



Maximizing Earth Science Observations With Data Harmonization: Harmonized Landsat/Sentinel-2

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Dr. Brian Freitag, Dr. Junchang Ju, Sean Harkins, Dr. Jeff Masek



What is HLS?

- What is “harmonized”?
 - Using data from two similar instruments and constructing an algorithm so products from each instrument can be used interchangeably
- Initiative to produce a virtual constellation of surface reflectance data from Landsat 8 OLI and Sentinel-2 MSI
 - Spectral similarities of L8 and S2 allow for harmonization



Sentinel-2

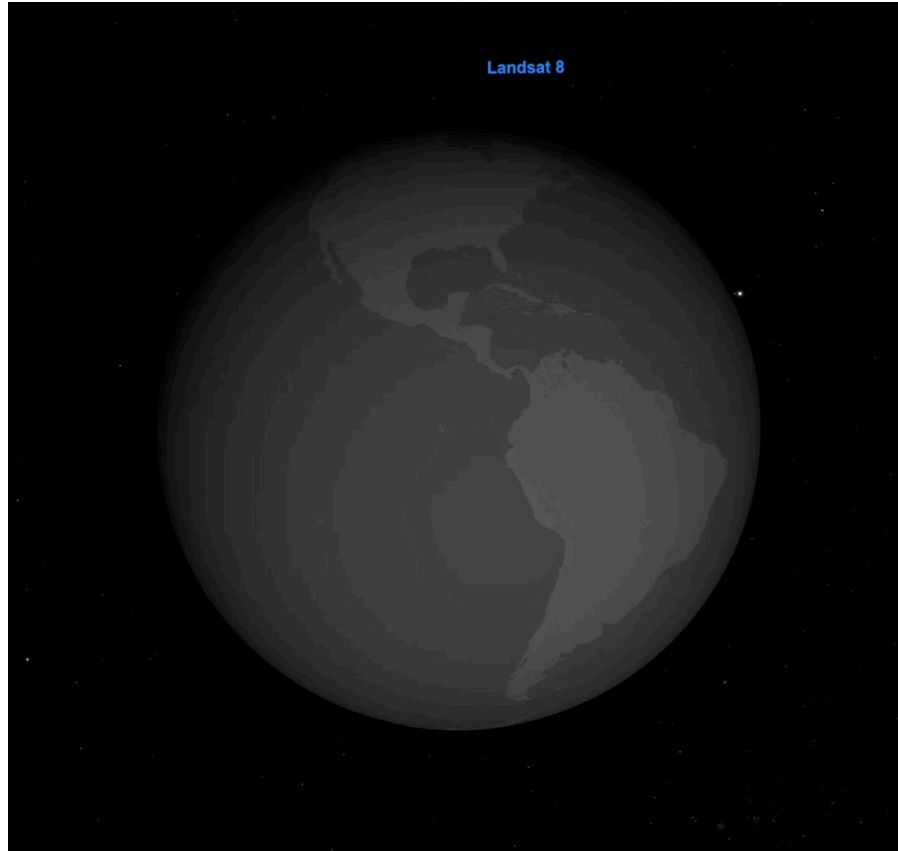
