

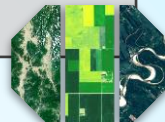
Tuesday May 12, 2026 starting at 1:25 pm CDT

Session 3: Accessing HLS in Various Environments

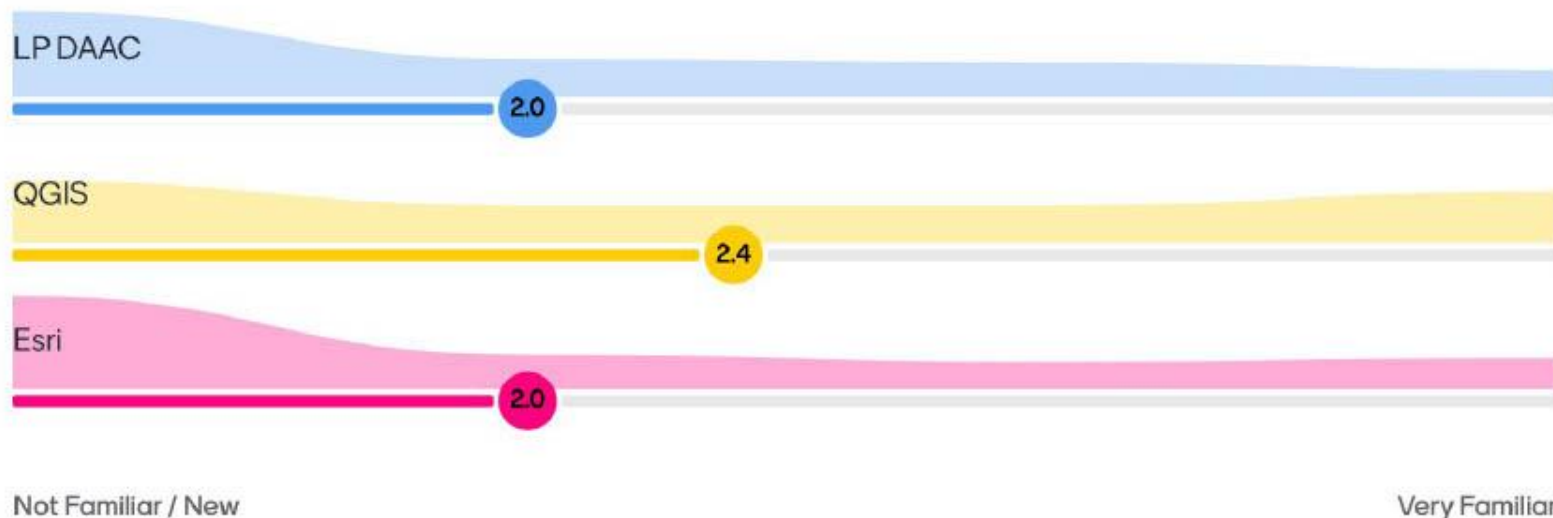
Goals:

- Demonstrate methods of discovery, download, visualization, and analysis of HLS.
- Engage with each environment and inform explorative opportunities.

Time (CDT)	Topics	Format	Speaker
1:25 - 1:30 (5 min)	Introducing HLS in Various Environments	Presentation	Essence Raphael, NSITE & UAH
1:30 - 2:30 (60 min)	Getting Started with HLS Data Access (+ Q&A)	Demo & Interactive 	Mahsa Jami, USGS EROS
2:30 - 3:30 (60 min)	Working with HLS Data in QGIS: Access, Visualization, and Analysis (+ Q&A)	Demo & Interactive 	Qiusheng Wu, UTK
3:30 - 3:40 (10 min)	Break		
3:40 - 4:40 (60 min)	HLS Data and Services in ESRI's ArcGIS Online and ArcGIS Pro (+ Q&A)	Demo & Interactive 	Leah Schwizer & Nalin Ly, NASA EGIST



(1/1) Rank how familiar you are working with HLS data in these environments



Session 3: Accessing HLS in Various Environments

Presenters



Mahsa Jami

NASA LP DAAC
Scientist

USGS EROS Center



Qiusheng Wu

Professor and
Graduate Studies
Director

University of
Tennessee, Knoxville



Leah Schwizer

EGIST Manager

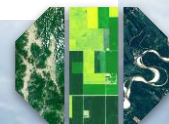
NASA EGIST



Nalin Ly

GIS Analyst

NASA EGIST



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EARTHDATA

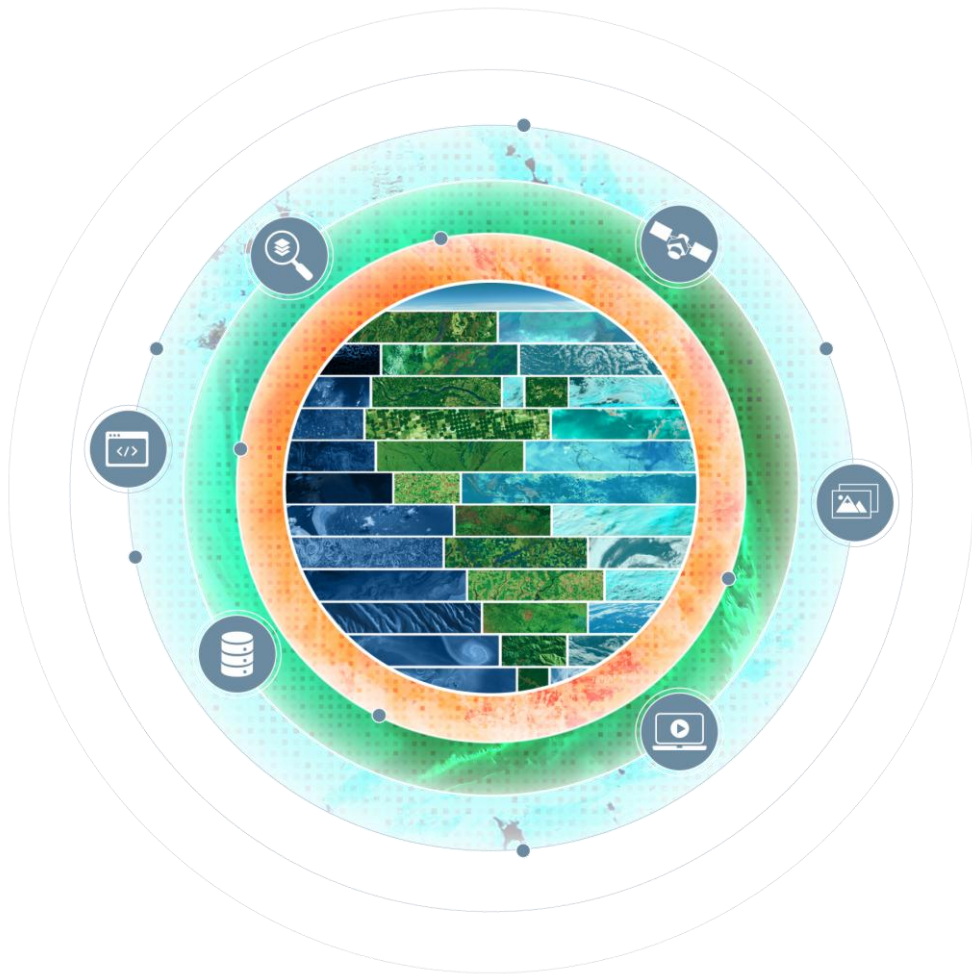
Getting Started with HLS Data Access

Mahsa Jami

Erik Bolch

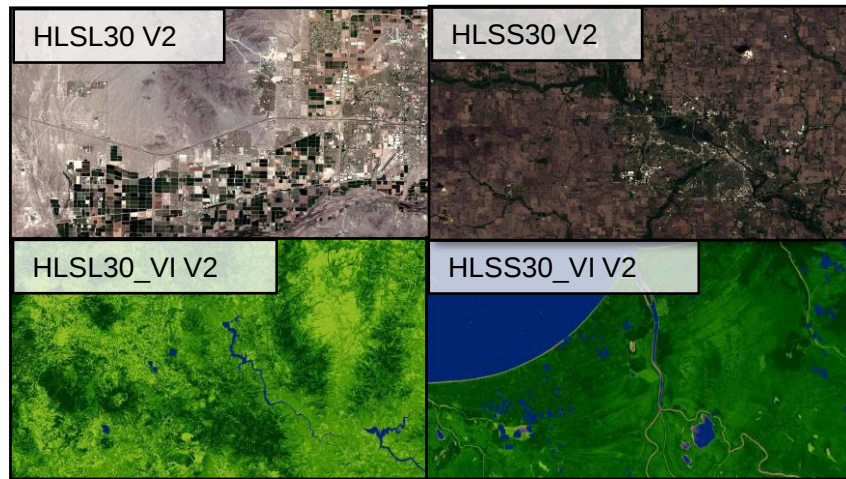
Nathan Roberts

KBR, contractor to the U.S. Geological Survey (USGS) Earth Resources
Observation and Science Center, Sioux Falls, SD 57198, USA. Work
performed under USGS Contract 140G0121D0001.



Outline

- About the NASA's LP DAAC
- NASA Earthdata Website
- Earthdata Cloud
- Find and Access HLS Data Using Earthdata Search
- Resources to Find and Access HLS Data Programmatically
- AppEEARS



About Us

Land Processes (LP) Distributed Active Archive Center (DAAC)

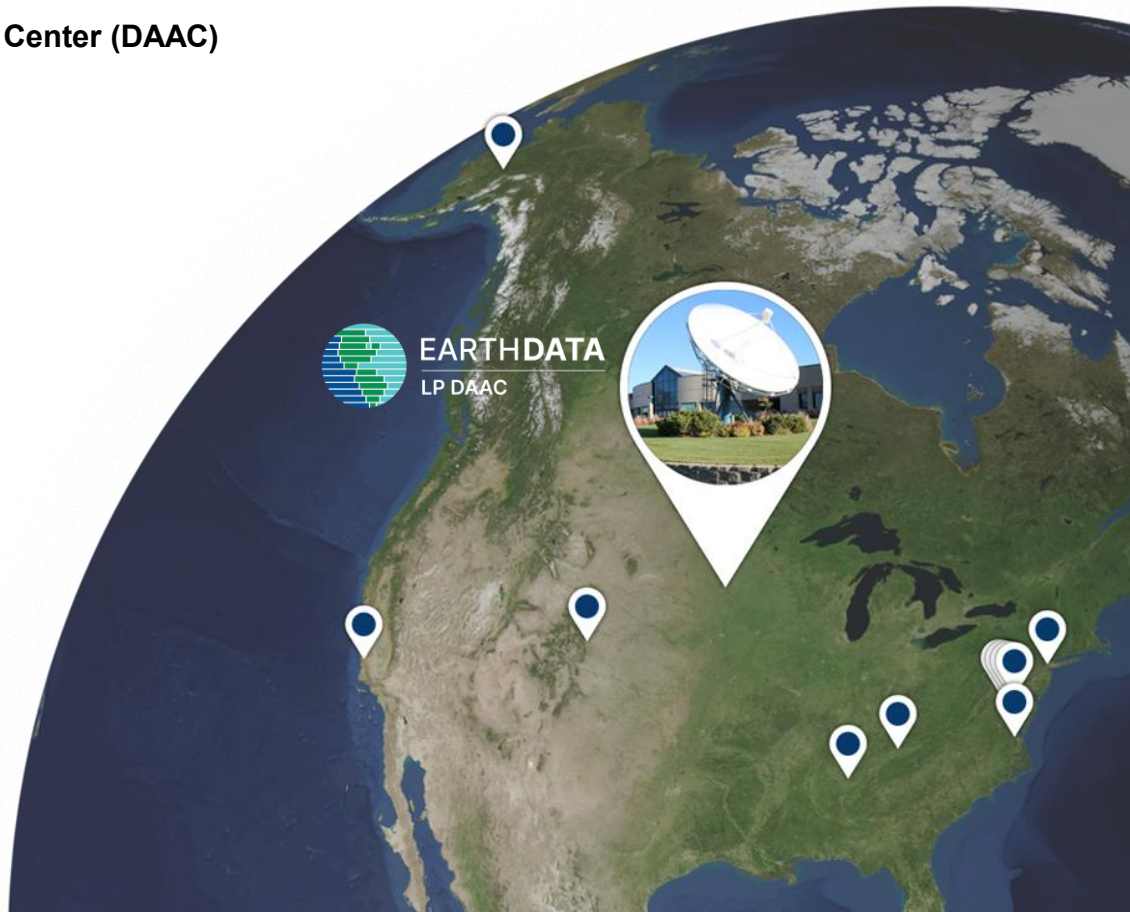
NASA's Land Discipline Archive

Sponsored by NASA's Earth Science Data and Information System (ESDIS) Project

Partnership between USGS & NASA

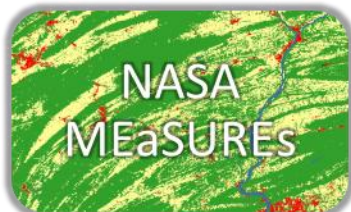
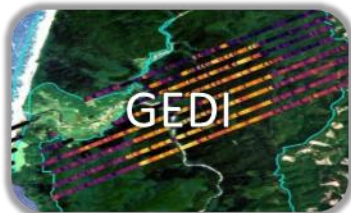
**Located and Managed at USGS EROS in
Sioux Falls, SD**

All data and resources
available at no cost

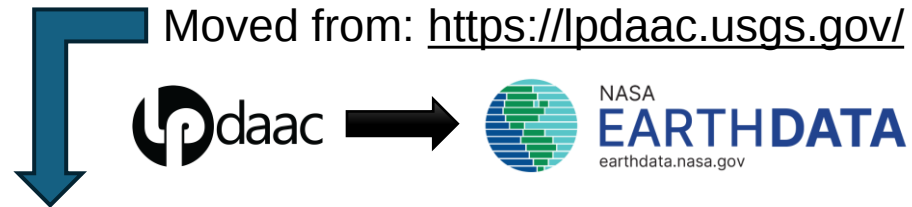


Supported Missions

Currently archive and distribute **over 1,000** data products to the remote sensing community at no charge



Website Migration

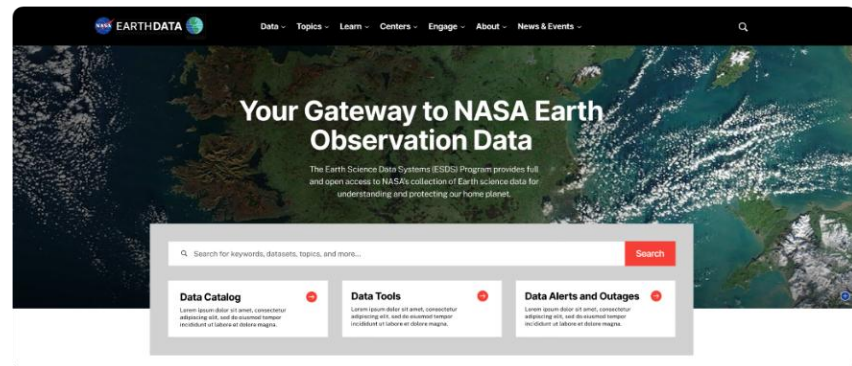
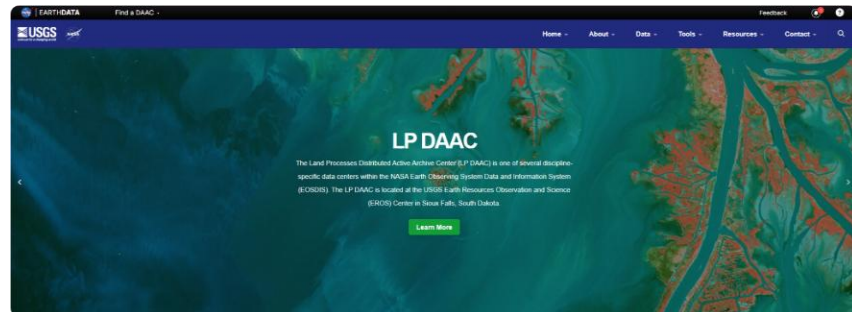


To: <https://www.earthdata.nasa.gov/>

Launch Date was June 17, 2025!



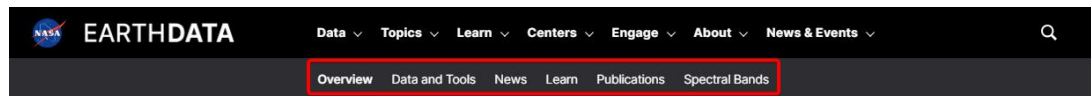
**Feedback?
Let Us Know**



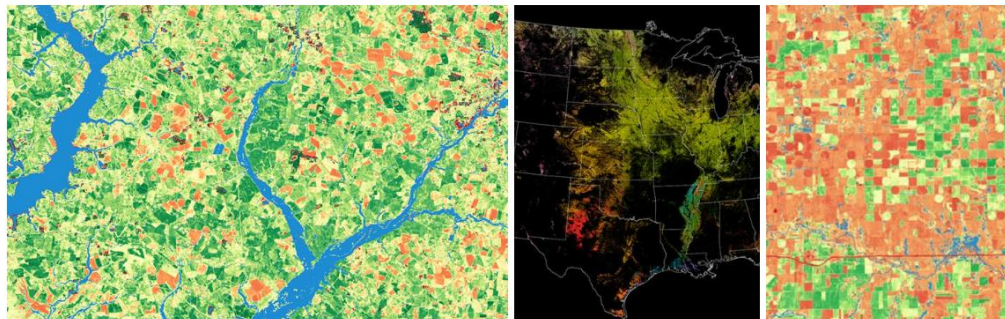
Earthdata Website

HLS Project

<https://www.earthdata.nasa.gov/data/projects/hls>



Home / Find Data / Projects / HLS



HLS

Harmonized Landsat and Sentinel-2

The Harmonized Landsat and Sentinel-2 (HLS) project is an extension of research conducted at NASA's Goddard Space Flight Center that takes input data from the joint NASA/USGS Landsat 8 and Landsat 9 satellites and the European Space Agency's Sentinel-2A, Sentinel-2B, and Sentinel-2C satellites to generate a harmonized, analysis-ready surface reflectance data product with observations every 1.6 days.

PRINCIPAL INVESTIGATOR

Dr. Christopher S.R. Neigh

PARTNERS

USGS

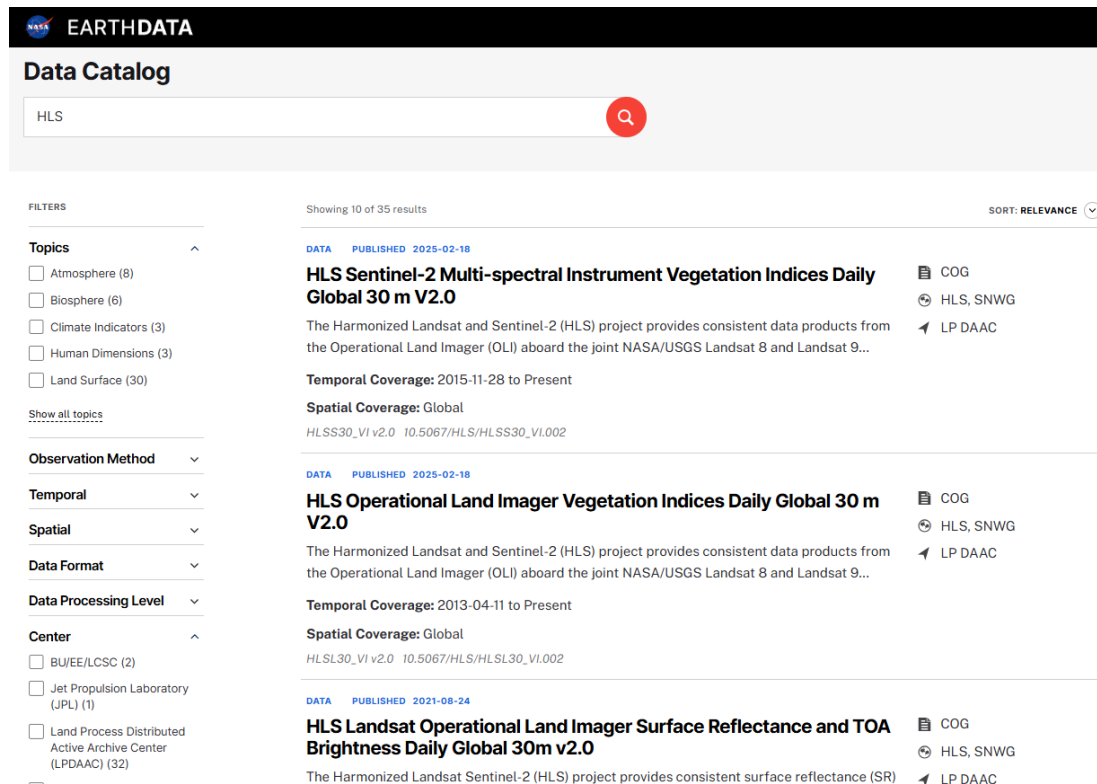
DATA CENTERS

LP DAAC



Data Catalog

<https://www.earthdata.nasa.gov/data/catalog?keyword=HLS>



Earthdata Website

HLS Dataset Landing Page

HLS Sentinel-2 Multi-spectral Instrument Surface Reflectance Daily Global 30m v2.0

HLSS30
VERSION 2.0

DOI: <https://doi.org/10.5067/HLS/S2000.002>

CENTER/PROJECT: Land Processes DAAC (LP DAAC)

Data at a Glance

Data Format	COG
Dataset Size	20 MB
Spatial Extent	N: 90 S: -90 E: 180 W: -180
Spatial Resolution	30 Meters x 30 Meters
Location	GLOBAL LAND

[Data Access](#)
[User Guide](#)

[Overview](#) [Documents and Resources](#) [Publications](#) [Variables](#)

Description

The Harmonized Landsat Sentinel-2 (HLS) project provides consistent surface reflectance data from the Operational Land Imager (OLI) aboard the joint NASA/USGS Landsat 8 satellite and the Multi-Spectral Instrument (MSI) aboard Europe's Copernicus Sentinel-2A, Sentinel-2B, and Sentinel-2C satellites. The combined measurement enables global observations of the land every 1.6 days at 30-meter (m) spatial resolution.

