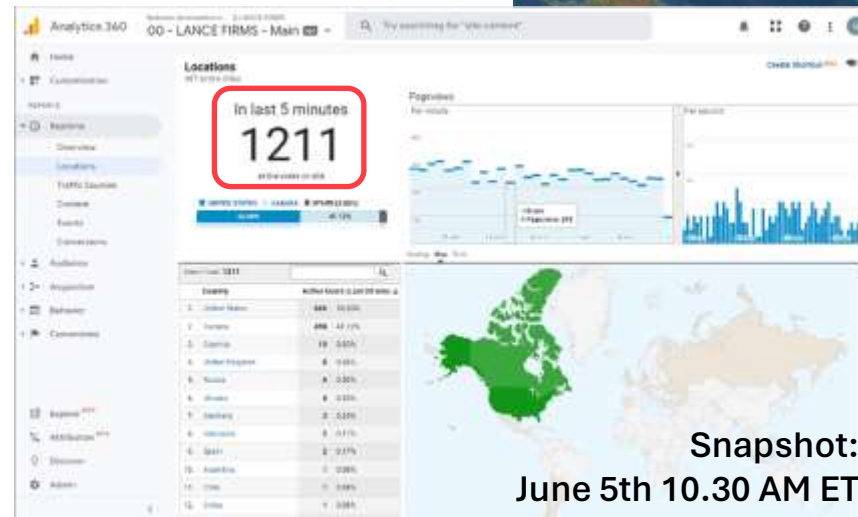
Background

- ❑ 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

Example of Active Fire / Corrected Reflectance Product
Siberia (05/22/01)