photo credit: ESA



Landsat 8

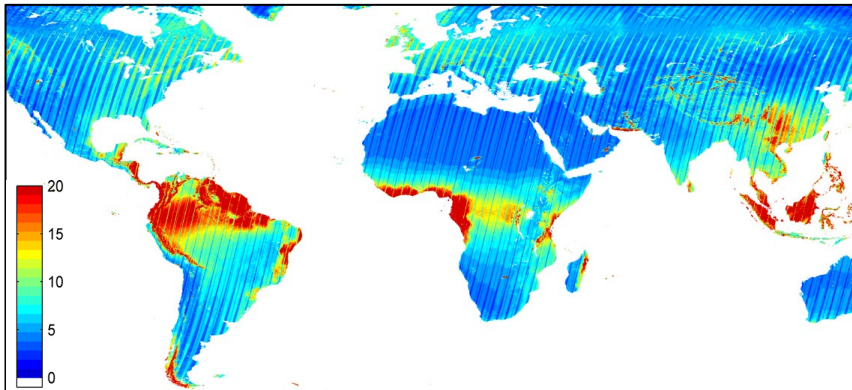
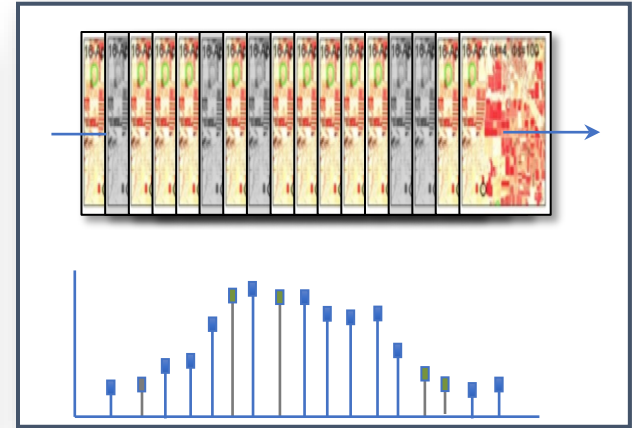
photo credit: NASA

HLS Constellation Overview (courtesy: NASA SVS)

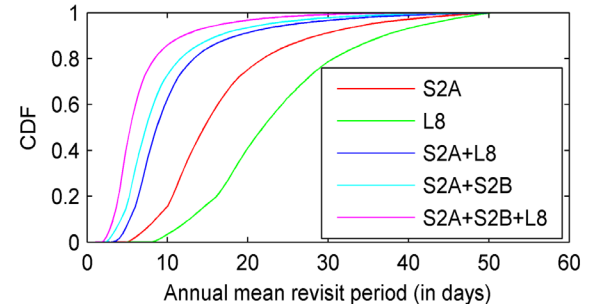


HLS Overview

- Harmonizing Sentinel-2A/B and Landsat 8/9 data streams provides analysis ready data with **2-4 day global coverage at 30m resolution**
- Access to input data products a coordinated effort between NASA, ESA, and USGS
- Data production and distribution fully contained within the cloud



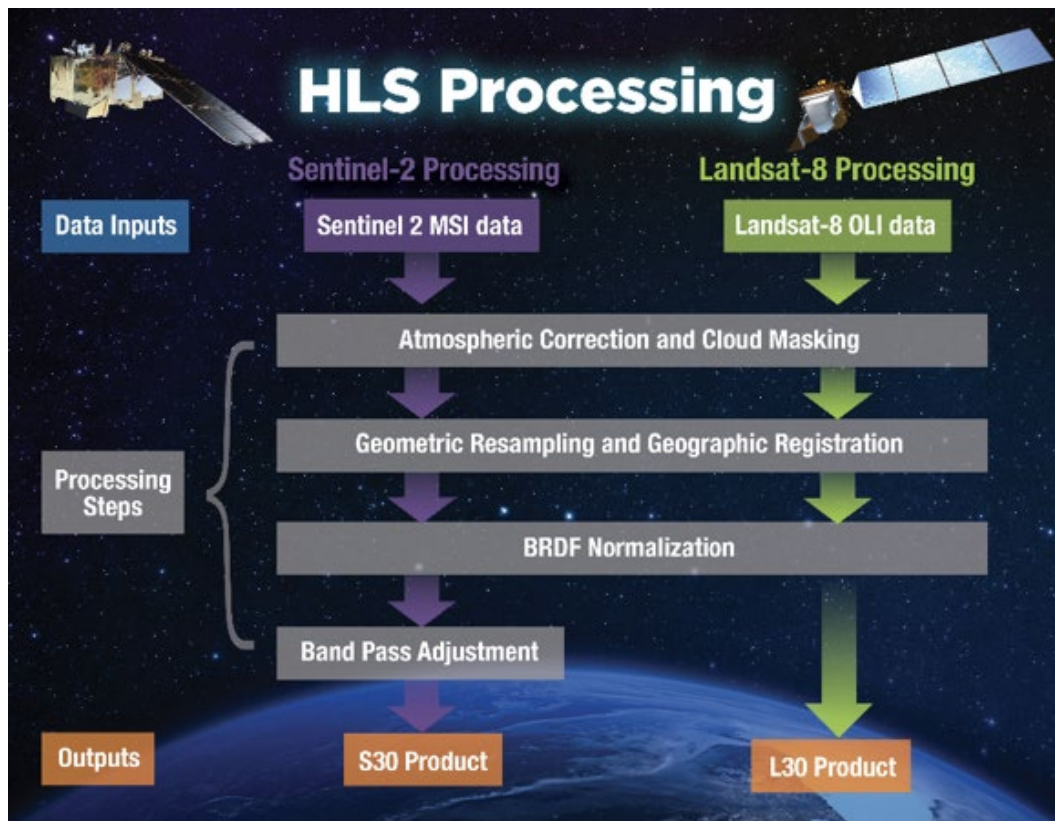
Potential Cloud free revisit using different Virtual Constellations