Version Description

The following improvement was implemented for the HLS surface reflectance Version 2 data products: Aerosol QA bits from the USGS Land Surface Reflectance Code (LSRC) model output have been added into the Function of Mask (Fmask) data layer. The two added bits indicate the aerosol levels: high, medium, low, and climatology aerosol.

Product Summary

Platforms	Sentinel-2A, Sentinel-2B, Sentinel-2C
Instruments	Sentinel-2 MSI
Spatial Extent	N: 90 S: -90 E: 180 W: -180
Spatial Resolution	30 Meters x 30 Meters
Spatial Reference System(s)	UTM
Location	GLOBAL LAND



Data Access

An Earthdata Login is required before users can download data or use selected tools that comprise NASA's Earth Observing System Data and Information System (EOSDIS).

Name	Description	Download
Earthdata Search	Earthdata Search allows users to search, discover, visualize, refine, and access NASA Earth Observation data.	Download
Thumbnail Image	Browse image for Earthdata Search	Download
APPEARS	The Application for Extracting and Exploring Analysis Ready Samples (AppEARS) offers a simple and efficient way to perform data access and transformation processes.	Download
WORLDVIEW	The URL for viewing a Worldview visualization. The Worldview tool from NASA's Earth Observing System Data and Information System (EOSDIS) provides the capability to interactively browse over 600 global, full-resolution satellite imagery layers and then download the underlying data.	Download

SHOWING 4 OF 4 ITEMS 10

Earthdata Website

Data Alerts

<https://www.earthdata.nasa.gov/data/alerts-outages>

 **EARTHDATA** 

Data Alerts

Stay up to date on data releases, updates, retirements, and outages.

KEY

- Active Outage
- Resolved Outage
- Data Update
- Data Release
- Data Retiring

FILTERS

STATUS CENTER PROJECT

Q HLS

Copy Link Clear All

Announcement	Status	Date Issued	Date Resolved	Source	Referenced Datasets
HLS Vegetation Indices Products Available in AppEEARS	Data Update	Dec. 9, 2025		AppEEARS, HLS	2
HLS Data Delay	Resolved Outage	Sept. 8, 2025	Sept. 10, 2025	HLS	2
HLS Data Delay	Resolved Outage	Aug. 8, 2025	Aug. 18, 2025	HLS	2
HLSS30 Geolocation Issue	Data Update	June 17, 2025		HLS	1
Harmonized Landsat and Sentinel-2 Vegetation Indices (HLS-VI) Data Products Released	Data Release	Feb. 18, 2025		OLI, Sentinel-2 MSI, HLS	2
HLS Vegetation Indices Released	Data Release	Feb. 18, 2025		HLS	2
HLS Version 1.5 Data Products Have Been Decommissioned	Data Retiring	Jan. 24, 2022		HLS	2

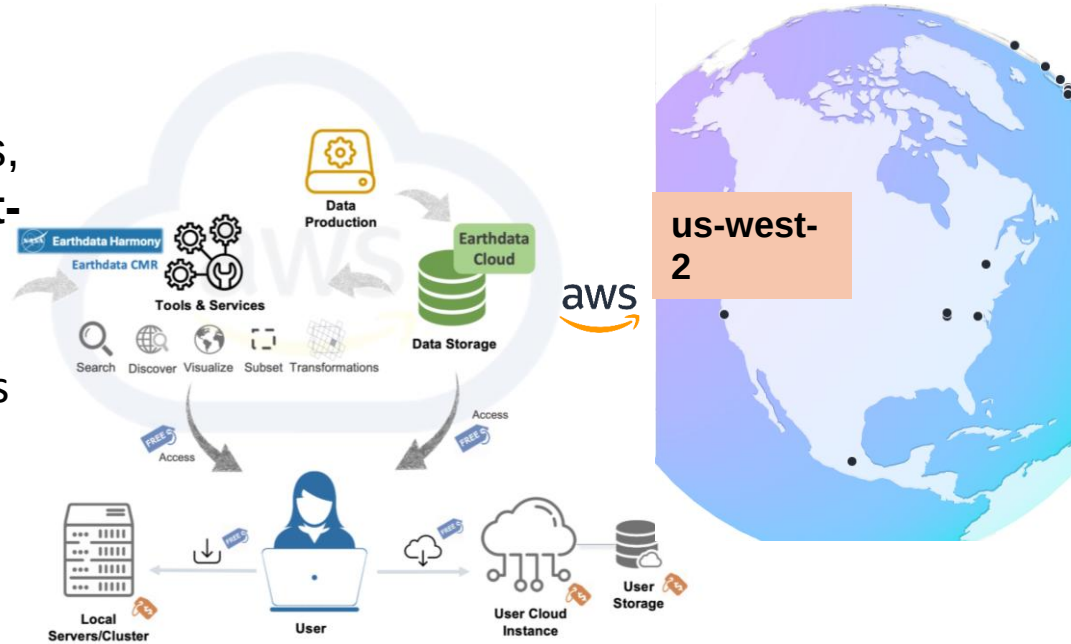
SHOWING 7 OF 7 ITEMS 10

Where is HLS Data Stored?

Earthdata Cloud (EDC) is the managed commercial cloud containing all NASA Earth data, tools, and services stored in **AWS us-west-2** region.

Common Metadata Repository (CMR) is the centralized NASA Earthdata Metadata Catalog and the key mechanism for **Data Search**.

All NASA Earthdata are indexed in CMR.



Find and Access Data

Graphical User Interface (GUI)

Earthdata Search

- Enterprise Data Search, Discovery, and Access System
- Enables discovery of 10,000+ NASA Earth Data Products (Land, Atmosphere etc.)
- Search and filter results
- <https://search.earthdata.nasa.gov/search>

Application Programming Interface (API)

CMR API

- **earthaccess** (Python Library for Interacting with NASA Earthdata via CMR)
<https://earthaccess.readthedocs.io/en/stable/>
- CMR SpatioTemporal Asset Catalog ([STAC](#)) API

Demo 1: Find and access HLS data using Earthdata Search

Search

32 Matching Collections

Showing 20 of 32 matching collections

Sort: Usage View: List

Temporal Spatial

Filter Collections

Features

☐ Available in Earthdata Cloud
 ☐ Customizable
 ☐ Map Imagery

Keywords

Platforms

Instruments

Organizations

Projects

Processing Levels

Data Format

Tiling System

Horizontal Data Resolution

HLS Landsat Operational Land Imager Surface Reflectance and TOA Brightness Daily Global 30m v2.0

15,211,227 Granules 2013-04-11 to Present

The Harmonized Landsat Sentinel-2 (HLS) project provides consistent surface reflectance (SR) and top of atmosphere (TOA) brightness data from a virtual...

GEOSS · HLSL30 v2.0 - LP DAAC

+

HLS Sentinel-2 Multi-spectral Instrument Surface Reflectance Daily Global 30m v2.0

20,717,086 Granules 2015-11-28 to Present

The Harmonized Landsat Sentinel-2 (HLS) project provides consistent surface reflectance data from the Operational Land Imager (OLI) aboard the joint...

GEOSS · HLSS30 v2.0 - LP DAAC

+

ECOSTRESS Tiled Land Surface Temperature and Emissivity Instantaneous L2 Global 70 m V002

14,589,719 Granules 2018-07-09 to Present

The ECOsystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS) mission measures the temperature of plants to better...

GEOSS · ECO_L2T_LSTE v002 - LP DAAC

+

?

Log In

2000 km

1000 mi

<https://search.earthdata.nasa.gov/search>

v26.1.1-1

Search Time: 0.7s

NASA Official: Doug Newman

FOIA

NASA Privacy Policy

USA.gov

Find and Access HLS Data Programmatically

LP DAAC Data Resources

<https://github.com/nasa/LPDAAC-Data-Resources>

NASA Land Processes Distributed Active Archive Center (LP DAAC) Data Resources



This repository is a place to find data user resources that demonstrate how to use [LP DAAC](#) tools, services, and data. Content include in this repository are listed below.

Resource	Type	Summary
LP DAAC Data Access Guide	Markdown	Provides an overview of available data access methods and services that can be used to find and access LP DAAC data
data_discovery_CMV_API_requests.ipynb	Jupyter Notebook	Demonstrates how to search for Earthdata data collections and granules using CMV API and <code>requests</code> Python package
earthaccess_introduction.ipynb	Jupyter Notebook	Demonstrates how to search for Earthdata data collections and granules using CMV API and <code>earthaccess</code> Python package
finding_data_cm-stac_api.ipynb	Jupyter Notebook	Demonstrates how to search for Earthdata data collections and granules using CMV-STAC API and <code>pyyaml</code> Python package
Data_Discovery_CMV_API_Bulk_Query.ipynb	Jupyter Notebook	Demonstrates how to search and extract data URLs for an entire collection using Python's <code>requests</code> package
glance_access.ipynb	Jupyter Notebook	Demonstrates how to search for process and visualize GLANCE3D Land Cover Data using Python
create_netrc_file.md	Markdown	Demonstrates how to create a <code>.netrc</code> file in your home directory
bulk_download_using_curl.md	Markdown	Demonstrates how to bulk download LP DAAC data using Curl from command line
bulk_download_using_wget.md	Markdown	Demonstrates how to bulk download LP DAAC data using Wget from command line
DAACDataDownload.py	Python script	Demonstrates how to download LP DAAC data using a command line executable script
Land Product Guide	Markdown	Cheat sheet including a high level overview of tools, resources, and URLs available for land data collections (including Landsat data)

HLS Data Resources

<https://github.com/nasa/HLS-Data-Resources>

HLS-Data-Resources

Welcome! This repository provides guides, short how-tos, and tutorials to help users access and work with Harmonized Landsat Sentinel-2 (HLS) data. In the interest of open science this repository has been made public but is still under active development. All Jupyter notebooks and scripts should be functional, however, changes or additions may be made. Contributions from all parties are welcome.

Resources

Below are data use resources available HLS data.

Name	Type/Link	Summary	Services and Tools
HLS Python Tutorial	Python Notebook	Tutorial demonstrating how to search for, access, and process HLS data in Python	earthaccess
EVI Timeseries with ODC-STAC	Python Notebook	Tutorial demonstrating how to use the Open Data Cube (ODC) and CMV-STAC to create an EVI time series very efficiently	CMV STAC API
HLS SuPER Script	Python Script	Find, download, and subset HLS data from a command line executable	CMV API
HLS Bulk Download Bash Script	Bash Script	Find and download	CMV API
HLS R Tutorial	R Markdown	Tutorial demonstrating how to search for, access, and process HLS data in R	CMV STAC API

Additionally, the [LPDAAC-Data-Resources](#) Repository has general resources associated with datasets hosted by the LP DAAC, as well as links to other repositories for specific datasets such as EMIT, ECOSTRESS, and GEDI.

HLS Background

The Harmonized Landsat Sentinel-2 (HLS) project produces seamless, harmonized surface reflectance data from the Operational Land Imager (OLI) and Multi-Spectral Instrument (MSI) aboard Landsat and Sentinel-2 Earth-observing satellites, respectively. The aim is to produce seamless products with normalized parameters, which include atmospheric correction, cloud and cloud-shadow masking, geographic co-registration and common gridding, normalized bidirectional reflectance distribution function, and spectral band adjustment. This will provide global observation of the Earth's surface every 2-3 days with 30 meter spatial resolution. One of the major applications that will benefit from HLS is agriculture assessment and monitoring, which is used as the use case for this tutorial.

Prerequisites/Setup Instructions

Instructions for setting up a compatible environment for accessing HLS data are linked to below.

- [Python set up instructions](#)

AppEEARS

Application for Extracting and Exploring Analysis Ready Samples (AppEEARS)

What is AppEEARS?

NASA Earthdata tool that offers a **simple and efficient way to perform data access and transformation processes**

What does it do?

- Allows users to **subset data spatially, temporally, and by layer**, through user-defined **point** and **area** samples
- **Mosaic** and **clip** data for area samples
- **Customize** the outputs (projection/format)
- Provides decoded quality information and summary statistics
- Provides reproducible outputs

What kind of data?

Enables access to geospatial data from a **variety of federal data archives**

How can users work with AppEEARS?

- **GUI** - Graphic User Interface
- **API** - Application Programming Interface

How can AppEEARS help?

- Reduces download volume by 99% compared to raw source files
- Lives in Earthdata cloud next to the source data
- Facilitates data preparation
- Ensures traceability and reproducibility
- Enhances interoperability across diverse datasets
- Adapts to user needs for a better experience

<https://appeears.earthdatacloud.nasa.gov/>

Data Access Made Simple

AppEARS
Application for Extracting and Exploring Analysis Ready Samples

a NASA EARTH DATA Application

NASA

Submit Cancel

EARTHDATA

earthdata.nasa.gov

Contact Us

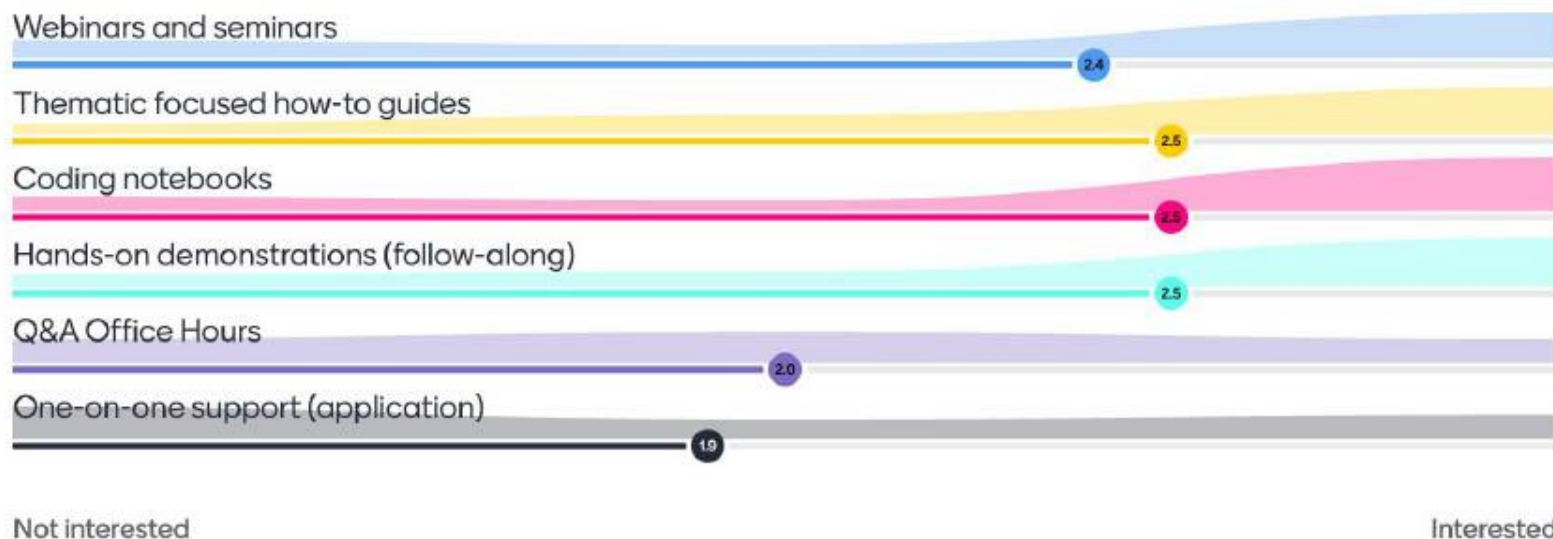
lpdaac@usgs.gov

Start a Discussion on the Earthdata Forum:
forum.earthdata.nasa.gov

Subscribe to the LP DAAC Listserv:
Send a blank email to lpdaac-join@lists.nasa.gov



(1/2) Which type of support would you need to get started with HLS in LP DAAC?





(2/2) What barriers might prevent you from using HLS in LP DAAC tomorrow?

Infrequent updating.

lack of skills

Skills/training

Programming challenges

Nothing

cost, bandwidth,
programming
challenges

Lack of skills

Just taking the time to
explore.



(2/2) What barriers might prevent you from using HLS in LP DAAC tomorrow?

Its bit complex

Training

Programming

Lack of skills

Training

Lack of support

spatial resolution is too
coarse, CPU
infrastructure

programming
challenges



(2/2) What barriers might prevent you from using HLS in LP DAAC tomorrow?

Training

There is a learning curve
to understand access
issues

bandwidth for learning
program

no barriers

The ability to do it an
other way

skills/training

programming challenges-
how to pull, mosaic, and
analyze massive data
volumes while minimizing
computational burden

Lack of data
processing skills



(2/2) What barriers might prevent you from using HLS in LP DAAC tomorrow?

Software or hardware limitations Processing satellite imagery often requires powerful computers, enough storage space, and compatible software such as: * QGIS * ArcGIS Pro * Google

API coding resources

No barriers

training with a community of practice could be advantageous

clouds;

Skills/training

Cannot access hls data without auth.

time, other required duties. very short staffed nowadays

(2/2) What barriers might prevent you from using HLS in LP DAAC tomorrow?

Access issues.

Programming

Coding resources.

Bandwidth and
processing power for
work with large areas

Las principales barreras serían
la optimización de los pipelines
de ingesta para integrar la
STAC API con sistemas locales,
los posibles costos de
transferencia de datos fuera de
la nube de la NASA



HLS in Various Environments

Questions from the Audience

What other **questions do the participants have** that we haven't answered yet?

What else could the presenters help with?