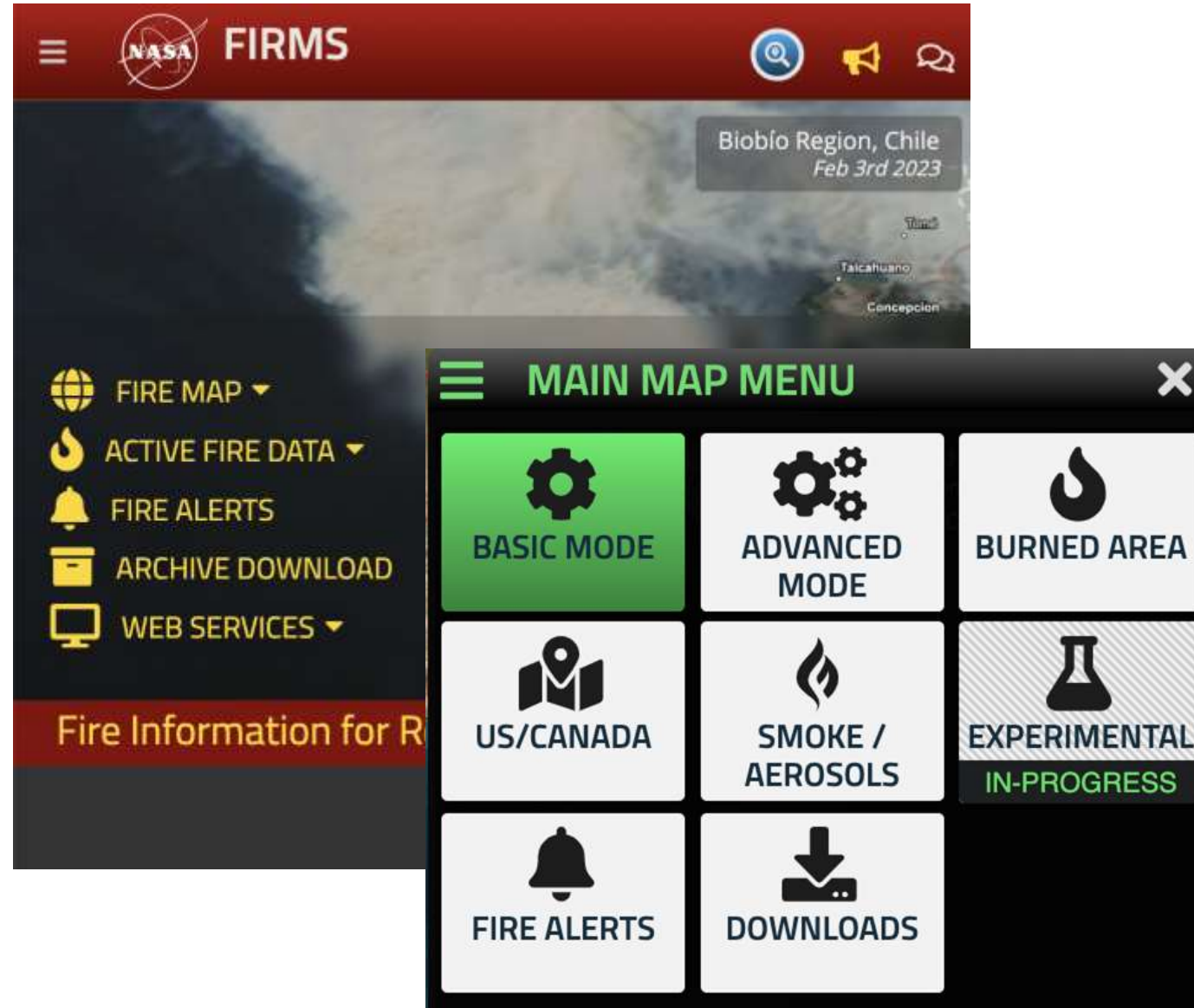


Snapshot:
June 5th 10.30 AM ET



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






BASIC MODE







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



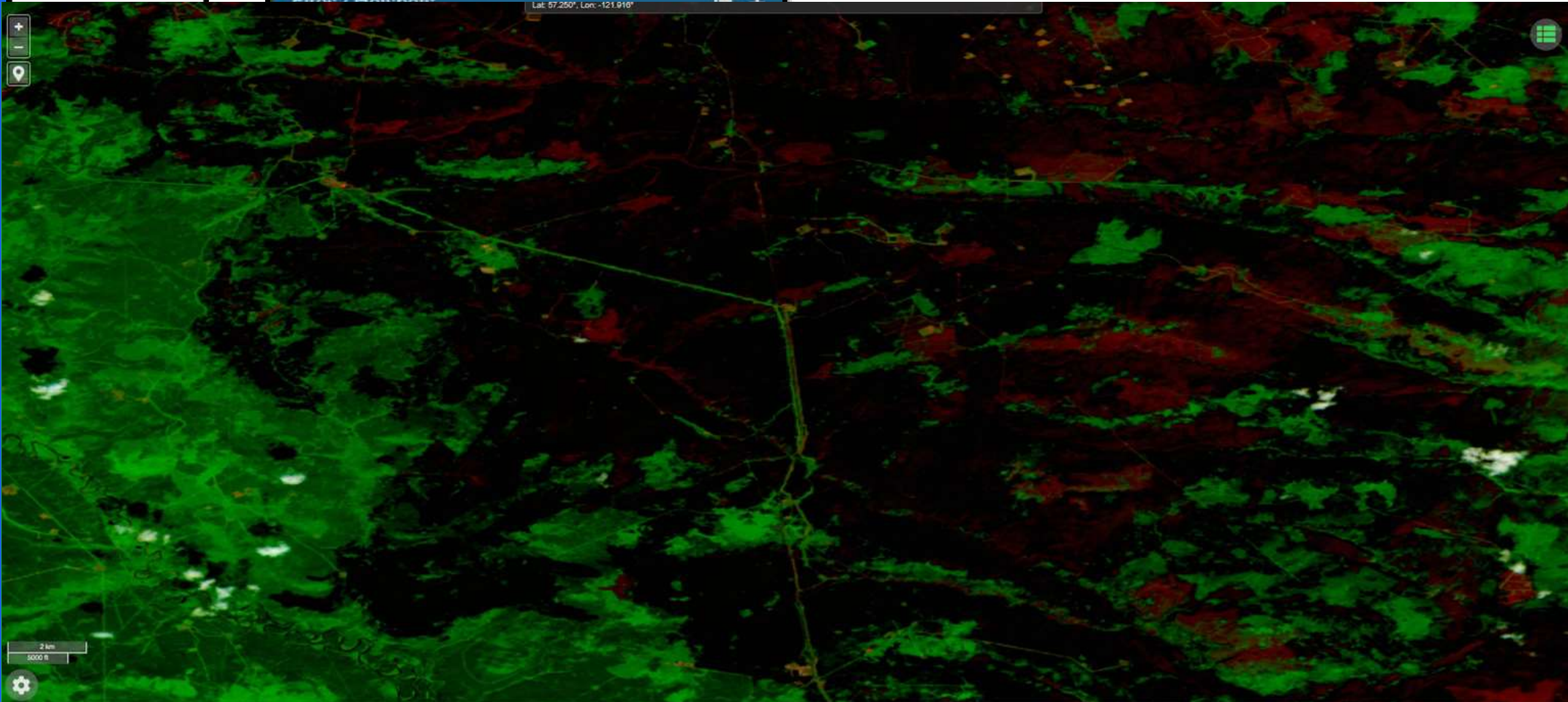