“Global” HLS Coverage Area

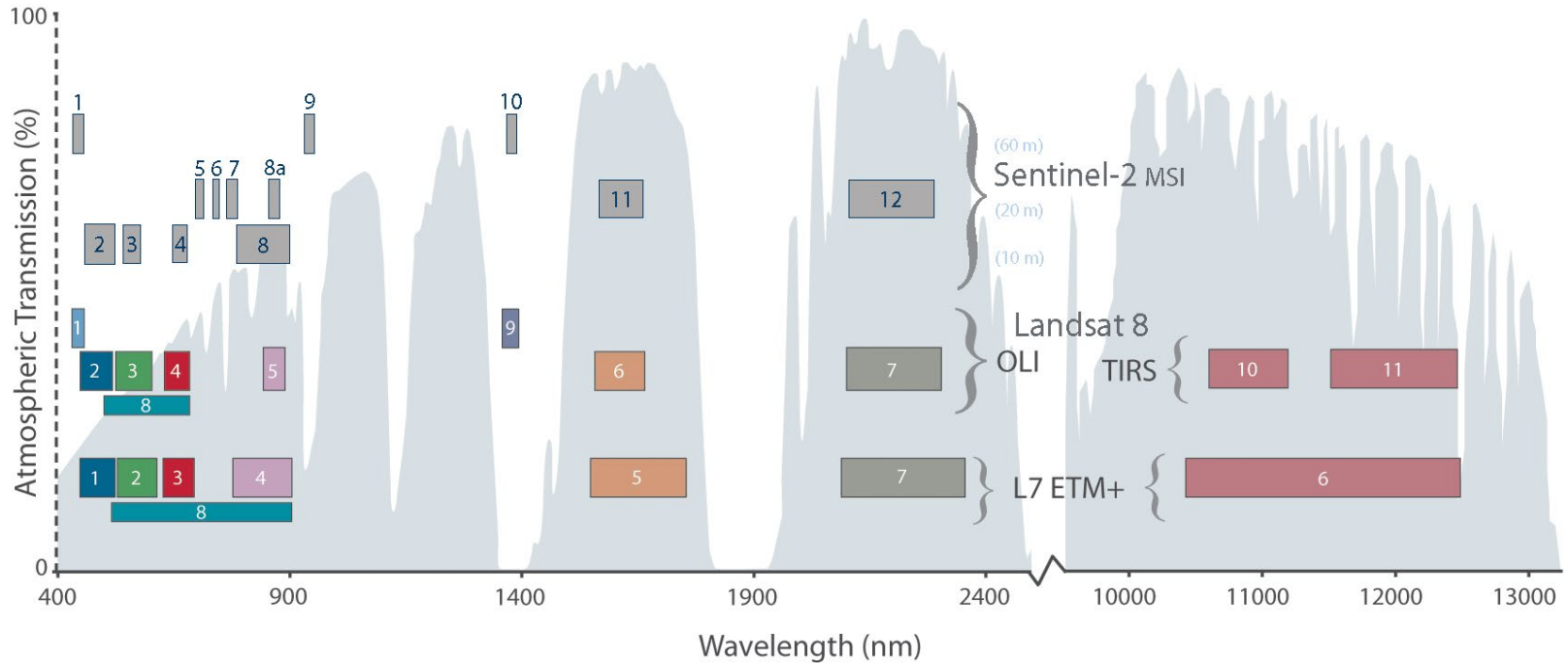


HLS Algorithm Workflow



Band Pass Adjustment

Comparison of Landsat 7 and 8 bands with Sentinel-2



Current Status of Data Production

- HLSL30 and HLSS30 version 2.0 data products released on 24 August 2021 at stage 1 validation
 - Historical HLSL30 processing completed in early April
 - Historical HLSS30 planned for completion in late-2022
 - Landsat 9 integrated into HLSL30 on May 17