Participants, please post your questions in the Webex Q&A



Tuesday May 12, 2026 starting at 1:25 pm CDT

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Working with HLS Data in QGIS: Access, Visualization, and Analysis

Qiusheng Wu

Associate Professor

Department of Geography & Sustainability

University of Tennessee, Knoxville

<https://gishub.org>



HLS Workshop
Slides: <https://tinyurl.com/QGIS-HLS>



slides

Outline

- Open Geospatial Solutions
- NASA Earthdata Plugin
- Earth Engine Data Catalogs Plugin
- Leafmap Plugin
- OpenGeoAgent Plugin
- Live Demos
- Q&A



stars 3.9k



stars 3.7k



stars 4k



stars 2.8k



Open Geospatial Solutions



<https://opengeos.org>

Python Packages

anymap	geemap	geoai
geospatial	geospatial-ml	HyperCoast
leafmap	lidar	mapwidget
open-buildings	pygis	segment-geospatial
whitebox-python	whiteboxgui	

Data Catalogs

geospatial-data-catalogs	aws-open-data	aws-open-data-geo
aws-open-data-stac	Earth-Engine-Catalog	NASA-CMR-STAC
NASA-Earth-Data	stac-index-catalogs	maxar-open-data
datasets	data	ee-tile-layers

Web Apps

streamlit-geospatial	streamlit-map-template	solara-geemap
solara-geospatial	solara-template	solara-maxar
voila-geospatial	geospatial-dataviz	surface-water-app

QGIS Plugins

Basemaps	CDSE	Earth Engine Data Catalogs
Geemap	GeoAI	HyperCoast
Leafmap	Map	Maxar Open Data
NASA Earthdata	NASA OPERA	Notebook
Plugin Template	SamGeo	STAC
Terrascope	Timelapse	Whitebox AI Agent

MapLibre GL JS Plugins

maplibre-gl-components	maplibre-gl-earth-engine	maplibre-gl-extend
maplibre-gl-geo-editor	maplibre-gl-html-widget	maplibre-gl-layer-control
maplibre-gl-layer-manager	maplibre-gl-lidar	maplibre-gl-noaa-lidar
maplibre-gl-planetary-computer	maplibre-gl-plugin-template	maplibre-gl-splat
maplibre-gl-storymaps	maplibre-gl-streetview	maplibre-gl-swipe
maplibre-gl-time-slider	maplibre-gl-typescript-examples	maplibre-gl-usgs-lidar

R Packages

whiteboxR

ArcGIS Toolboxes

WhiteboxTools-ArcGIS

NASA Earthdata Plugin

<https://github.com/opengeos/qgis-nasa-earthdata-plugin>

The screenshot displays the QGIS desktop environment with the NASA Earthdata plugin installed. The main map view shows a satellite image of a mountainous region with a blue grid overlay. The left sidebar contains the 'Browser' and 'Layers' panels. The 'Layers' panel shows the loaded dataset: 'HLS.L30.T11SNB.2024365T182124.v2.0.B05.tif' (Band 1: NIR (Gray)) with a scale of 0.5971. The right sidebar features the 'NASA Earthdata Search' panel, which includes search parameters and results.

NASA Earthdata Search Parameters:

- Keyword: Filter datasets by keyword...
- Dataset: HLSL30
- Title: Operational Land Imager Surface Reflectance and TDA Brightness Daily Global 30m v1.5
- Max Items: 50
- Bounding Box: -116.0498, 35.0431, -113.4289, 37.2043
- Date Range: From: 2024-12-28 To: 2025-12-28

Advanced Options:

- Cloud Cover: Min: 0% Max: 10%
- Day/Night: Any
- Provider: e.g., LPCLLOUD, PODAAC, NSIDC, ECS
- Version: e.g., 2.0, 061
- Granule ID: e.g., *T11* or HLS.L30.*
- Orbit Number: Min: Any Max: Any

Search Results:

ID	Date	Size
1 HLS.L30.T11SNB.2024365T182124.v2.0	2024-12-30	187.6 MB
2 HLS.L30.T11SPB.2024365T182124.v2.0	2024-12-30	157.5 MB
3 HLS.L30.T11SPA.2024365T182124.v2.0	2024-12-30	120.9 MB
4 HLS.L30.T11SNA.2024365T182124.v2.0	2024-12-30	195.6 MB

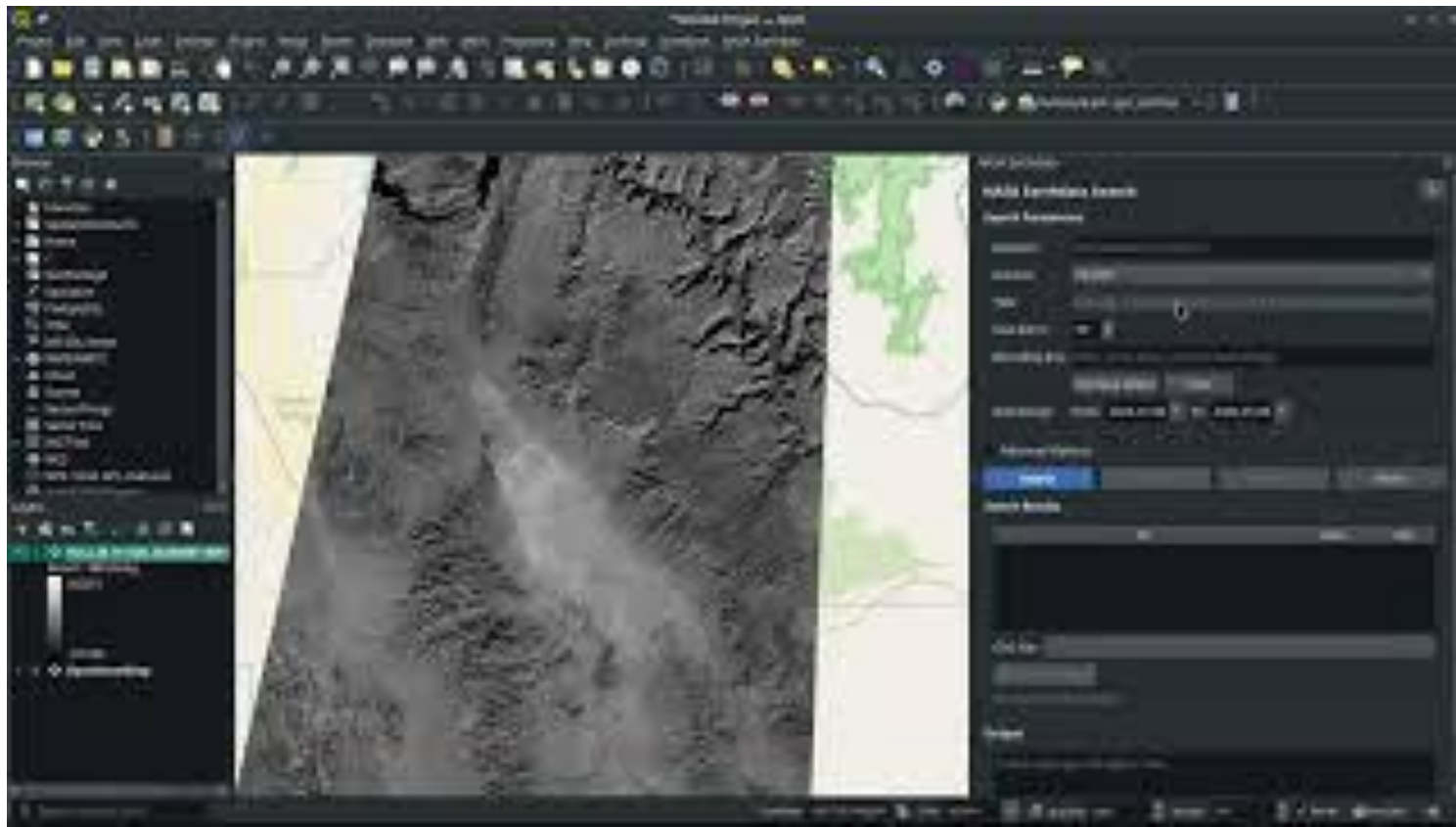
COG File: HLS.L30.T11SNB.2024365T182124.v2.0.B05.tif

Zoom to Footprints

Output:

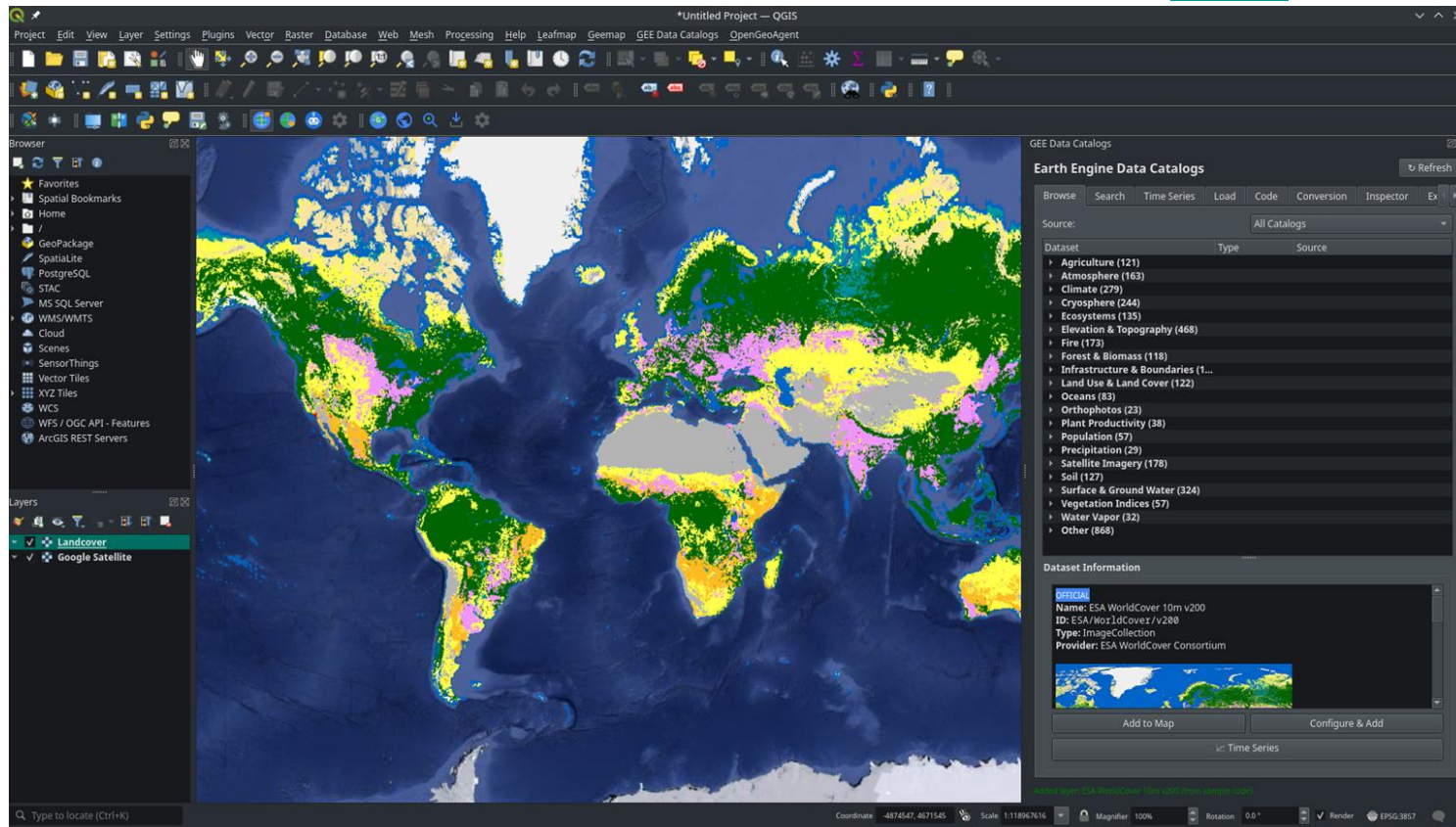
```
[17:29:45] Using selected: HLS.L30.T11SNB.2024365T182124.v2.0.B05.tif
[17:29:45] Loading: HLS.L30.T11SNB.2024365T182124.v2.0.B05.tif
[17:29:52] Added layer: HLS.L30.T11SNB.2024365T182124.v2.0.B05.tif
[17:29:52] Added 1 COG layer(s)
```

NASA Earthdata Plugin

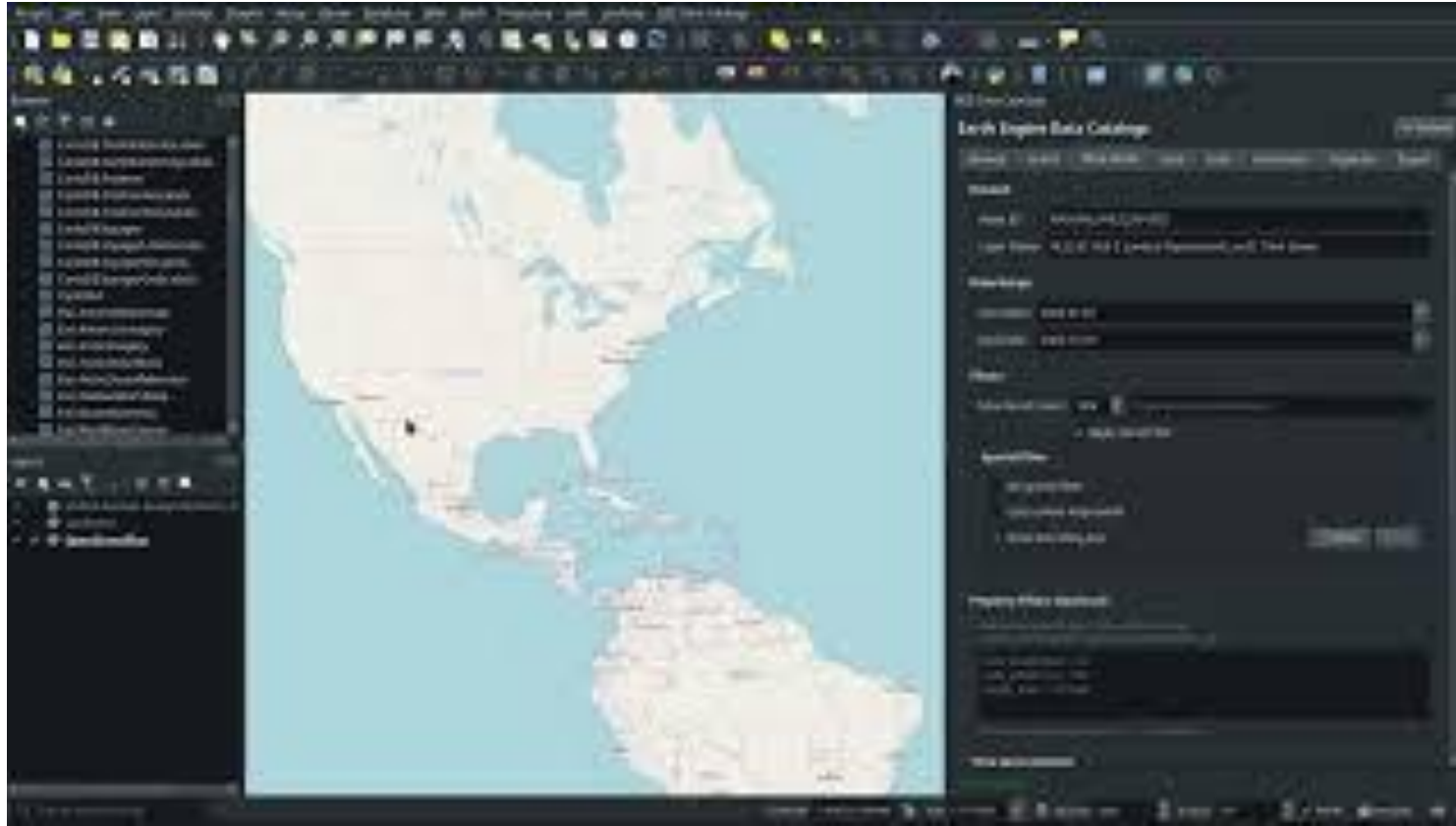


Earth Engine Data Catalogs Plugin

<https://github.com/openeo/qgis-gee-data-catalogs-plugin>

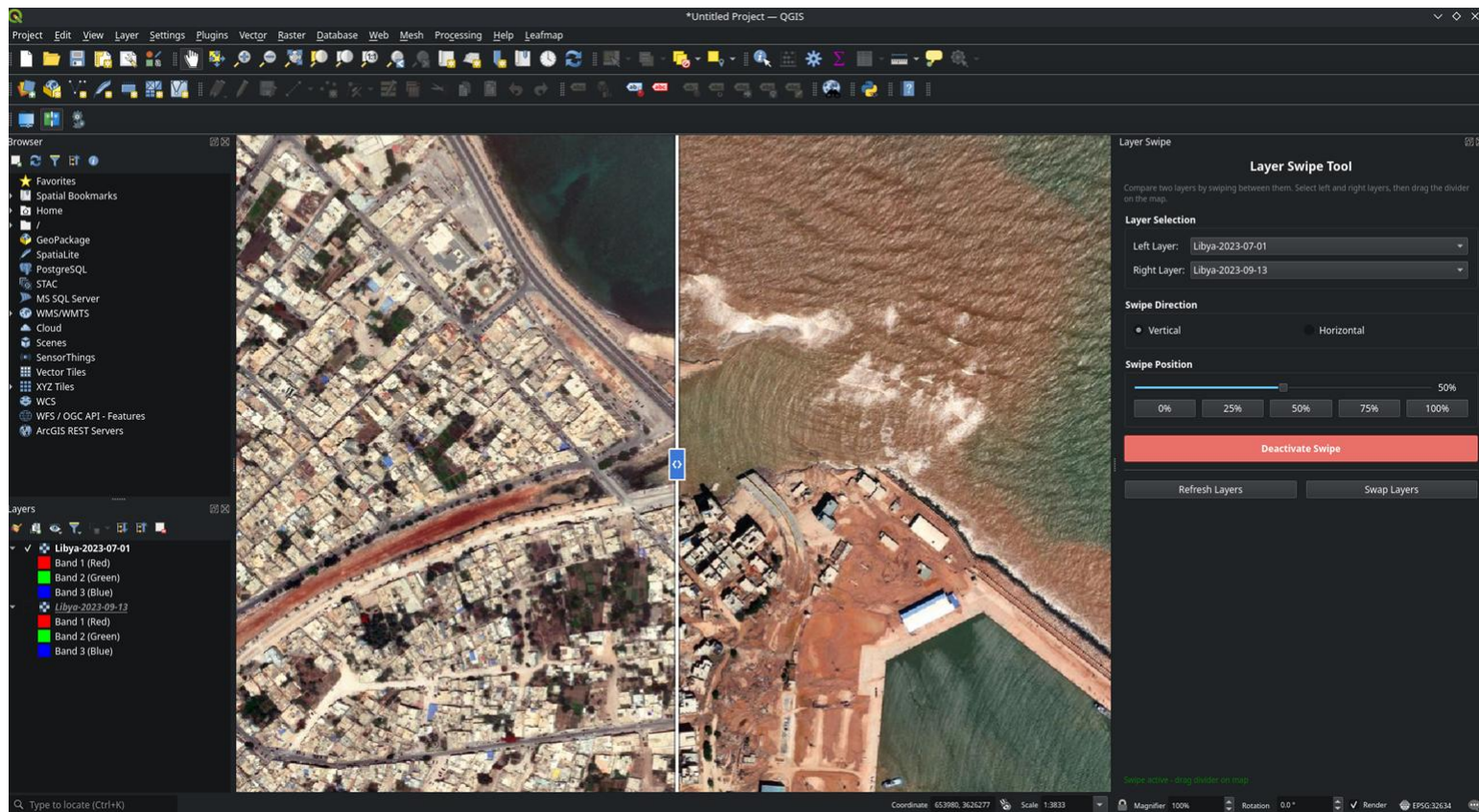


Earth Engine Data Catalogs Plugin



Leafmap Plugin

<https://github.com/opengeos/qgis-leafmap-plugin>



Leafmap Plugin



OpenGeoAgent Plugin

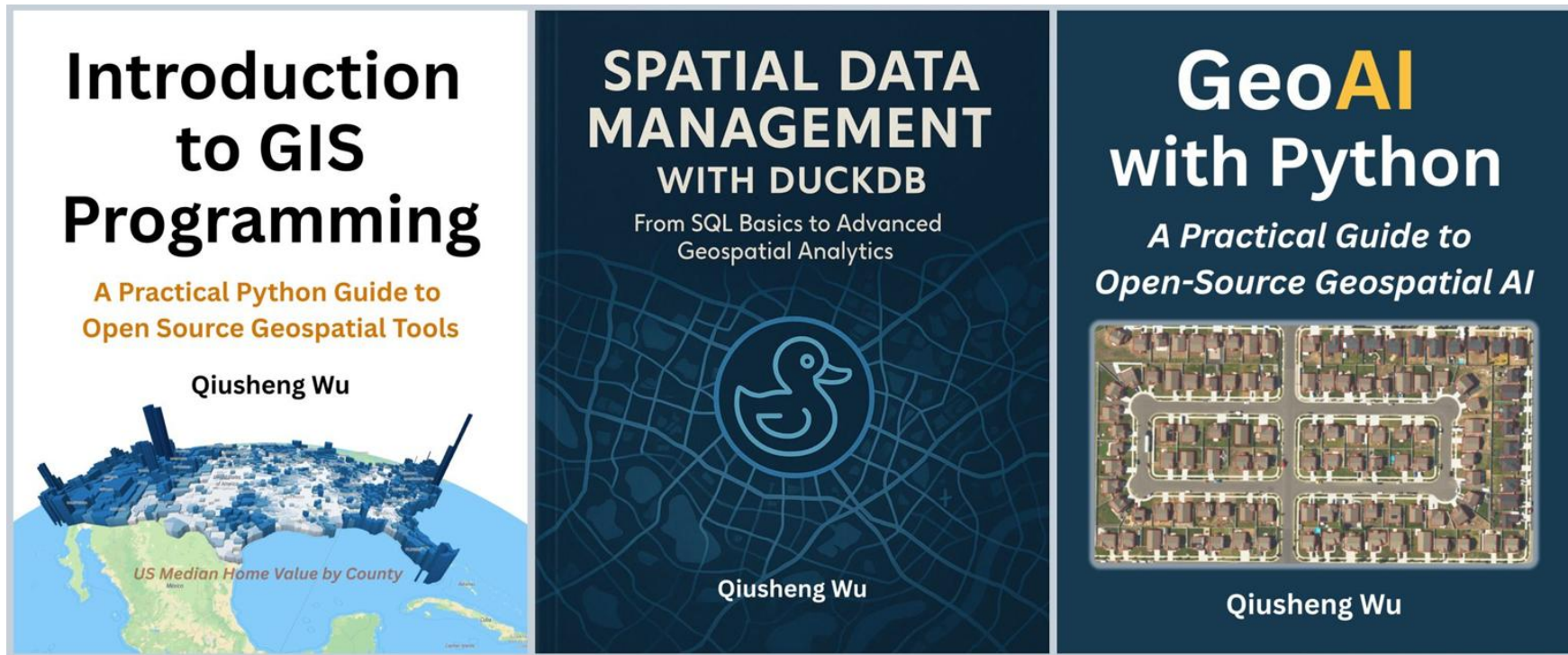
<https://github.com/opengeos/GeoAgent>



Additional Resources

Books

<https://opengeopub.com/bundles/geopython>



<https://gispro.gishub.org>

<https://duckdb.gishub.org>

<https://book.opengeoai.org>



<https://youtube.com/@giswqs>



Open Geospatial Solutions

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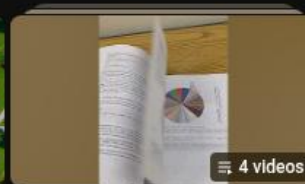
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[View full playlist](#)



Live Streaming
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Thank you!