BURNED AREA  

 Jun 12 2023  4 WEEKS 

Fire / Hotspots 

Lat: 57.250°, Lon: -121.916°



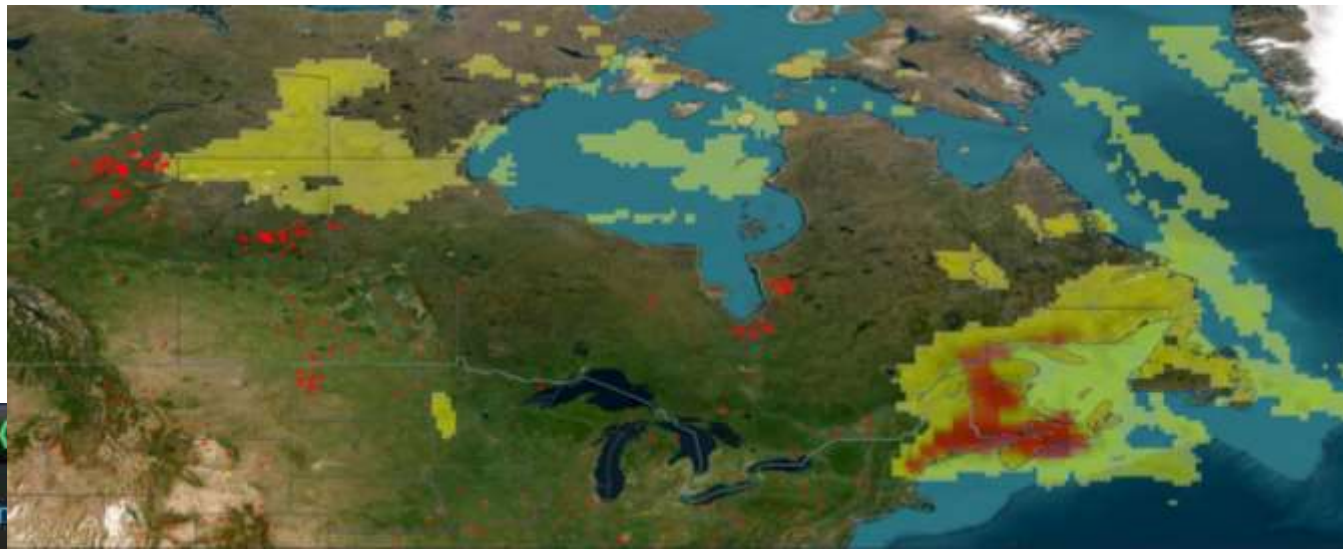
JUNE 2023 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | **JULY 2023** | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21