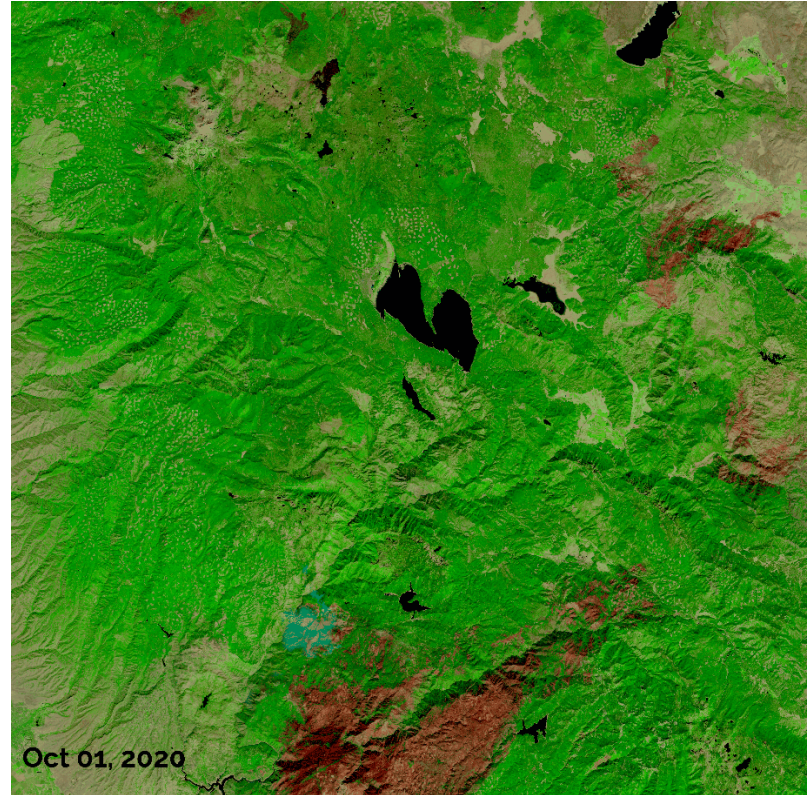
Dataset Statistics

	HL30	HL30
Current data start date	11-Apr-2013	29-Sep-2020
Number of granules	~7.8M	~3.5M
Average daily files	2350	5860
Average daily volume (TB)	0.75	1.9

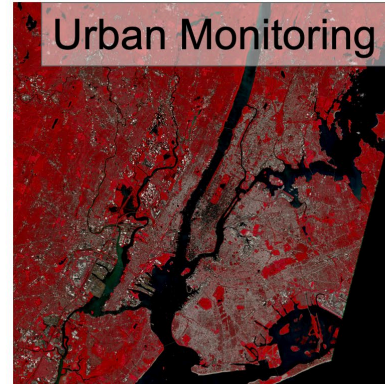
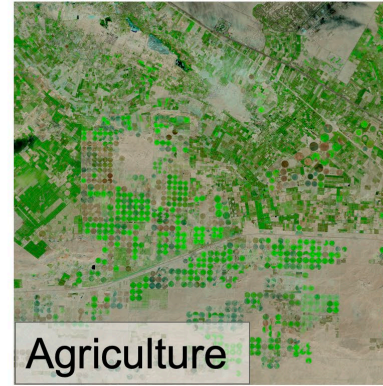
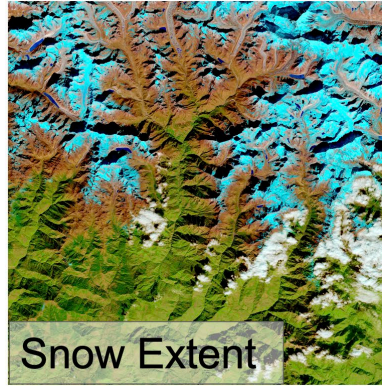
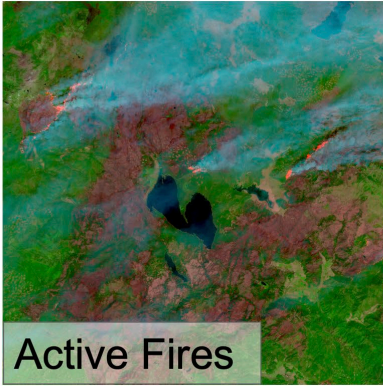