Any questions



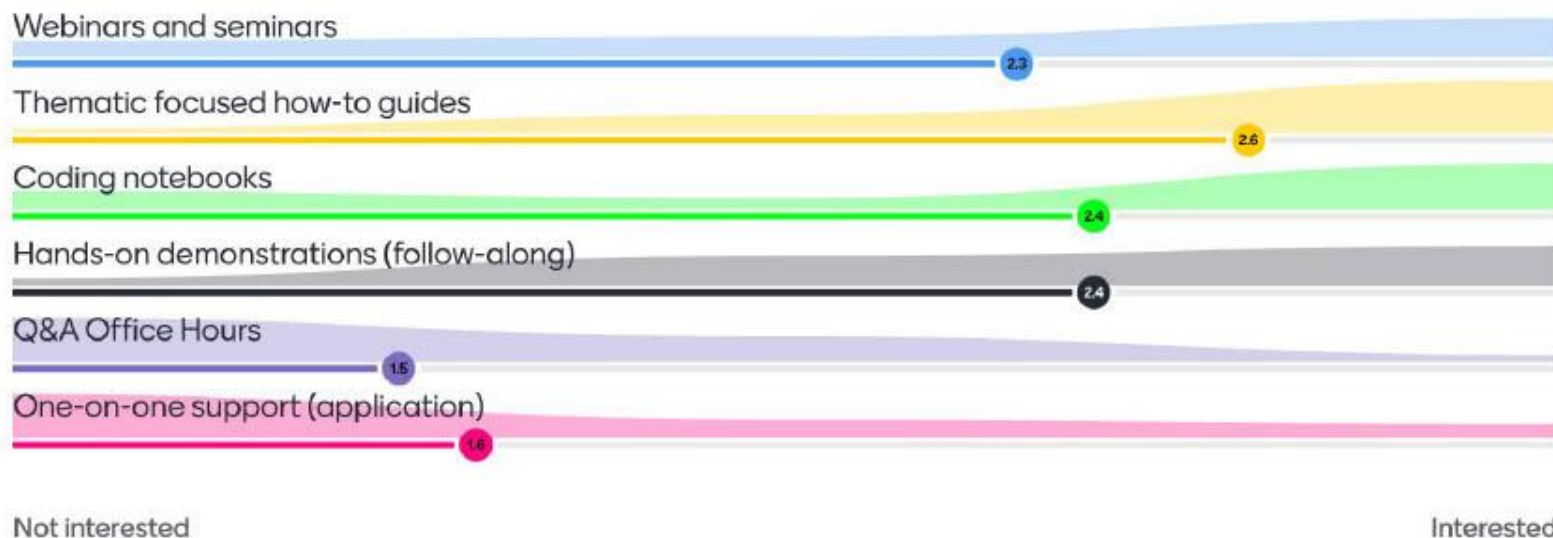
Qiusheng Wu

<https://gishub.org>



Live Demos

(1/2) Which type of support would you need to get started with HLS in QGIS?





(2/2) What barriers might prevent you from using HLS in QGIS tomorrow?

no barriers

No barrier

Plug in installation
problems

skills/training

More training

Training

All good

tools, and cost

(2/2) What barriers might prevent you from using HLS in QGIS tomorrow?

Much less barriers with
the tools just presented

Licenses to Google
Earth engine or open ai.

Training

Aliño/training

Setting up HLS plugins
and dataset in QGIS

Training

Just taking time to
implement

Mainly enough time



(2/2) What barriers might prevent you from using HLS in QGIS tomorrow?

Lack of training for robust repeatability

No Barriers

No Barriers yet. Possibly the skills

More training and possibly licenses

Training

Possibly the skill set.

Skills/training

Las barreras críticas son la caducidad de las credenciales S3 (1 hora) que requiere automatización, la latencia de red local que afecta la fluidez del GIS de escritorio, y la necesidad de configurar f



HLS in Various Environments

Questions from the Audience

What other **questions do the participants have** that we haven't answered yet?

What else could the presenters help with?

Participants, please post your questions in the Webex Q&A

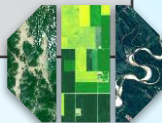
Tuesday May 12, 2026 starting at 1:25 pm CDT

Session 3: Accessing HLS in Various Environments

Goals:

- Demonstrate methods of discovery, download, visualization, and analysis of HLS.
- Engage with each environment and inform explorative opportunities.

Time (CDT)	Topics	Format	Speaker
1:25 - 1:30 (5 min)	Introducing HLS in Various Environments	Presentation	Essence Raphael, NSITE & UAH
1:30 - 2:30 (60 min)	Getting Started with HLS Data Access (+ Q&A)	Demo & Interactive 	Mahsa Jami, USGS EROS
2:30 - 3:30 (60 min)	Working with HLS Data in QGIS: Access, Visualization, and Analysis (+ Q&A)	Demo & Interactive 	Qiusheng Wu, UTK
3:30 - 3:40 (10 min)	Break		
3:40 - 4:40 (60 min)	HLS Data and Services in ESRI's ArcGIS Online and ArcGIS Pro (+ Q&A)	Demo & Interactive 	Leah Schwizer & Nalin Ly, NASA EGIST



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National Aeronautics and
Space Administration

GIS Tools, Services, & Resources for HLS

*Presented by NASA's
ESDS GIS Team (EGIST)*

A large, circular graphic on the right side of the slide. It features a central image of Earth from space, surrounded by concentric rings of various Earth-related imagery: a satellite, a desert landscape, a forest, a coral reef, and a close-up of green leaves. A white airplane is shown flying over the Earth. The text "NASA Earth" is written in large white letters across the center of the graphic.

NASA Earth

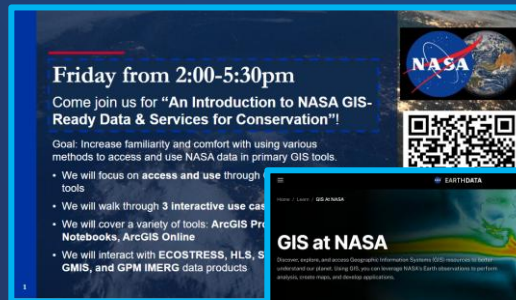
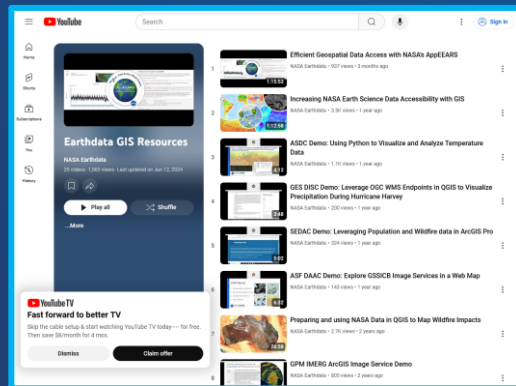
HLS Workshop – May 12-13, 2026

Who is the EGIST?

Maintain an awareness of GIS capabilities/efforts **across NASA Earth Science** to encourage the development, coordination, & maturation of GIS

Build a community to curate, publicize, & highlight **GIS content** to aid users in navigating Earth science data

Demonstrate the use & utility of GIS for NASA Earth Science by **leading public-facing technical discussions, webinars, & workshops**



What are we here to talk about today?

EGIST focuses on enabling **NASA data to be “GIS-ready”**.

This refers to data, services, & maps/apps are **compatible with common GIS software/tools**.

- We will be **demoing HLS data and services** within Esri software.
- *...but why Esri?*

	2022 %	2022 N	2022 CSI
Tool used to work with data ~~~			
ArcGIS	61%	1,022	84
Quantum GIS (QGIS)	45%	751	84
Excel	30%	496	83
ENVI	24%	397	84
Other/open source	23%	377	83
ERDAS/IMAGINE	16%	268	85
Global Mapper	15%	243	84
GDAL	14%	242	84
MATLAB	12%	199	84
GRASS	11%	187	84
Jupyter Notebooks	11%	189	82
Convert to Vector	6%	108	83
Panoply	6%	107	85
IDRISI	5%	88	84
Geomatica	4%	64	81
HDFView	4%	64	82
SeaDAS			
GrADS			
Ferret			
HEG			
IDV			
MapReady			
NCL			
Don't know/Not applicable			
HDFLook			
IDL			
MODIS Reprojection Tool (MRT)	0%	0	--
R	0%	0	--
Number of Respondents		1,674	

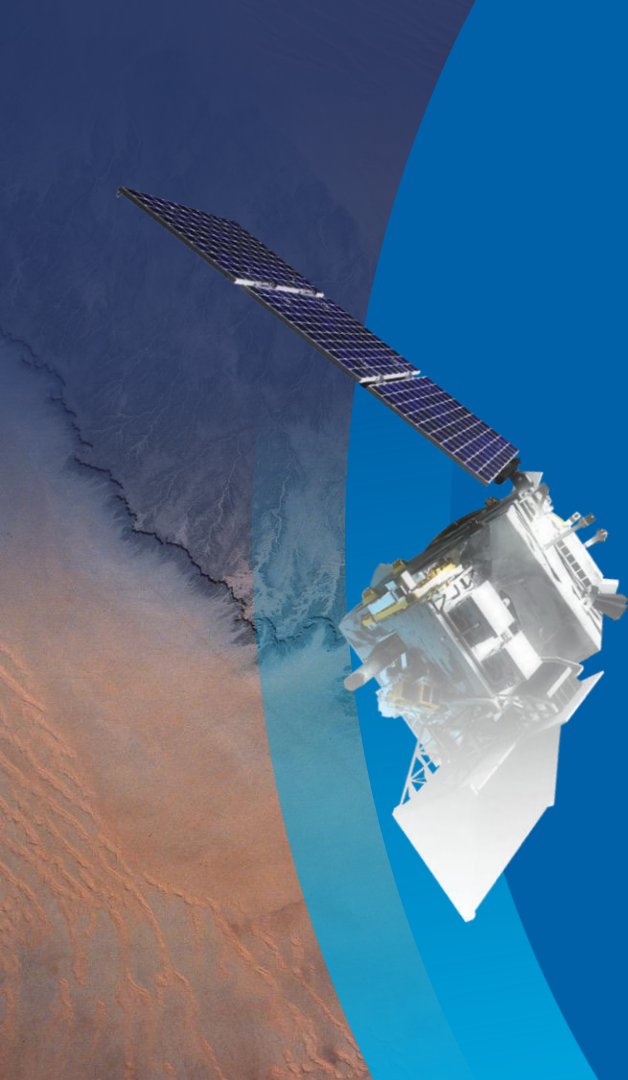
Since 2017, ACSI reports that **ArcGIS is the most used software tool/package** for working with NASA EO data at 61%, followed by QGIS (45%), & Excel (30%).

Working closely with its federal partners, over the years, Easi **has vastly improved its ability to handle imagery & scientific data formats**.

Agenda

- Demonstrations:
 - Downloaded Data Files in ArcGIS Pro
 - Cloud Storage Connection in ArcGIS Pro
 - SpatioTemporal Asset Catalog (STAC) in ArcGIS Pro
 - Global Imagery Browse Service (GIBS) in ArcGIS Pro & ArcGIS Online (AGOL)
 - Earthdata GIS (EGIS) Image Service in ArcGIS Pro & ArcGIS Online
- Esri's Landsat & Sentinel Viewers
- Earthdata GIS Resources





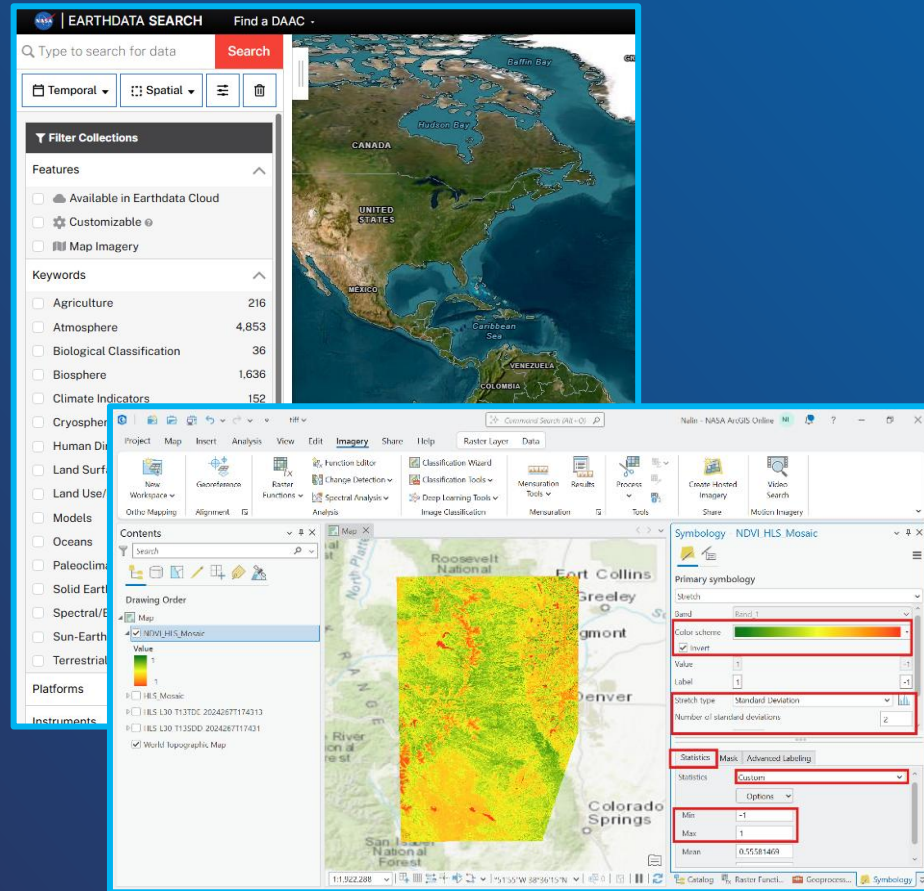
Demoing HLS: Using Downloaded Data Files from Earthdata Search in ArcGIS Pro

Overview

This workflow assumes users have downloaded granules from Earthdata Search.

Users will use ArcGIS Pro to:

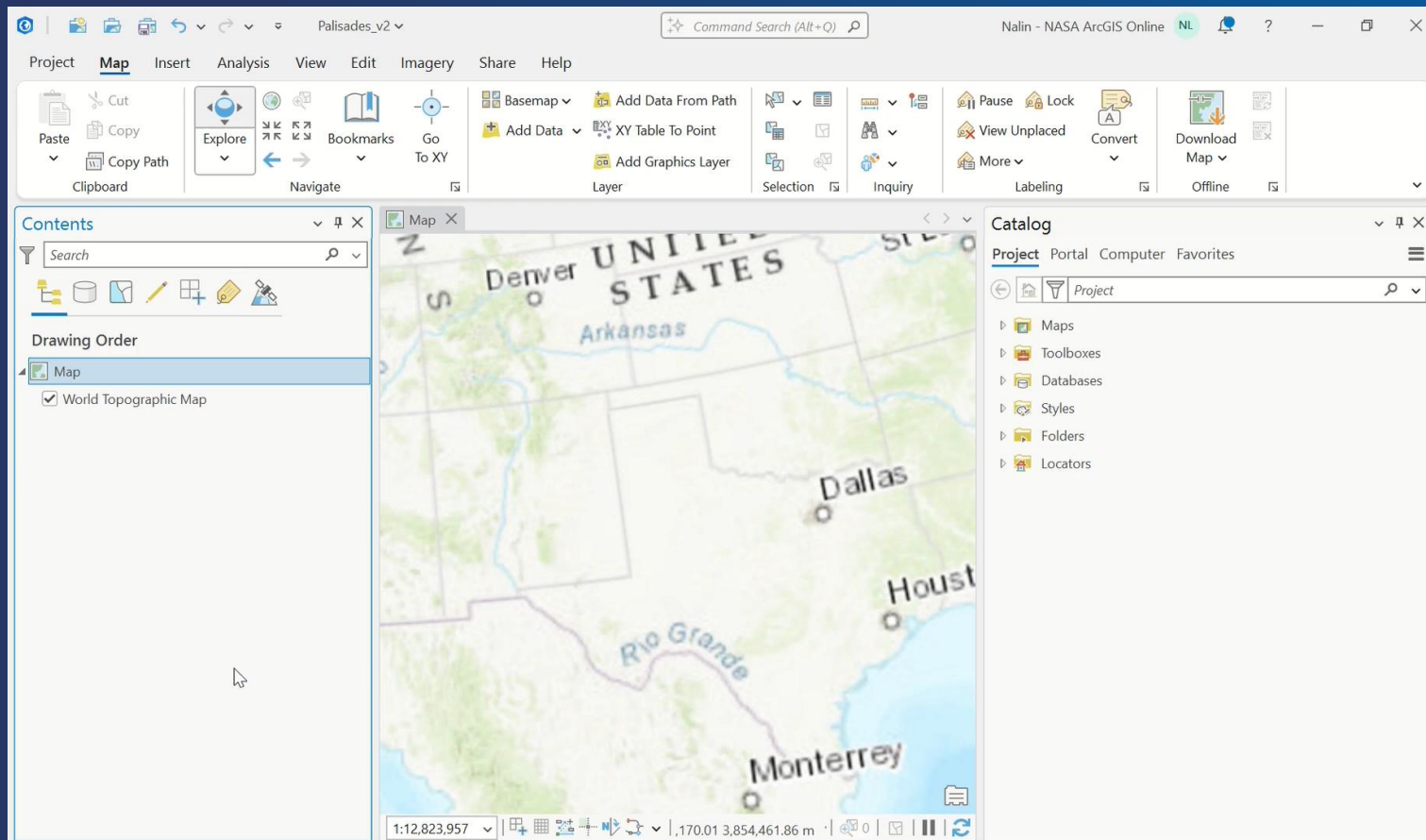
1. combine individual spectral bands into a multiband composite
2. Clip imagery to a boundary
3. Apply an NDVI raster function for basic vegetation analysis
4. Subtract output NDVIs for Change Detection



Palisades Fire Overview

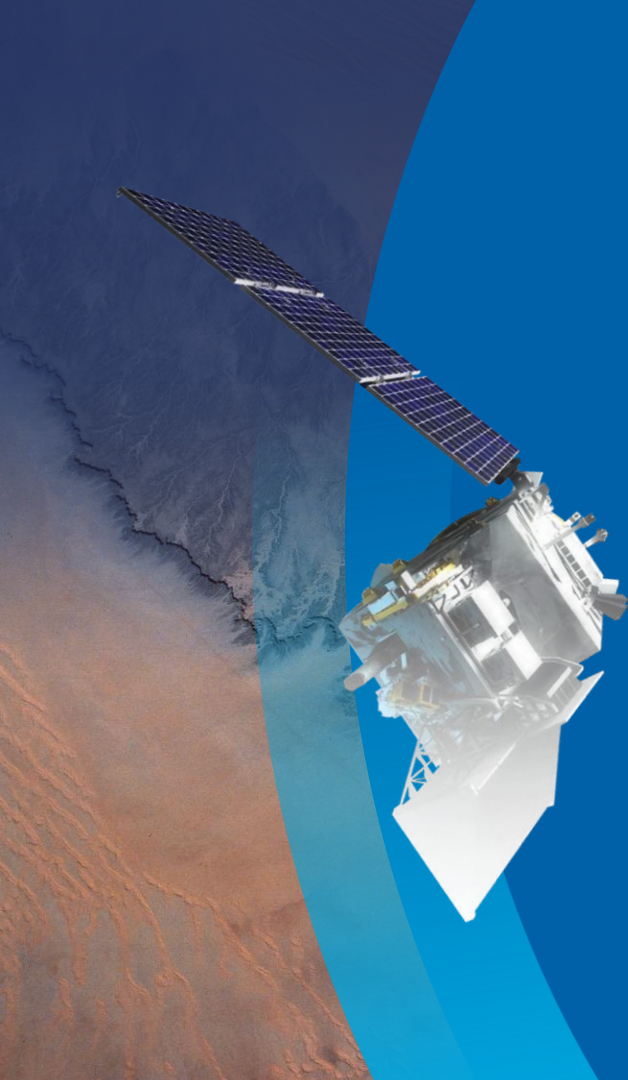
- Wildfire that started in the Santa Monica Mountains in Los Angeles County
 - Spread to areas in the Pacific Palisades, Topanga, and Malibu
 - ~23,500 acres burned between 1/7/2025 – 1/31/2025

Workflow Demonstration



Recap

- Data is freely and openly available to download through Earthdata Search
- A broad set of tools and raster functions are available to leverage this data in a wide variety of workflows
 - Clipping helps focus the analysis area
 - NDVI raster functions assess vegetation
 - Raster Calculator can quantify change between pre- and post-event imagery



Demoing HLS: Discovering Content with Cloud Storage Connection in ArcGIS Pro

Overview

- Securely access data directly from the cloud via temporary credentials
 - Earthdata Search results
 - LPDAAC credential endpoint

Known Limitations:

- Temporary credentials are valid for 1 hour
- Requires user to be operating within US-West-2 (Oregon) on ArcGIS Pro installed from an AWS US-West-2 server
 - NASA's requestor pays model limits the ability for any/all users to access data through CSC due to egress costs

Create Cloud Storage Connection

Connection File Name

LPDAAC Cloud Store

Service Provider

AMAZON

Authentication

Access Key ID (Account Name)

Secret Access Key (Account Key)

.....