JUL 07 2023
◀ 1 DAY ▶





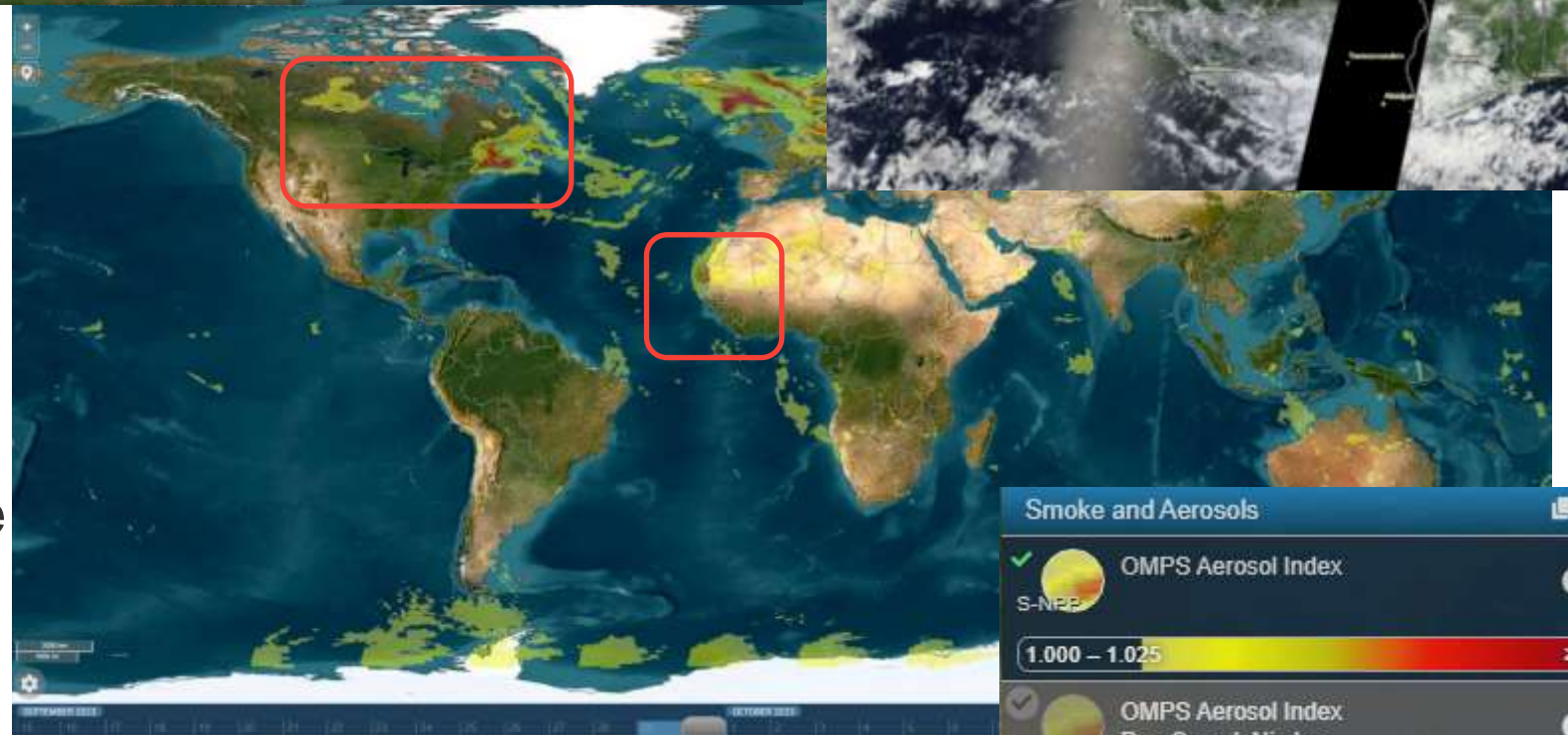
SMOKE /
AEROSOLS



SMOKE

Jan

- Fires / Hotspots +
- Smoke and Aerosols +
- Orbit Tracks and Overpass Times +
- Overlays +
- Dynamic Imagery +
- Static Backgrounds +