Dataset Characteristics

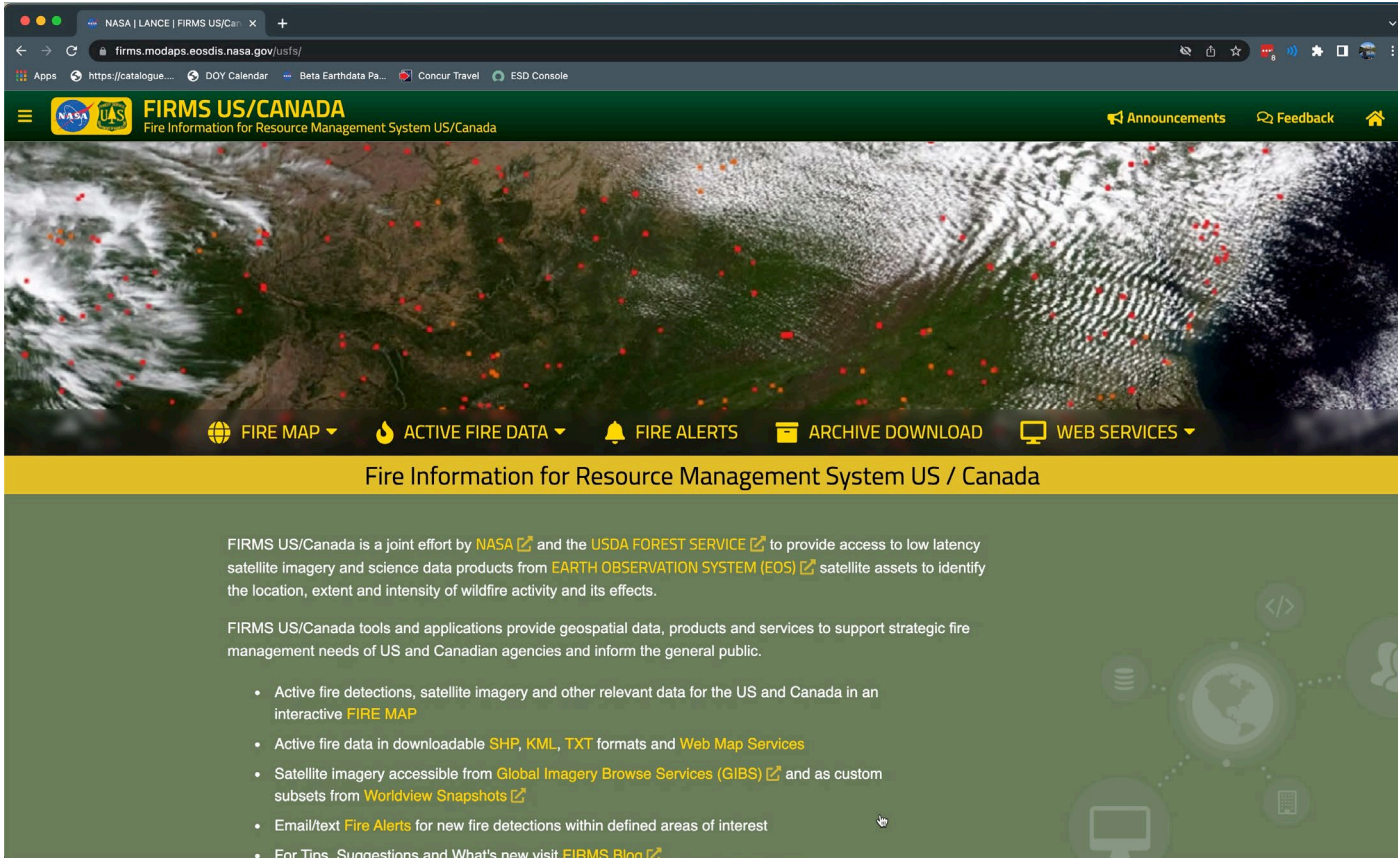
- Resolution: 30 m
- Latency: 2-3 days
- Data Format: Cloud-optimized GeoTIFF
- Granule Structure:
 - 13 single band data files
 - 4 angle bands
 - 1 QA band, 1 browse image
- Data Distributor: LP DAAC