Bucket (Container) Name

lp-prod-protected

Folder

Region (Environment)

US West (Oregon)

Service Endpoint

s3-us-west-2.amazonaws.com

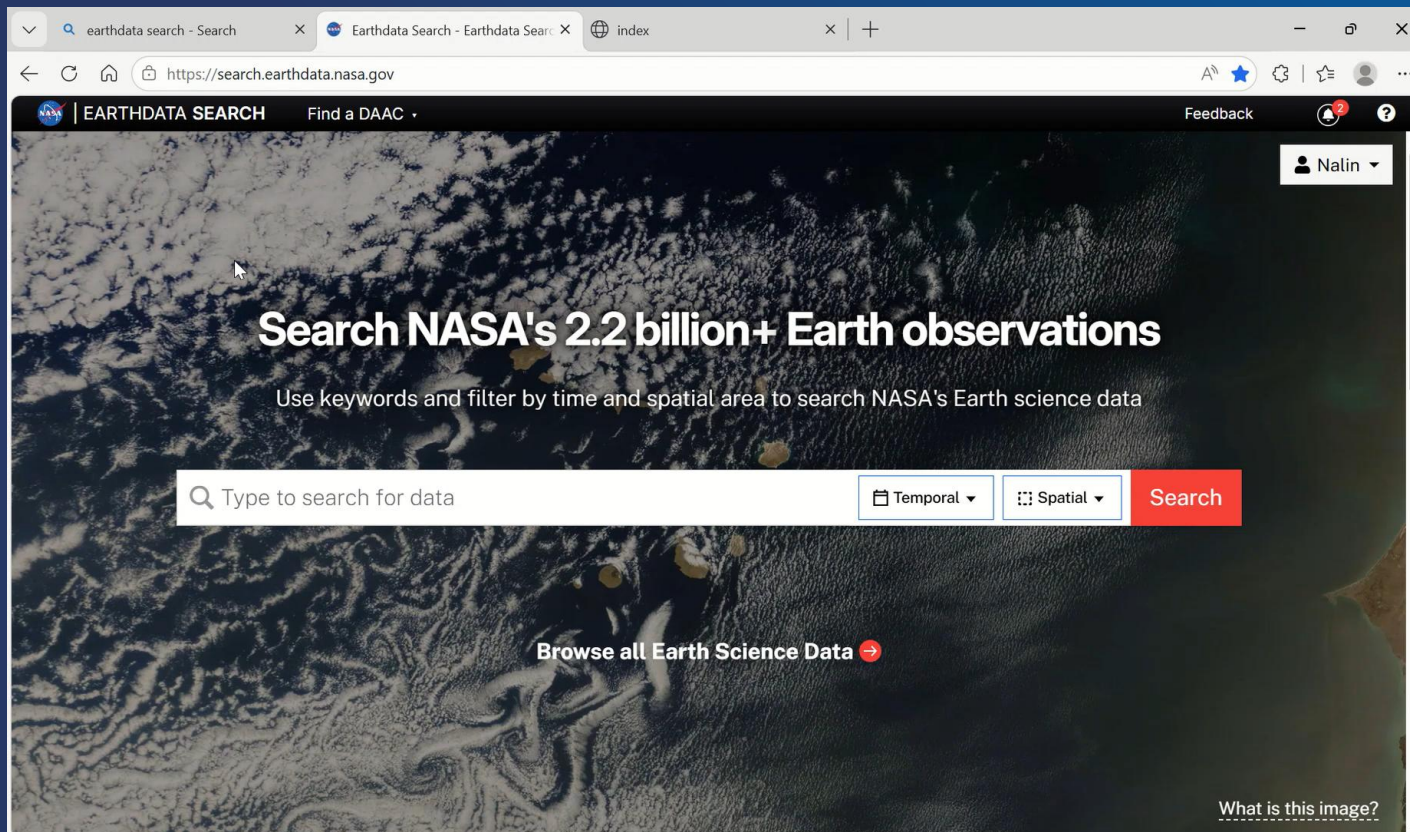
Provider Options

Name	Value
ARC_DEEP_CRAWL	NO
AWS_SESSION_TOKEN	

OK

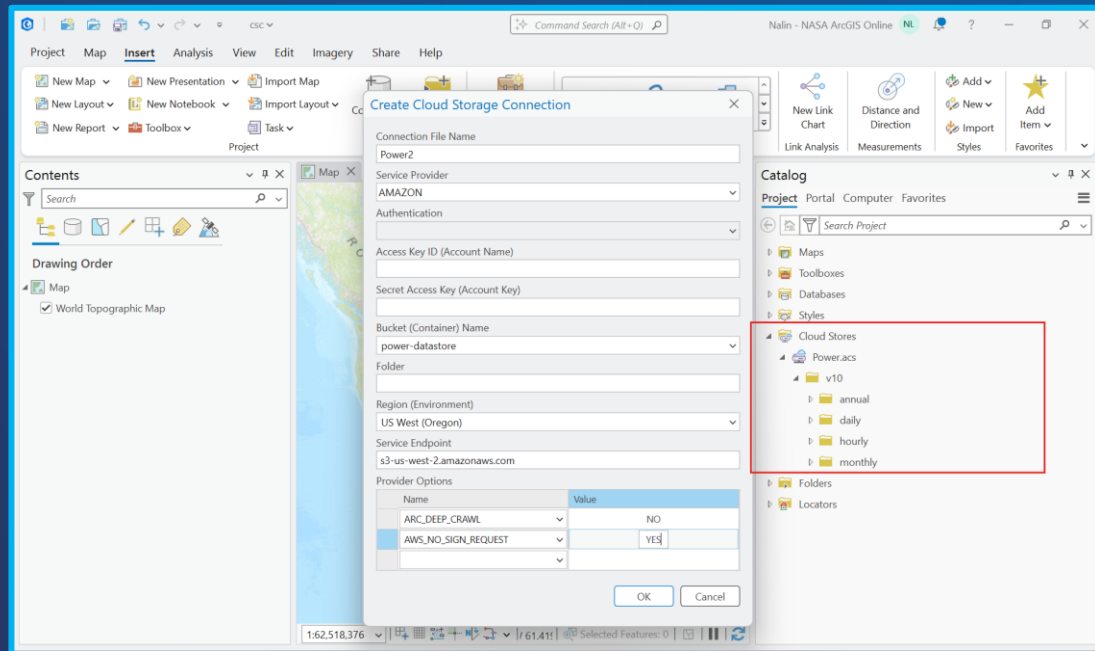
Cancel

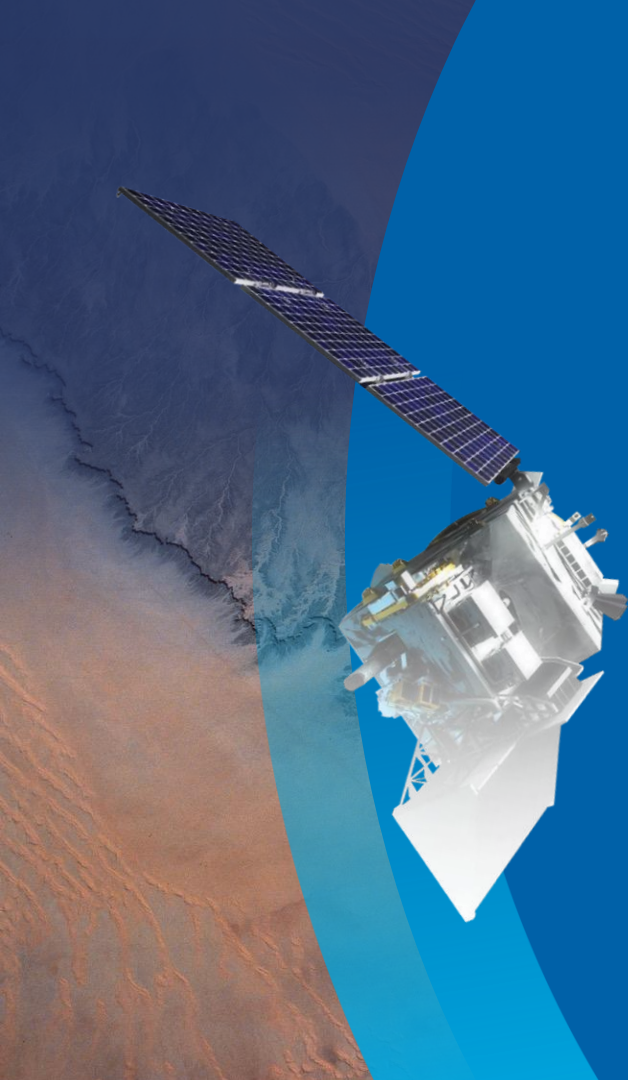
Workflow Demonstration



Recap

- Cloud Storage Connections offer a direct way to gain access to data in the cloud and quickly add to your project
- Credentials expire after 1 hour
- Users with instances downloaded and run from a US-West-2 server can leverage this workflow more readily/easily





Demoing HLS: Discovering Content via SpatioTemporal Asset Catalog (STAC) in ArcGIS Pro

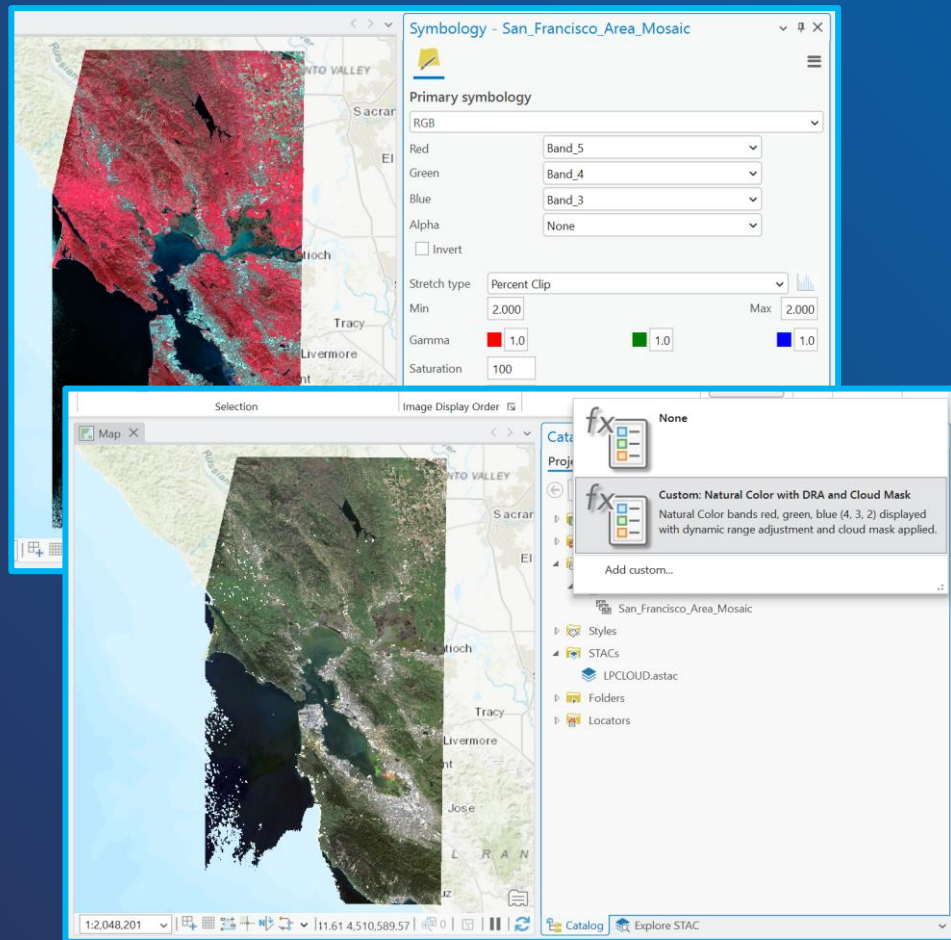
Overview

- **Common Metadata Repository (CMR)**
 - Earthdata metadata catalog
- **SpatioTemporal Asset Catalog (STAC)**
 - Standard for organizing and searching cloud-hosted geospatial data
- **NASA CMR-STAC**
 - bridges CMR system and STAC standard by making CMR metadata searchable through a STAC-compatible interface.

Workflow Overview

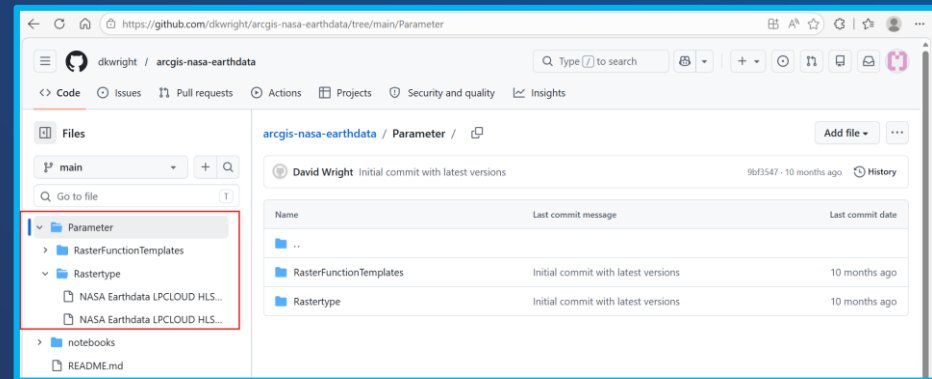
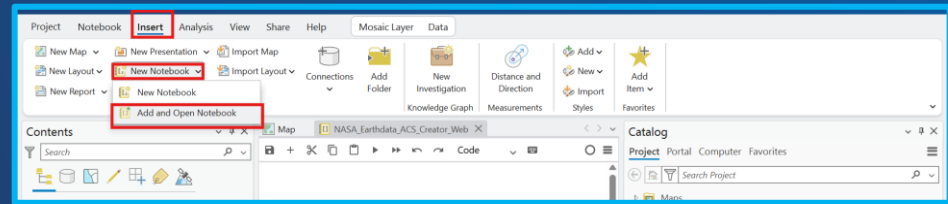
- Searching and filtering data
- Using ACS files to authenticate access
- Add data to a mosaic dataset
- Use of RasterType and Raster Function Templates (RFT) to visualize HLS imagery

***NOTE:** Empty mosaic dataset has been created ahead of the demo for STAC data

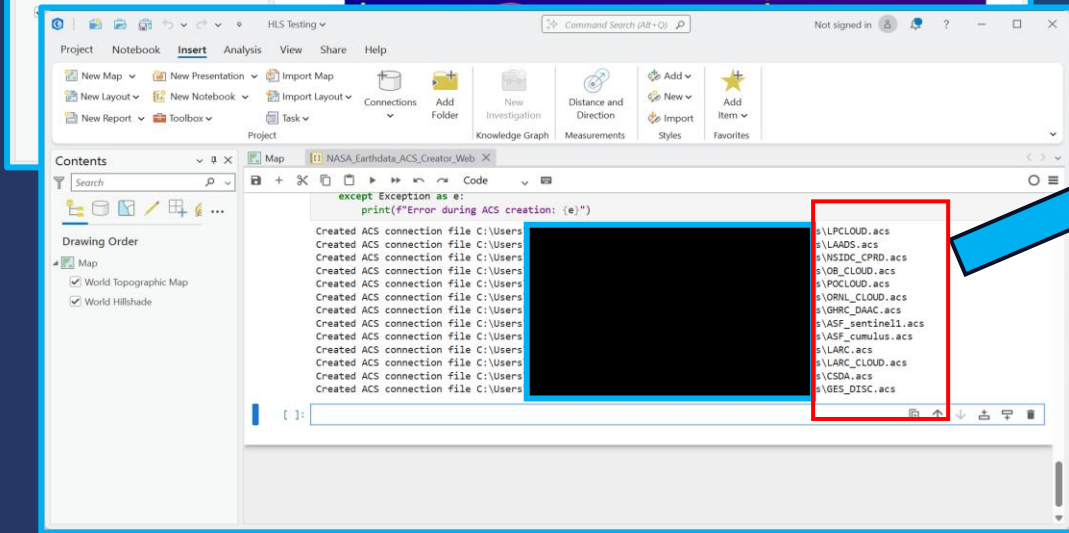
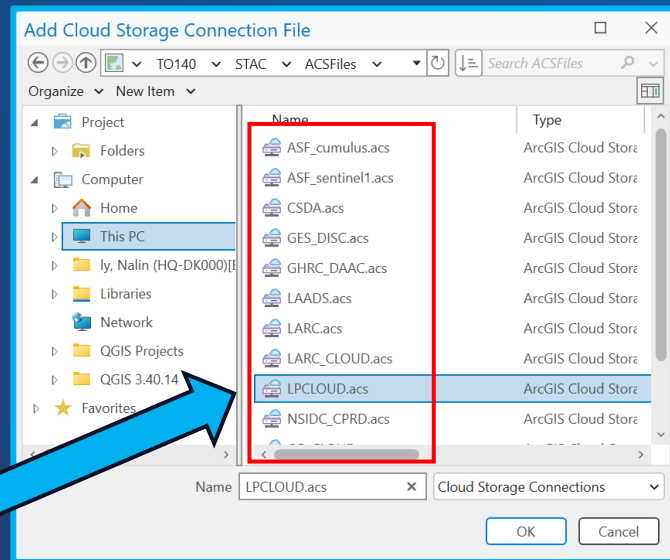
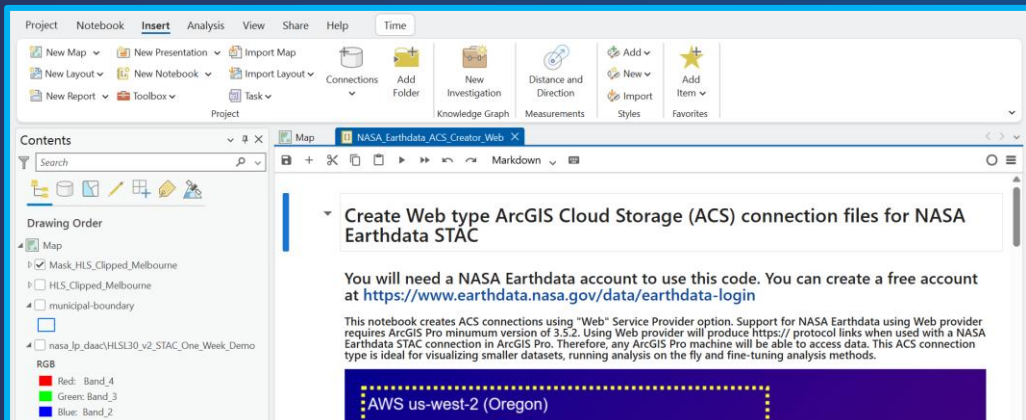