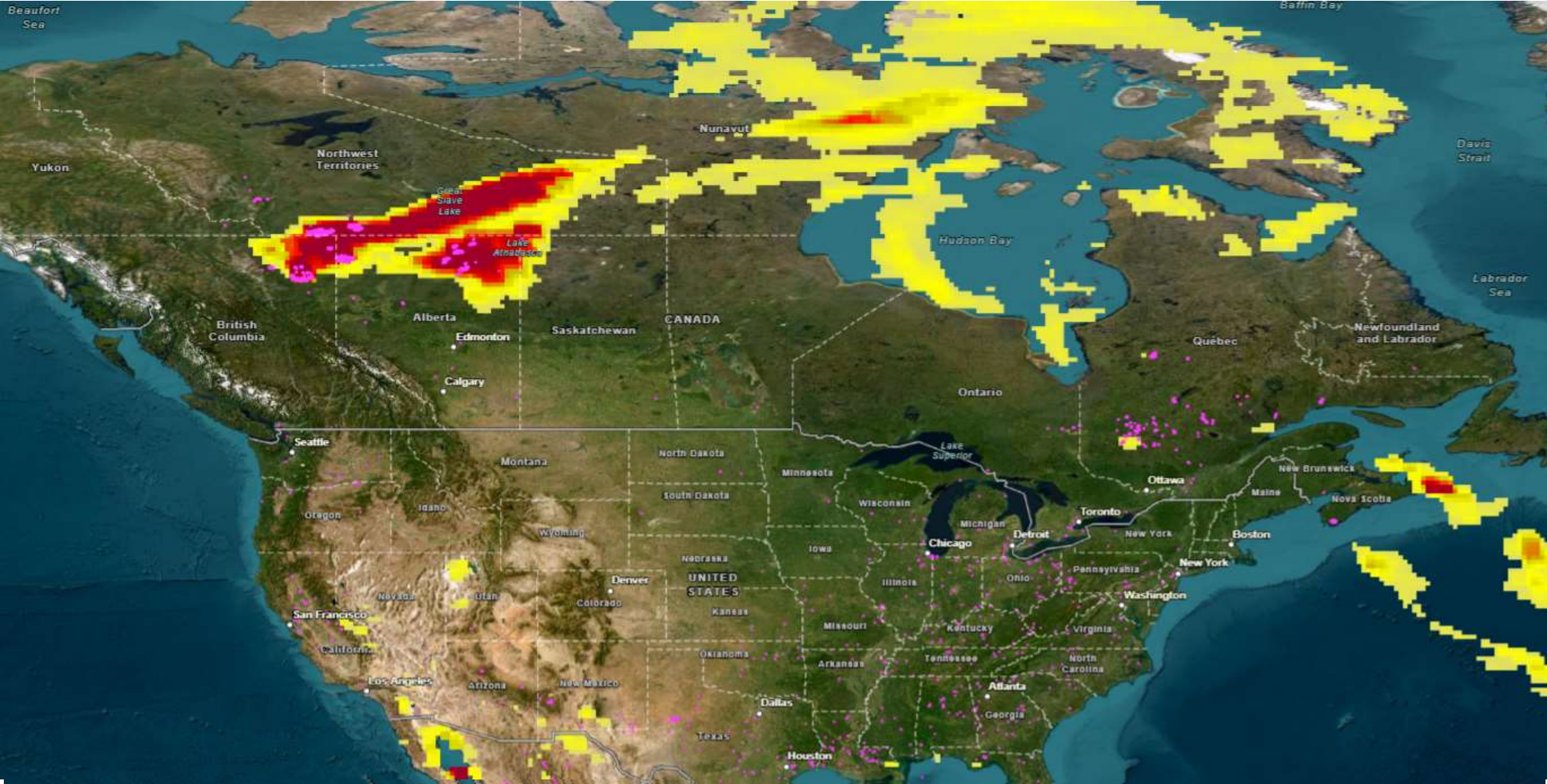
☐ Tracking transport of smoke

☐ Also – volcanic ash, dust



☐ 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



EARTHDATA
OPEN ACCESS FOR OPEN SCIENCE

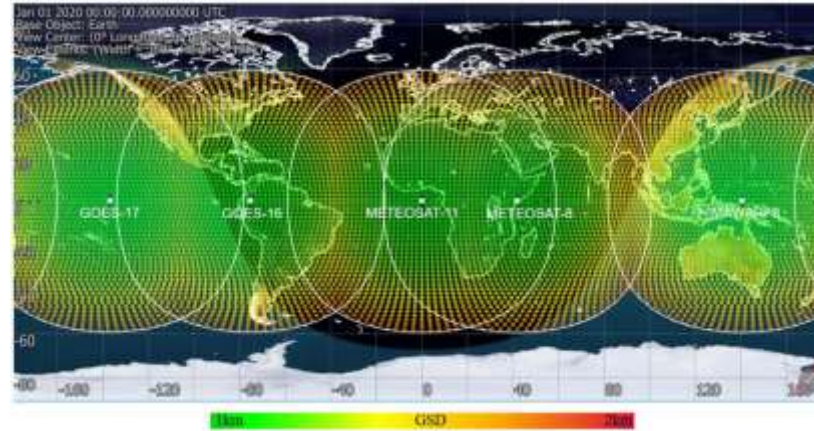


ADVANCED
MODE

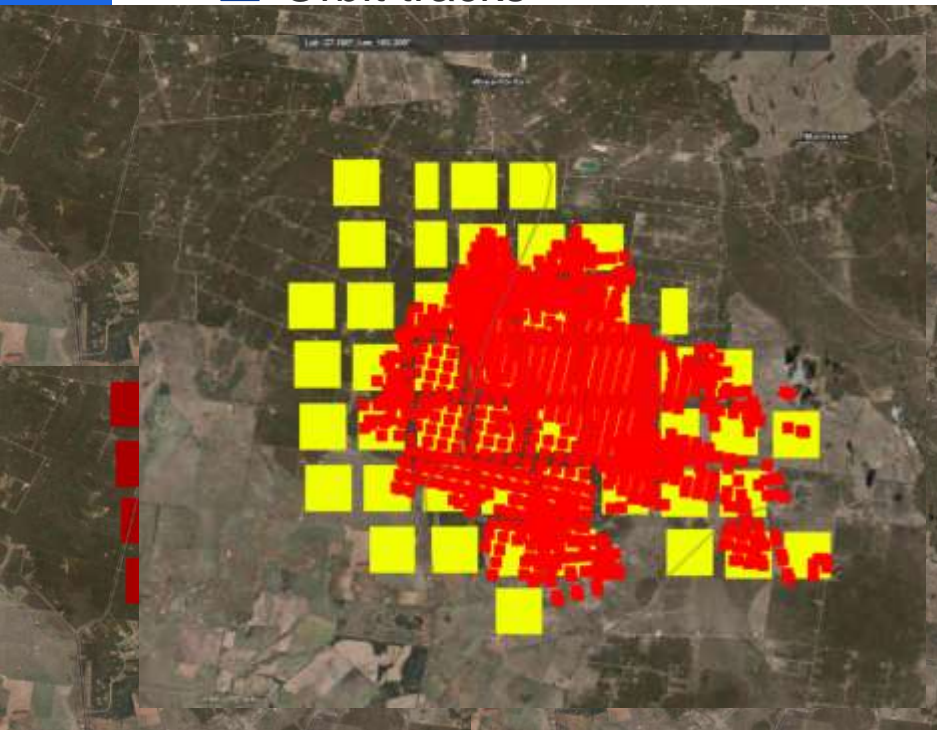
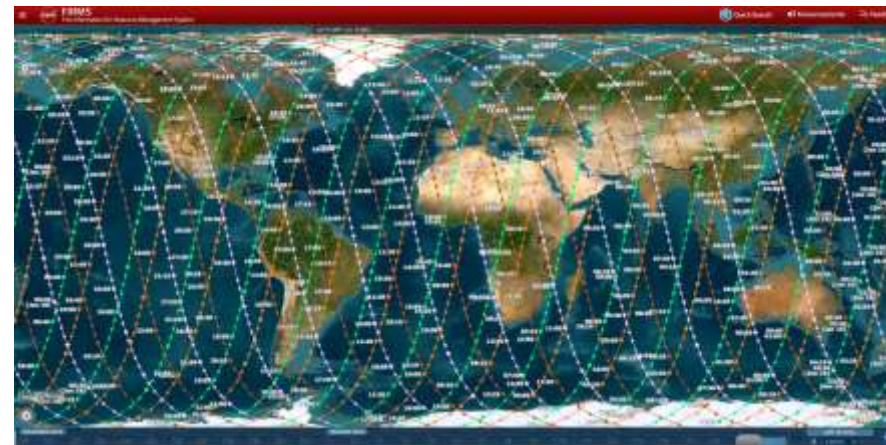
- ❑ One stop shop for existing users
- ❑ Emphasis: customization
- ❑ Enables user to build a narrative

❑ 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>



ADVANCED MODE [Settings] [User Icon] [Close]

Today **-24hrs** 3 days 7 days [Refresh]

DAILY **SUB-DAILY**

Jan 18 2024 2 days [Dropdown]

Fires / Hotspots [Close]

Simple Time Based Custom

POLAR ORBITING **RECOMMENDED** [Info] [Minus]