HLS Science Applications



HLS capabilities in FIRMS








The screenshot shows the FIRMS US/CANADA website interface. At the top, there is a navigation bar with the NASA and USFS logos, the text "FIRMS US/CANADA", and the subtitle "Fire Information for Resource Management System US/Canada". To the right of the navigation bar are links for "Announcements", "Feedback", and a home icon. Below the navigation bar is a large satellite map of North America with numerous red dots indicating fire detections. Below the map is a horizontal menu with five items: "FIRE MAP", "ACTIVE FIRE DATA", "FIRE ALERTS", "ARCHIVE DOWNLOAD", and "WEB SERVICES". Below the menu is a yellow banner with the text "Fire Information for Resource Management System US / Canada". Below the banner is a green section with text and a list of features. The text describes the joint effort between NASA and the USDA Forest Service to provide access to low latency satellite imagery and science data products from the Earth Observation System (EOS) satellite assets to identify the location, extent and intensity of wildfire activity and its effects. The text also describes the tools and applications provided to support strategic fire management needs of US and Canadian agencies and inform the general public. The list of features includes: Active fire detections, satellite imagery and other relevant data for the US and Canada in an interactive FIRE MAP; Active fire data in downloadable SHP, KML, TXT formats and Web Map Services; Satellite imagery accessible from Global Imagery Browse Services (GIBS) and as custom subsets from Worldview Snapshots; Email/text Fire Alerts for new fire detections within defined areas of interest; and For Tips, Suggestions and What's new visit FIRMS Blog.






NASA | LANCE | FIRMS US/Can... x +

firms.modaps.eosdis.nasa.gov/usfs/

Apps https://catalogue... DOY Calendar Beta Earthdata Pa... Concur Travel ESD Console

  **FIRMS US/CANADA**
Fire Information for Resource Management System US/Canada

 Announcements  Feedback 

 FIRE MAP  ACTIVE FIRE DATA  FIRE ALERTS  ARCHIVE DOWNLOAD  WEB SERVICES

Fire Information for Resource Management System US / Canada

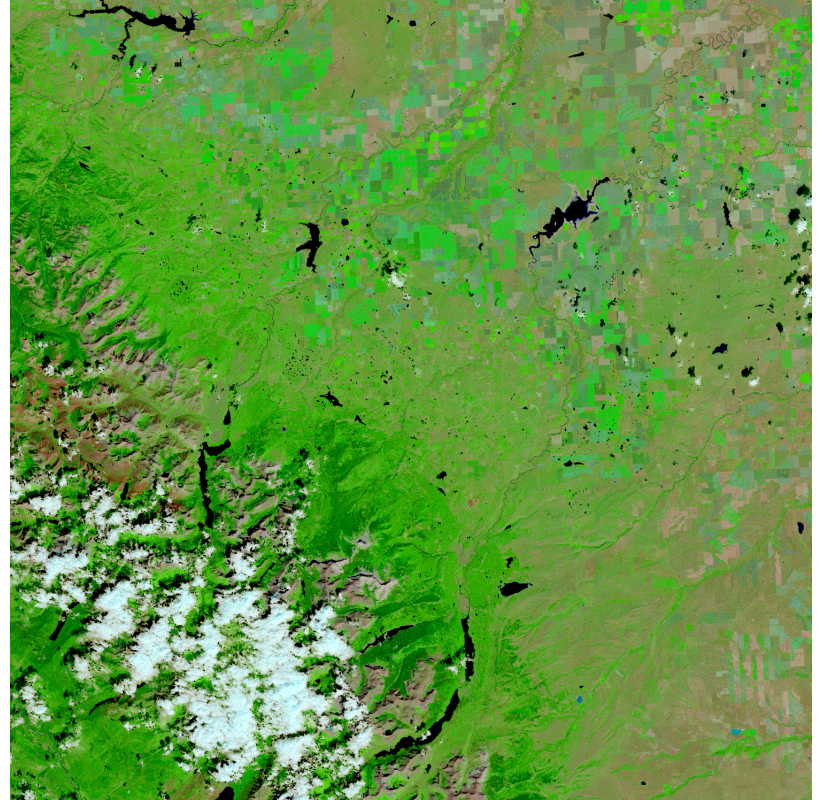
FIRMS US/Canada is a joint effort by [NASA](#) and the [USDA FOREST SERVICE](#) to provide access to low latency satellite imagery and science data products from [EARTH OBSERVATION SYSTEM \(EOS\)](#) satellite assets to identify the location, extent and intensity of wildfire activity and its effects.