Preparing Your Environment with the dkwright Repository

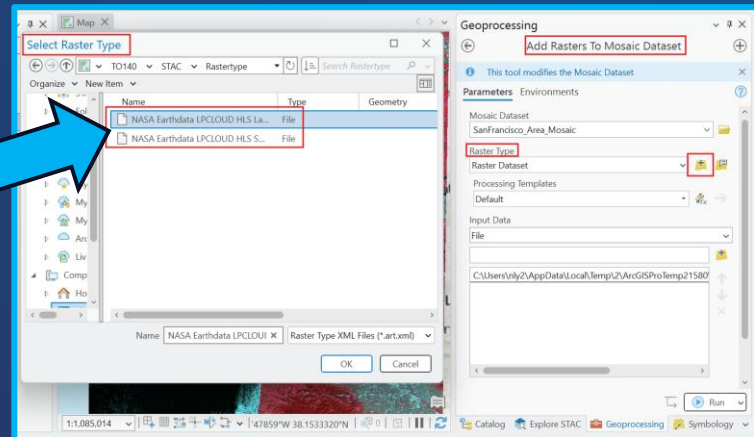
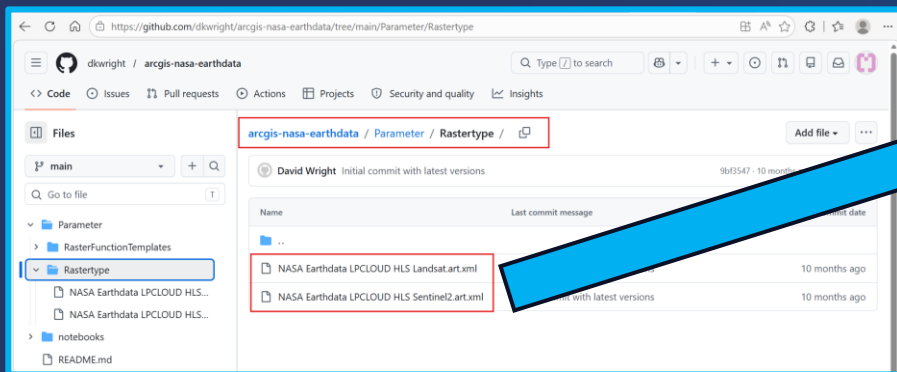
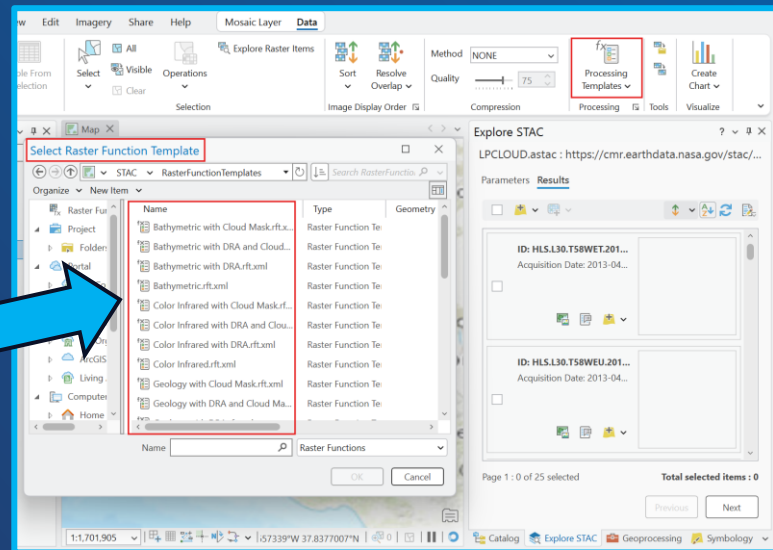
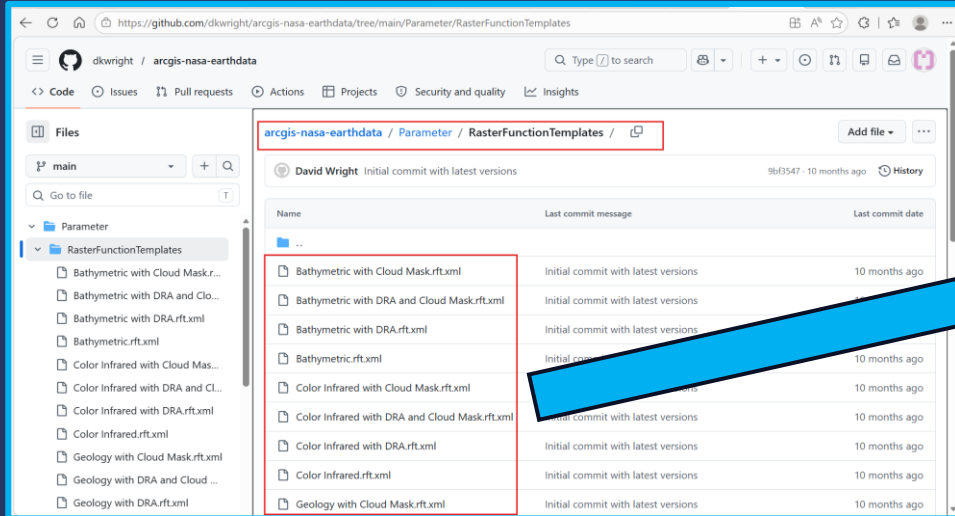
- The dkwright [arcgis-nasa-earthdata](#) github repository is a supplemental resource that streamlines use of NASA Earthdata in ArcGIS with the following:
 - ArcGIS Cloud Storage (ACS) file generation for access
 - ArcGIS Pro 3.5.2 or later
 - This ACS connection type is ideal for visualizing smaller datasets, running analysis on the fly, and fine-tuning analysis methods
- Raster Types** to define how the imagery is read and structured by ArcGIS for consistent interpretation
- Raster Function Template (RFT)** to define how the data is rendered and analyzed; applies preconfigured symbology



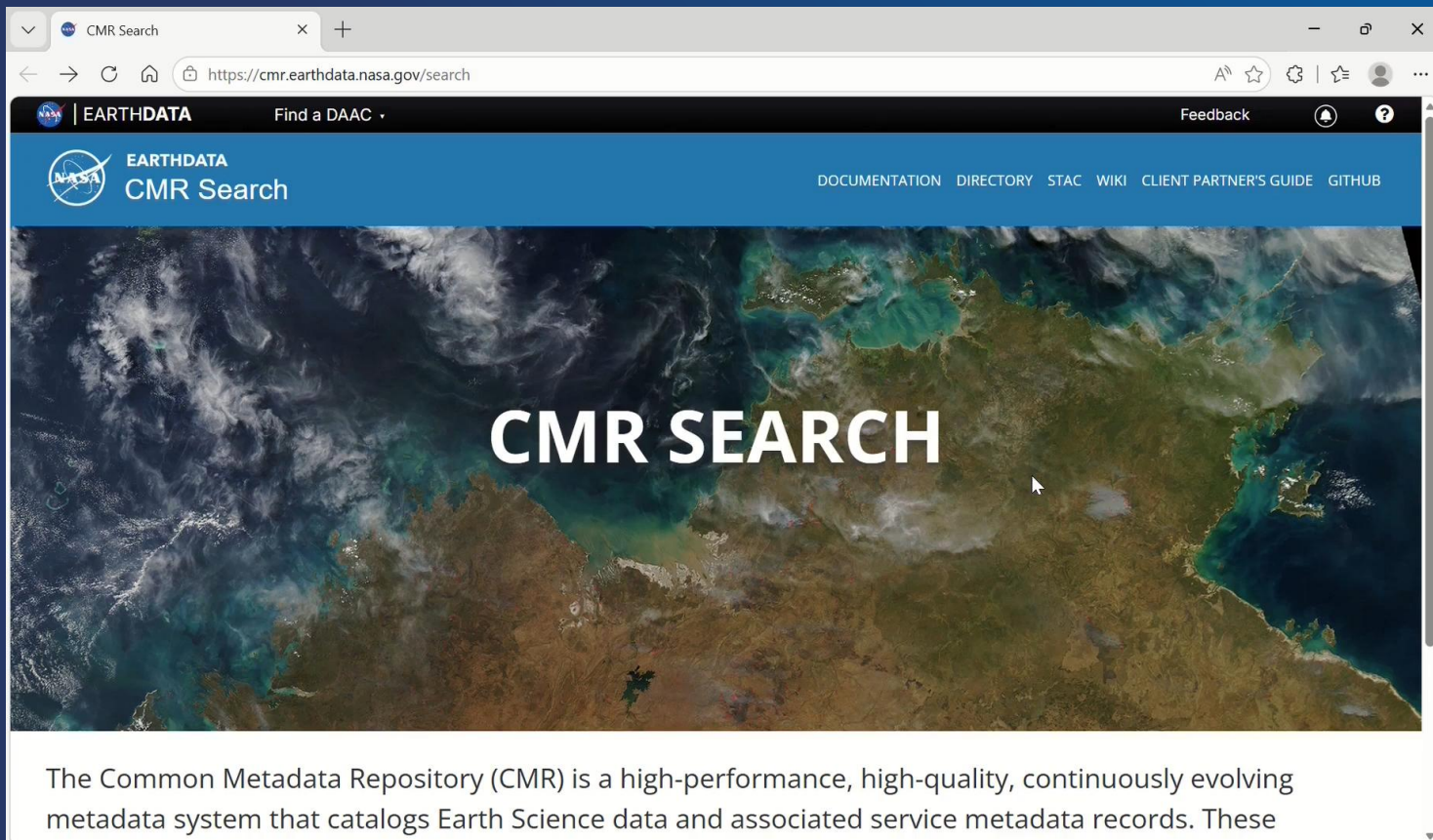
Dkwright Web ACS Notebook Generation



Dkwright Raster Type and RFT



Workflow Demonstration



CMR Search

Find a DAAC

Feedback

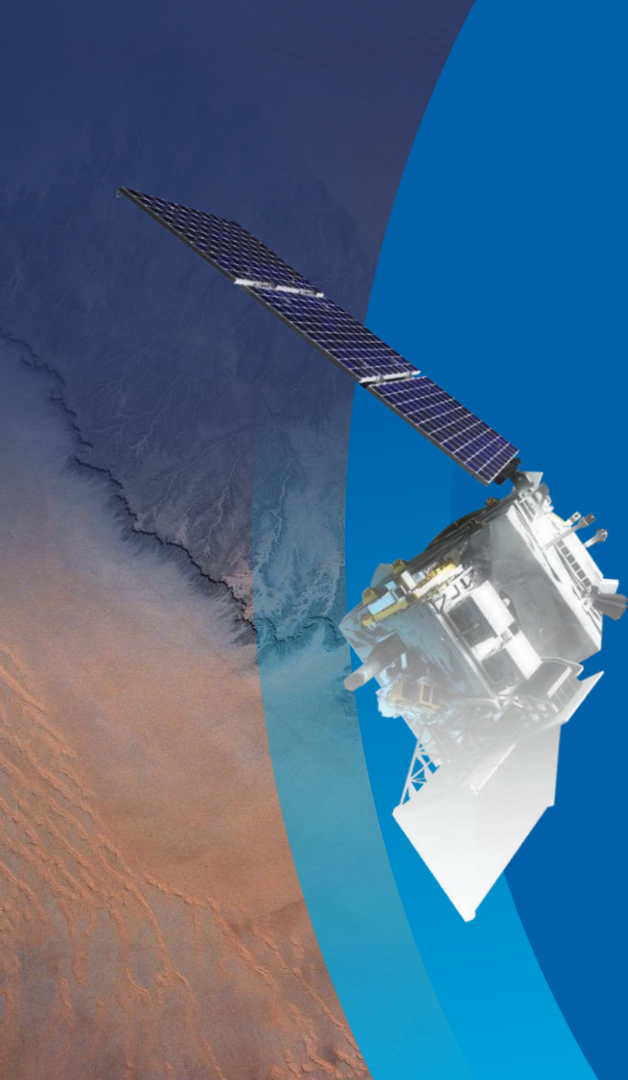
DOCUMENTATION DIRECTORY STAC WIKI CLIENT PARTNER'S GUIDE GITHUB

CMR SEARCH

The Common Metadata Repository (CMR) is a high-performance, high-quality, continuously evolving metadata system that catalogs Earth Science data and associated service metadata records. These

Recap

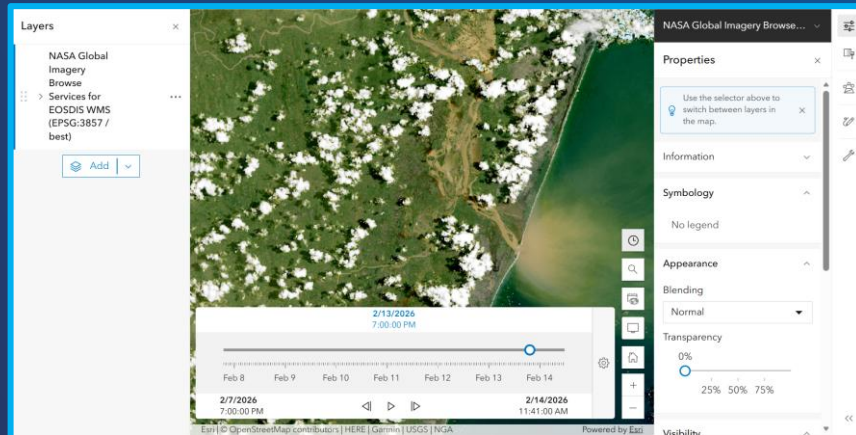
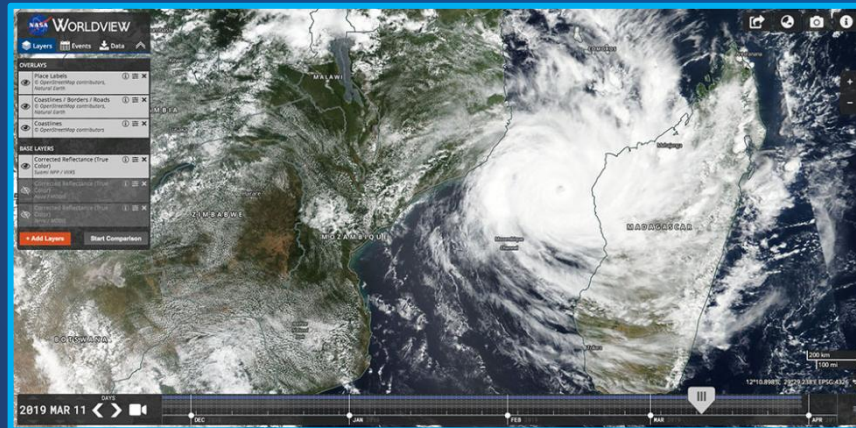
- STAC is an effective method to discover and learn about data
- STAC can be used publicly, without temporary credentials to browse available collections
- NASA's implementation of STAC using the Common Metadata Repository (CMR) has underlying limitations regarding access and use of data
- Future improvements underway to establish a more consistent user experience across the collections in CMR



Demoing HLS: Accessing & Using the Global Imagery Browse Service (GIBS) in ArcGIS Pro

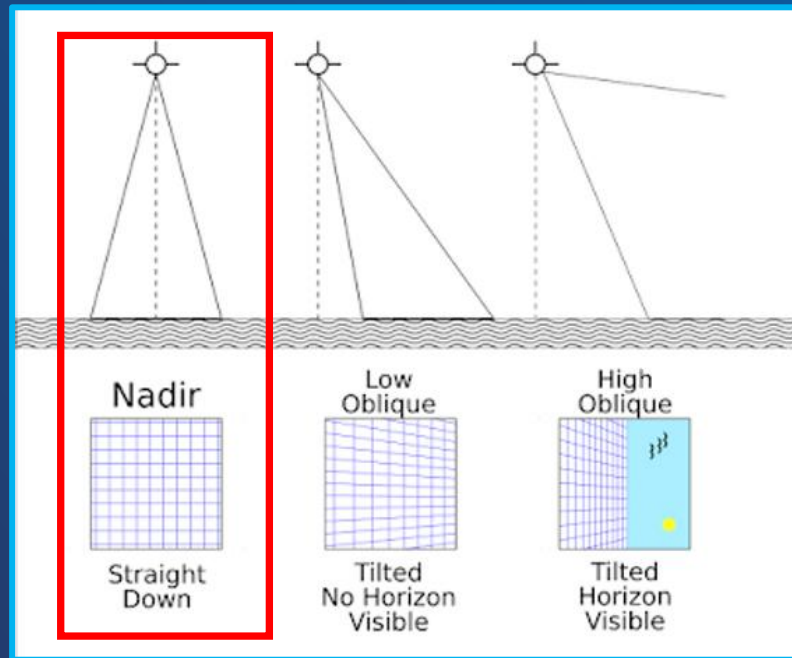
GIBS Overview

- **Web map service (WMS)** and Web Map Tile Services (WMTS) that provides access to global, full-resolution satellite imagery
 - WMS allows GIS software view map layers hosted online without downloading the underlying data
- Compliant with Open Geospatial Consortium (OGC) standards
- Backend of NASA Worldview interactive web application
 - Worldview is a free user-friendly data visualization tool for satellite imagery
 - Uses GIBS to rapidly retrieve its imagery for an interactive browsing experience