- OLI / Landsat [30m] [Info]
- VIIRS / NOAA-20 [375m] [Info]
- VIIRS / Suomi NPP [375m] [Info]
- MODIS / Aqua [1km] [Info]
- MODIS / Terra [1km] [Info]

GEOSTATIONARY **BETA** [Info] [Plus]

NRT AND STANDARD (FOR RESEARCH) [Info] [Plus]

Orbit Tracks and Overpass Times [Close] [Plus]

- MODIS Burned Area [Close] [Plus]
- Gridded Fire Hotspots (Daily) [Close] [Plus]
- Smoke and Aerosols [Close] [Plus]
- Overlays [Close] [Plus]
- Harmonized Landsat Sentinel-2 Imagery [Close] [Plus]
- Dynamic Imagery [Close] [Minus]


Allow multi layer selection





- VIIRS NOAA-20 Corrected Reflectance (true color)** [Info] [Info]
- VIIRS S-NPP Corrected Reflectance (true color)** [Info] [Info]
- MODIS/Aqua Corrected Reflectance (true color)** [Info] [Info]

TUTORIALS **MORE RESOURCES**

API & Web Map Services


A screenshot of the FIRMS website's navigation menu. The menu is located on the left side of the page and includes several options: FIRE MAP, ACTIVE FIRE DATA, FIRE ALERTS, ARCHIVE DOWNLOAD, and WEB SERVICES. The WEB SERVICES option is highlighted with a red rectangular box. Below the menu is a dark red banner with the text "Fire Information for Resource Management System" in yellow.


 **FIRMS**

-  FIRE MAP ▾
-  ACTIVE FIRE DATA ▾
-  FIRE ALERTS
-  ARCHIVE DOWNLOAD
-  **WEB SERVICES ▾**

Fire Information for Resource Management System


A screenshot of the FIRMS website's "Web Services" page. The page has a dark red header with the NASA logo, the text "FIRMS Fire Information for Resource Management System", and navigation links for "Quick Search", "Announcements", and "Feedback". The main content area is light gray and features a dark gray header with the text "Web Services". Below this header are five rounded rectangular buttons: "API - Application Programming Interface", "CSV, KML and ShapeFiles", "WFS - Feature Service", "WMS - Map Service", and "Tutorials & Examples". At the bottom of the page, there is a link for "FIRMS Mailing List" with an envelope icon.

  **FIRMS**
Fire Information for Resource Management System

 Quick Search  Announcements  Feedback

Web Services

- API - Application Programming Interface
- CSV, KML and ShapeFiles
- WFS - Feature Service
- WMS - Map Service
- Tutorials & Examples

 [FIRMS Mailing List](#)

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:

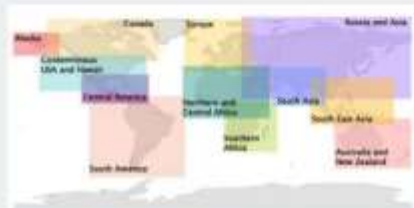
- WMS and WMS-T
- FIRMS Archive Download * for data older than 7 days
- Daily text files for the last two months via HTTPS: <https://firms.modaps.eosdis.nasa.gov/archive/FIRMS>

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



◀ 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.

Sign up for FREE Map Key for:

Get MAP Key

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.

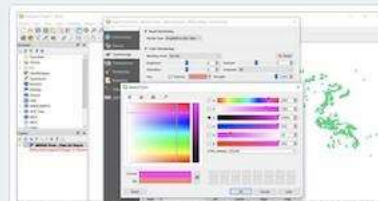


FIRMS Story Map
Managing Wildfires with Satellite Data.

WMS



ArcGIS
Ingest FIRMS WMS into ArcGIS and
Customize the Symbology



QGIS
Ingest FIRMS WMS into QGIS and
Customize the Symbology

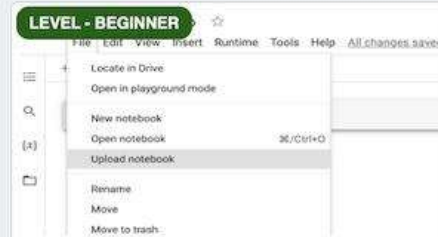
Fire Data Academy

/academy/

Google Colab



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



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

Jupyter Notebooks
Google Colab
Python

- data ingest
- data manipulation
- visualization
- API examples

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

FIRMS

include QR codes