FIRMS US/Canada tools and applications provide geospatial data, products and services to support strategic fire management needs of US and Canadian agencies and inform the general public.

- Active fire detections, satellite imagery and other relevant data for the US and Canada in an interactive [FIRE MAP](#)
- Active fire data in downloadable [SHP](#), [KML](#), [TXT](#) formats and [Web Map Services](#)
- Satellite imagery accessible from [Global Imagery Browse Services \(GIBS\)](#) and as custom subsets from [Worldview Snapshots](#)
- Email/text [Fire Alerts](#) for new fire detections within defined areas of interest
- For [Tips](#), [Suggestions](#) and [What's new](#) visit [FIRMS Blog](#)

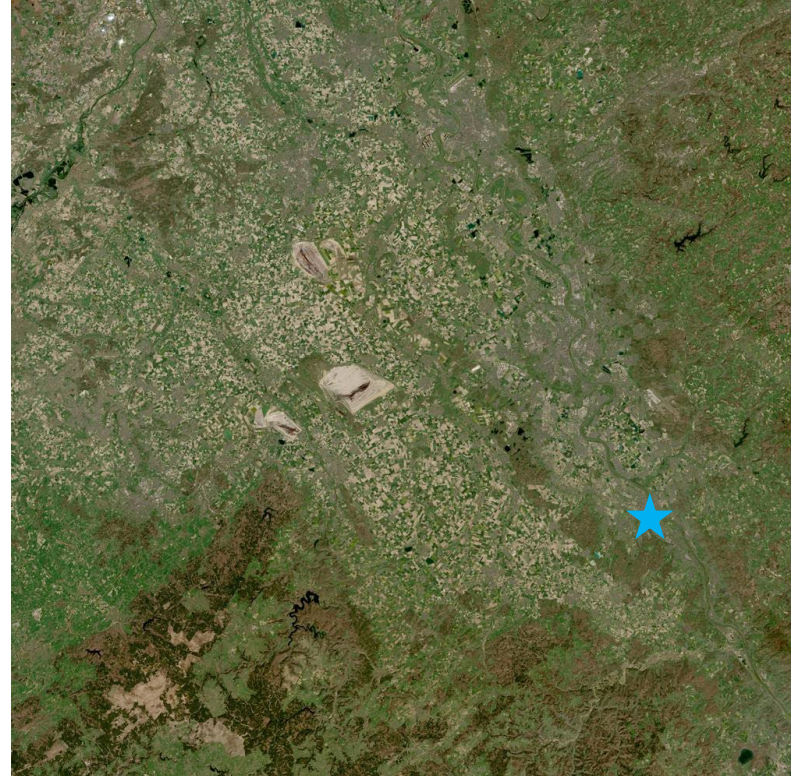
Next Steps

- Integration of HLS products into surface water extent and surface deformation and change products (planned for ~2025)
- Update atmospheric correction to use VIIRS as MODIS reaches end of life
- Algorithm enhancements and improvements
- Explore development and distribution of add-on HLS products



Concluding Remarks

- HLS continues to serve as a pilot for cloud-based data production, distribution, and visualization for NASA
- Cloud-optimized data format allows for dynamic band combinations and calculation on HLS scenes
- Collaboration with external partners (USGS, ESA) is crucial to success of HLS





Thank you.