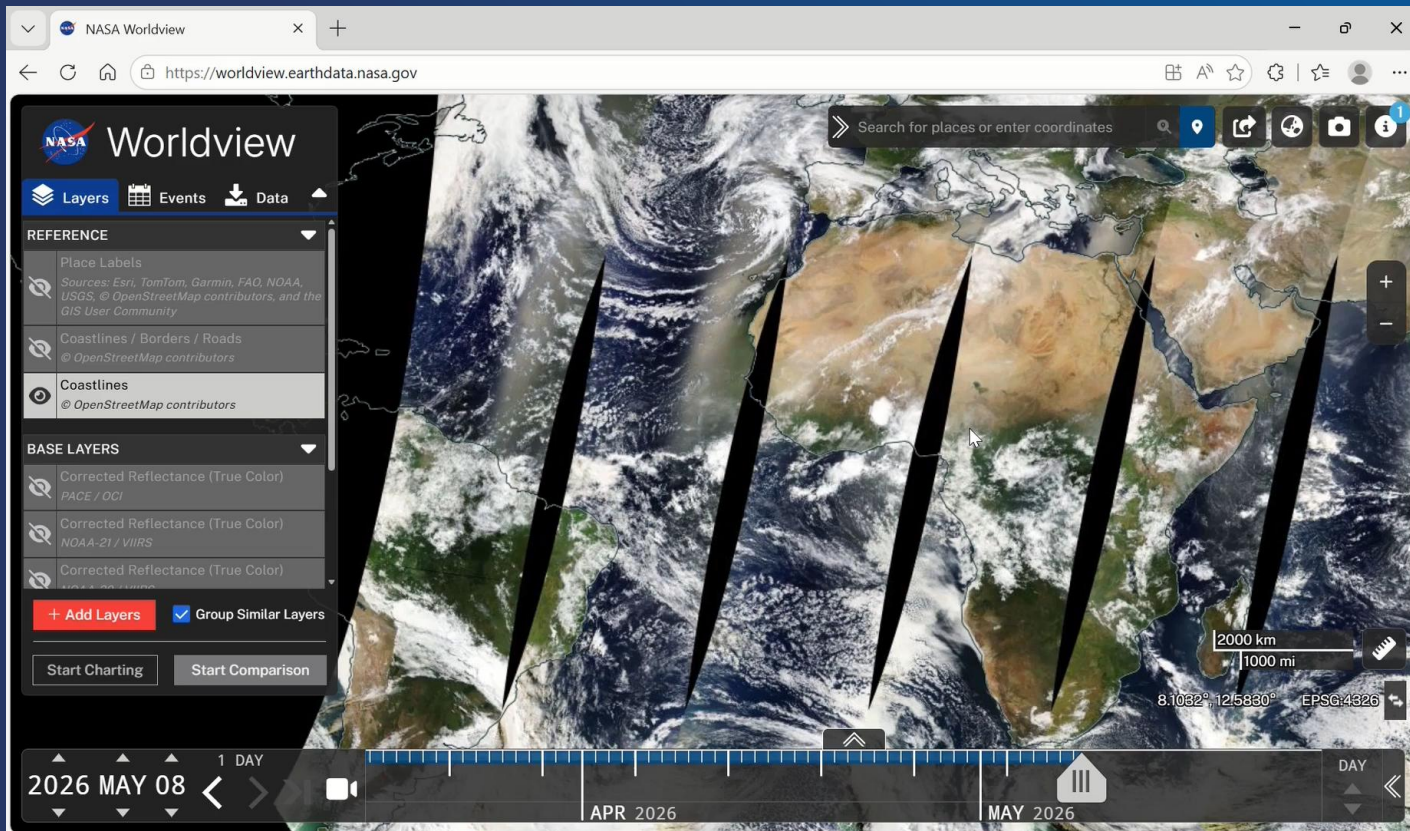


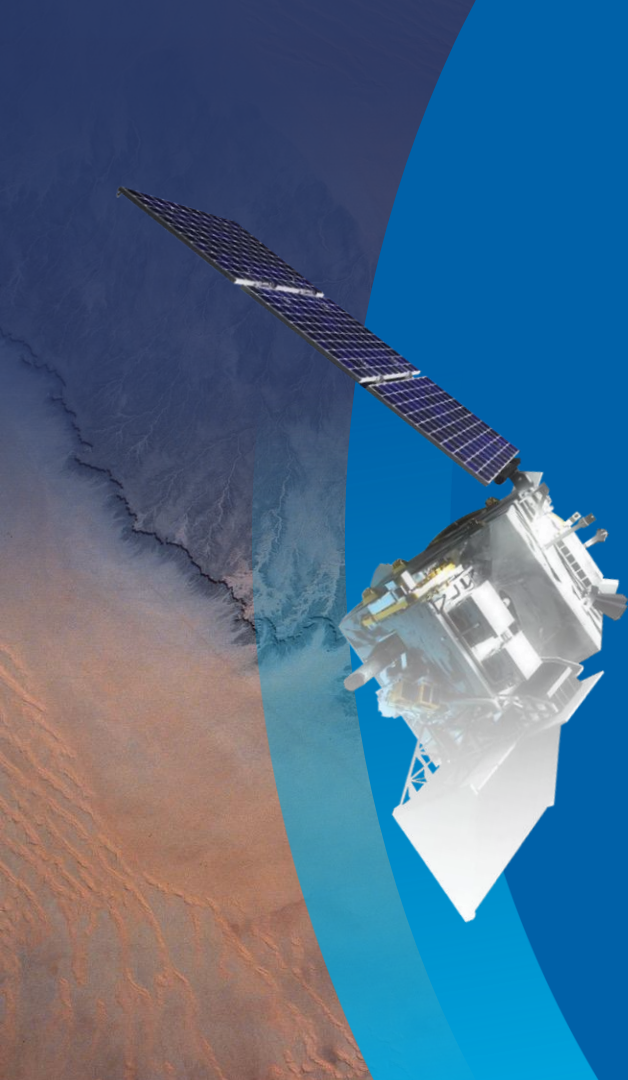
GIBS Workflow

- Find GIBS endpoints
- Access GIBS in ArcGIS Pro and ArcGIS Online
 - Nadir Bidirectional Reflectance Distribution Function (BRDF) Adjusted Reflectance
 - 30-meter Nadir BRDF-Adjusted Reflectance (NBAR)
 - Normalization that corrects for angular effects, producing data as if viewed from directly overhead
- Configure time enabled properties



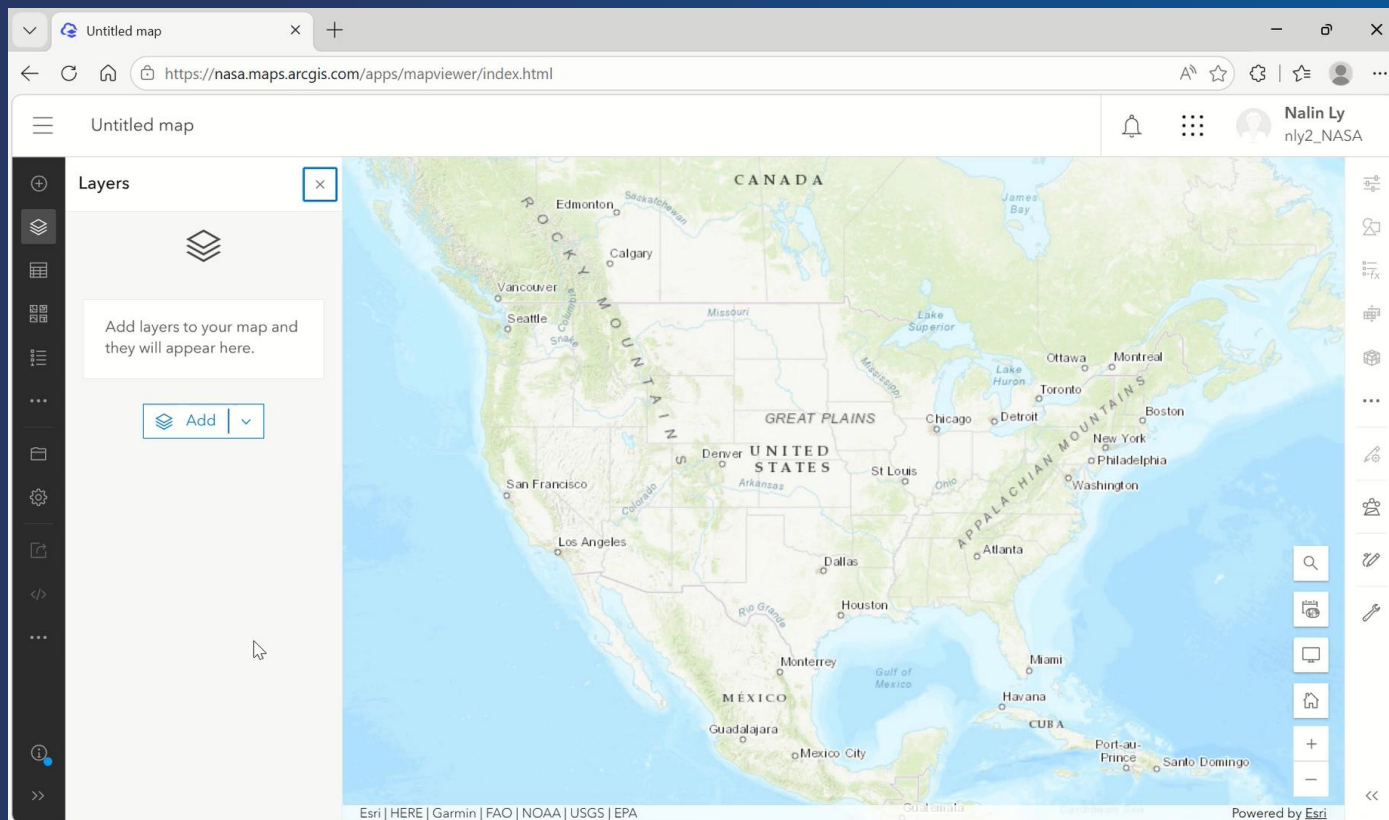
Workflow Demonstration





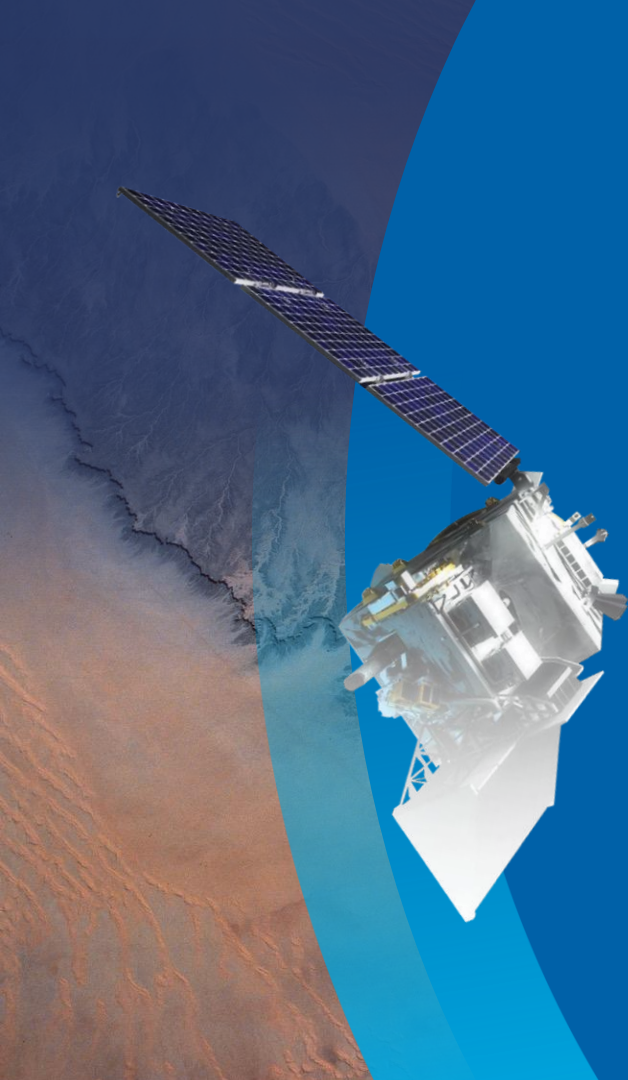
Demoing HLS: Accessing & Using the Global Imagery Browse Service (GIBS) in ArcGIS Online (AGOL)

Workflow Demonstration



Recap

- GIBS is the backend of Worldview
- Contains an extensive catalog of services (1,000+)
- Provides NRT, time-enabled data, and global coverage
- WMS can be used across compliant GIS clients
- WMS provides visualization only
- Useful for quick exploration and identifying areas or dates for further analysis



Demoing HLS: Accessing & Using the Earthdata GIS (EGIS) Image Service in ArcGIS Pro

Future Living Atlas of the
World (LAW) Layer

Enabling GIS at NASA: Earthdata GIS



Home Gallery Map Scene Groups Help

Earthdata GIS

Earthdata GIS

NASA's Earthdata Geographic Information System (EGIS) is a resource for distributing cloud-native, GIS-ready NASA Earth Science data, services, and resources. These include ArcGIS and Open Geospatial Consortium (OGC)-compliant raster and feature geospatial services*. To access to the full NASA Earth observation repository for data download, please visit [Earthdata Search](#).

EGIS is actively deploying new services, please visit the Gallery to see the full list of publicly available content.

Featured Layers

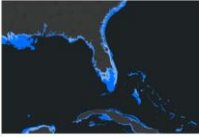
NASA authoritative data sets enabled as web services to be used in GIS. Layers are visual representations of a geographic dataset in a digital map environment. These layers, often referred to as services, reference a data source that defines how the data should be visualized and contain the underlying data properties and values.



POWER Annual Radiation
Imagery Layer
Open in Map Viewer



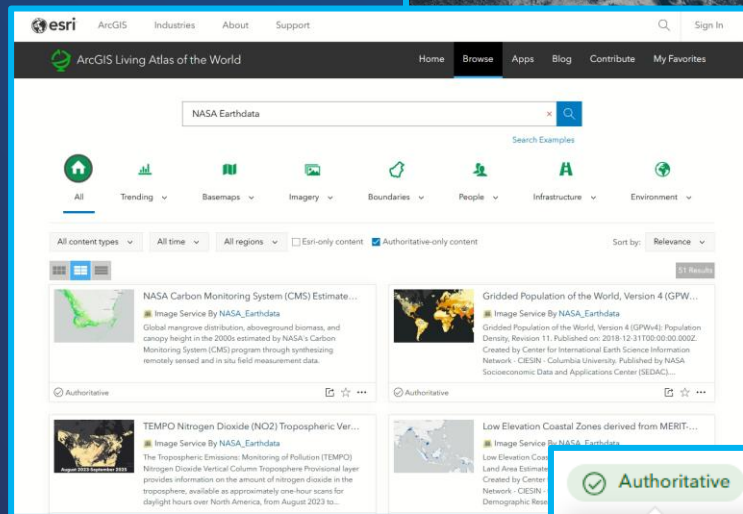
Tropospheric Emissions: Monitoring of Pollution (TEMPO) Version 03 Level 3 Gridded Nitrogen Dioxide (NO2) Tropospheric Vertical Column (Provisional)
Imagery Layer
Open in Map Viewer



Low Elevation Coastal Zone (LECD) Urban-Rural Population and Land Area Estimates, Version 3
Imagery Layer
Open in Map Viewer

A NASA-Managed
ArcGIS Enterprise...

...that enables the publishing of
authoritative NASA ES layers in the
Living Atlas of the World (LAW)



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NASA Earthdata

All Trending Basemaps Imagery Boundaries People Infrastructure Environment

All content types All time All regions ☐ Eri-only content ☒ Authoritative-only content Sort by: Relevance

11 Results



NASA Carbon Monitoring System (CMS) Estimate...
Image Service By NASA_Earthdata
Global mangrove distribution, aboveground biomass, and canopy height in the 2000s estimated by NASA's Carbon Monitoring System (CMS) program through synthesizing remotely sensed and in situ field measurement data.



Gridded Population of the World, Version 4 (GPWv4)...
Image Service By NASA_Earthdata
Gridded Population of the World, Version 4 (GPWv4) Population Density, Revision 11. Published on: 2018-12-31T00:00:00.000Z. Created by Center for International Earth Science Information Network - CIESIN - Columbia University. Published by NASA Socioeconomic Data and Applications Center (SEDAC).



TEMPO Nitrogen Dioxide (NO2) Tropospheric Ver...
Image Service By NASA_Earthdata
The Tropospheric Emissions: Monitoring of Pollution (TEMPO) Nitrogen Dioxide Vertical Column Troposphere Provisional layer provides information on the amount of nitrogen dioxide in the troposphere, available as approximately one-hour scans for daylight hours over North America, from August 2023 to...



Low Elevation Coastal Zones derived from MERIT...
Image Service By NASA_Earthdata
Low Elevation Coastal Zones derived from MERIT...

Authoritative

Living Atlas

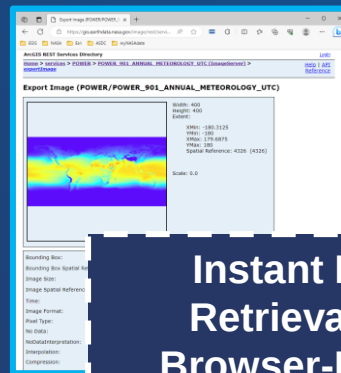
Recommended by NASA ArcGIS Online

Why these services?

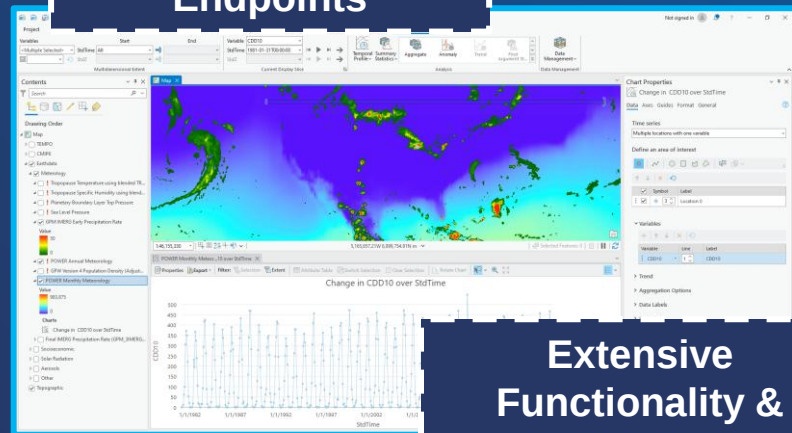
Image & feature services enable users to **reduce the time spent on data wrangling & pre-processing** in order to increase time for analysis. With these services, you can:

- Perform raster analytics including aggregates, differences, or classifications
- Perform raster functions including reprojection, orthorectification, clipping, application of complex image processing algorithms, & more

**Integration w/
Interactive Data-
Driven Apps**



**Instant Data
Retrieval via
Browser-Based
Endpoints**

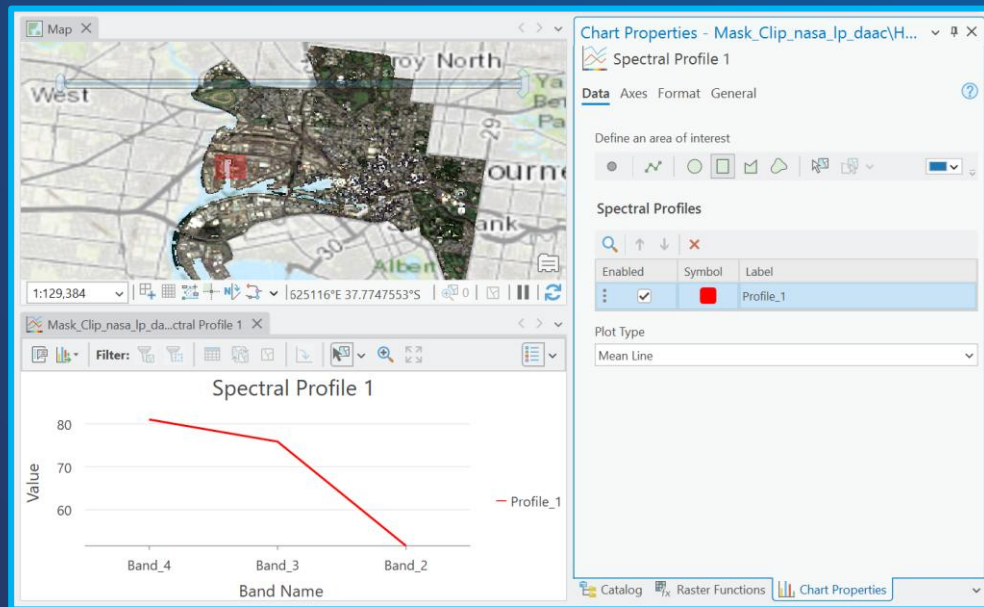


**Extensive
Functionality &
Analytic Capabilities**

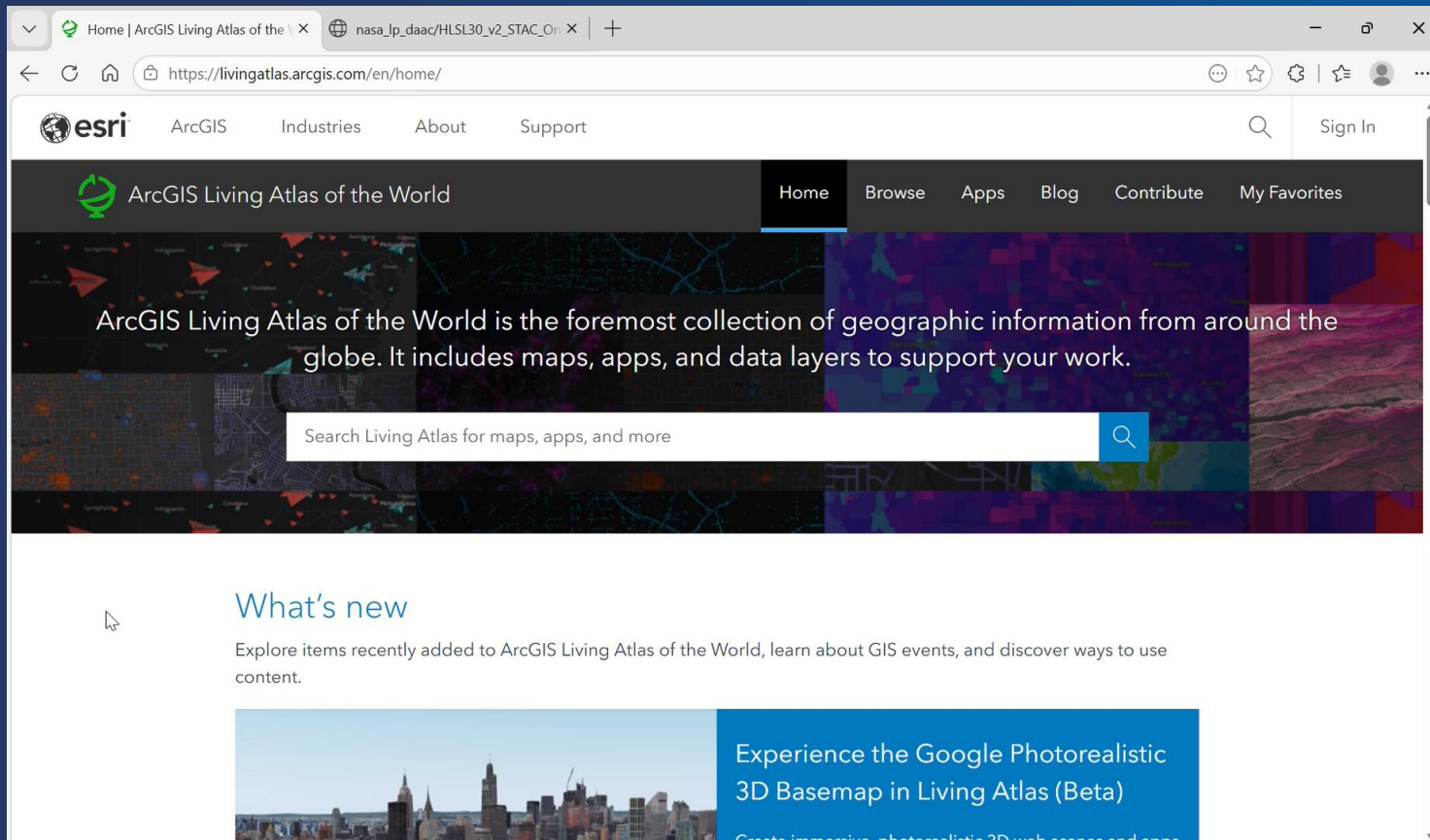
Workflow Outline

- Find an Image Service Endpoint
- Add an Image Service to ArcGIS Pro
- Clip to a Boundary
- Apply Mask
- Create a Spectral Profile

REMINDER: This demonstration will use a prototype service. The full HLS service is currently in development.



Workflow Demonstration



The screenshot shows a web browser window with the URL `https://livingatlas.arcgis.com/en/home/`. The browser's address bar and tabs are visible at the top. The page features the Esri logo and navigation links for ArcGIS, Industries, About, and Support. A secondary navigation bar includes Home, Browse, Apps, Blog, Contribute, and My Favorites. The main content area has a dark background with a collage of maps and a large text block stating: "ArcGIS Living Atlas of the World is the foremost collection of geographic information from around the globe. It includes maps, apps, and data layers to support your work." Below this text is a search bar with the placeholder text "Search Living Atlas for maps, apps, and more" and a magnifying glass icon. Further down, a section titled "What's new" includes a sub-header "Explore items recently added to ArcGIS Living Atlas of the World, learn about GIS events, and discover ways to use content." and a featured image of a city skyline. To the right of the image is a blue box with the text "Experience the Google Photorealistic 3D Basemap in Living Atlas (Beta)" and a partially visible line of text below it: "Create immersive, photorealistic 3D web scenes and apps."

Home | ArcGIS Living Atlas of the World | nasa_lp_daac/HLSL30_v2_STAC_On | +

`https://livingatlas.arcgis.com/en/home/`

esri ArcGIS Industries About Support

ArcGIS Living Atlas of the World

Home Browse Apps Blog Contribute My Favorites

ArcGIS Living Atlas of the World is the foremost collection of geographic information from around the globe. It includes maps, apps, and data layers to support your work.

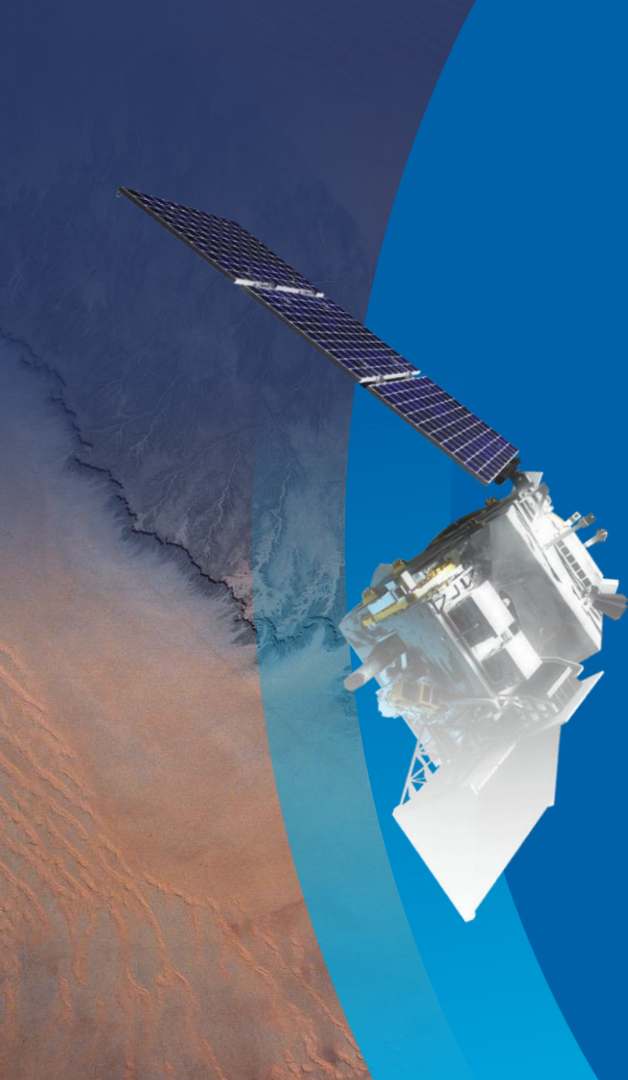
Search Living Atlas for maps, apps, and more

What's new

Explore items recently added to ArcGIS Living Atlas of the World, learn about GIS events, and discover ways to use content.

Experience the Google Photorealistic 3D Basemap in Living Atlas (Beta)

Create immersive, photorealistic 3D web scenes and apps



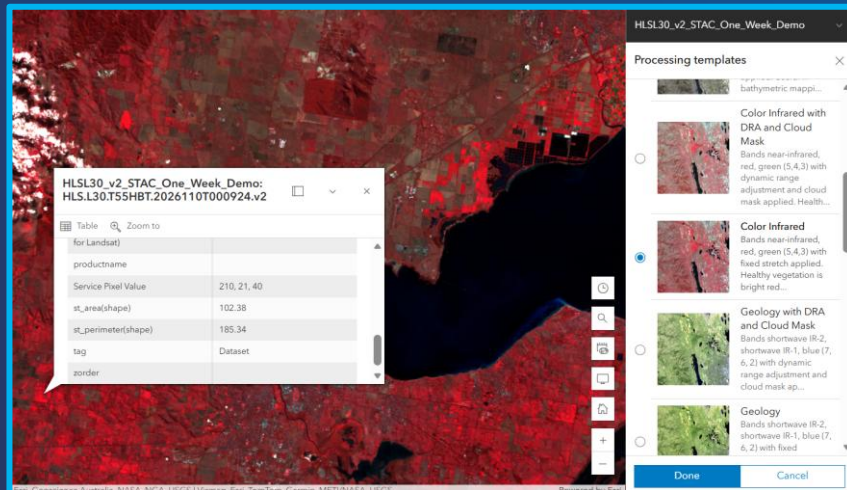
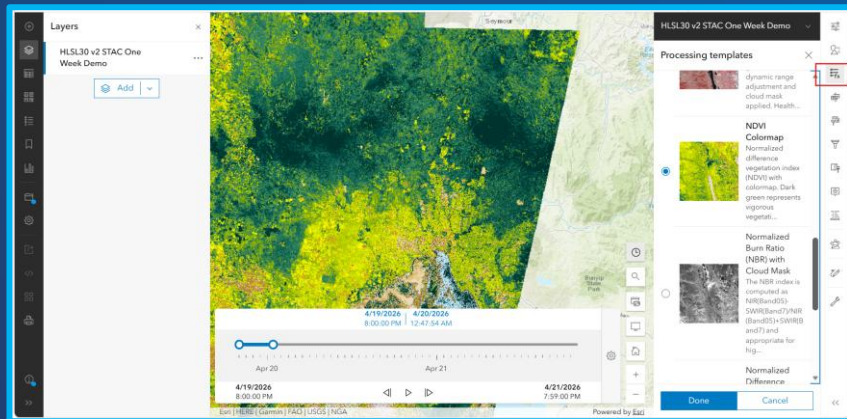
Demoing HLS: Accessing & Using the Earthdata GIS (EGIS) Image Service in ArcGIS Online

Future Living Atlas of the
World (LAW) Layer

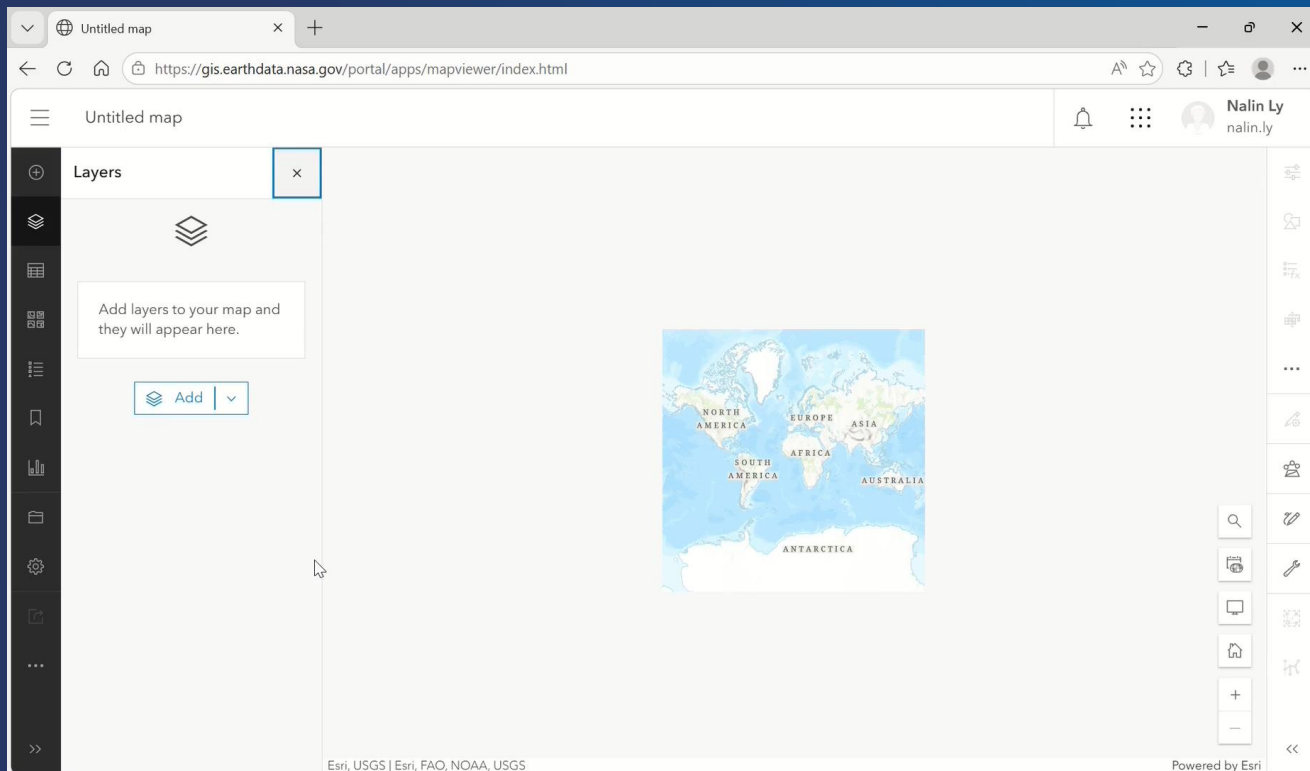
Workflow Outline

- Add Image Service to ArcGIS Online
- Configure time enabled properties
- Navigate the Image Collection Explorer
 - Filter, query, preview, and select granules
- Apply Processing Templates
- Identify Pixel Values

REMINDER: This demonstration will use a prototype service. The full HLS service is currently in development.

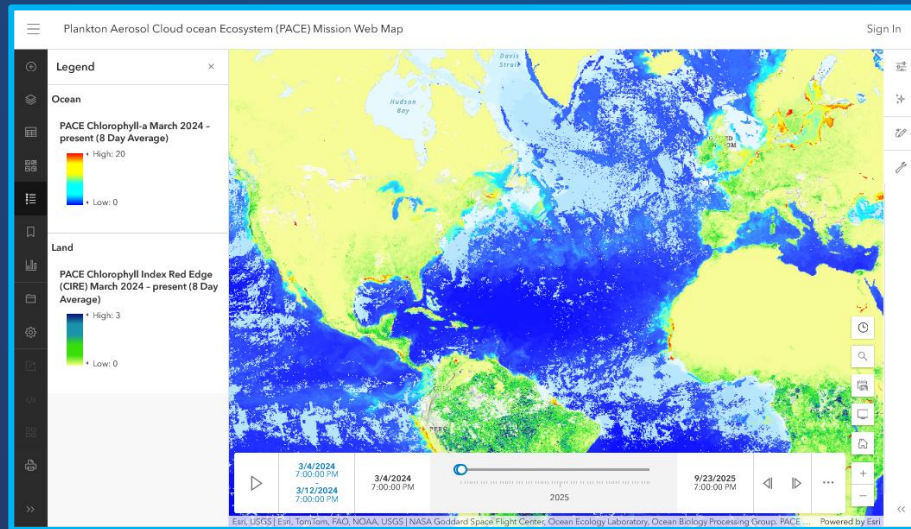


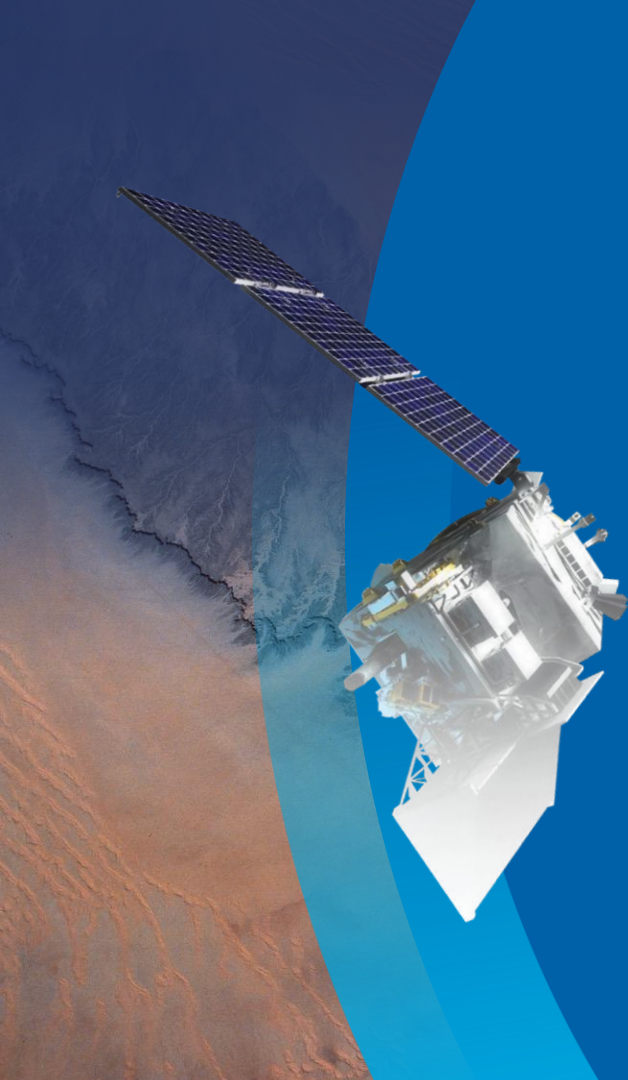
Workflow Outline



Recap

- Image services provide analytic capabilities to perform raster functions using the underlying data collection
 - EGIS services provide REST endpoints to use in a variety of GIS clients/tools
 - Analytic tools in ArcGIS Online use Credits
- Image service will be in sync with the official repository of NASA data
- Full HLS production service is in the works
- Plan to nominate to Esri's Living Atlas of the World to improve discoverability





GIS Tools

Esri's Landsat and
Sentinel Viewer
applications



EXPLORE

SWIPE

ANIMATE

ANALYZE

DYNAMIC

FIND A SCENE

DYNAMIC VIEW

In the current map display, the most recent and most cloud free scenes from the Landsat archive are prioritized and dynamically fused into a single mosaicked image layer. As you explore, the map continues to dynamically fetch and render the best available scenes.

To select an individual scene for a specific date, try the [FIND A SCENE](#) mode.

INTERESTING PLACES



RENDERER





EXPLORE

SWIPE

ANIMATE

ANALYZE

LEFT
2025-10-13
MNDWI

RIGHT
2025-10-18
MNDWI

SCENE SELECTION

2015
J F M A M J J A S O N D
Oct 18, 2015
MISSION ALL
CLOUD 15%

SCENE INFORMATION

Scene Id LC08_L2SP_138045_201510...
Satellite Landsat 8
Sensor OLI/TIRS combined
Correction L2SP
Path/Row 138, 45
Acquired Oct 18, 2015
Sun Elevation 53.206
Sun Azimuth 145.835
Cloud Cover 11%

RENDERER

Natural Color

Color IR

Short-wave IR

Agriculture

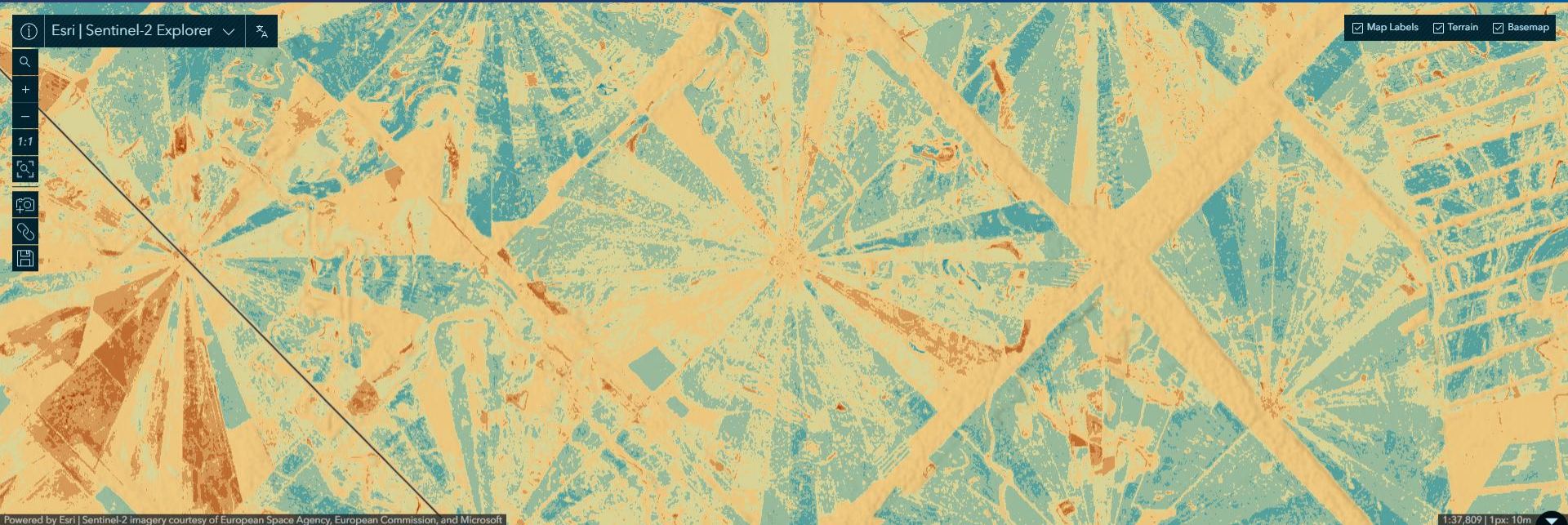
Urban

NDVI Colonized

Surface Temp

MNDWI

NDMI



EXPLORE

INDEX
mask

SCENE A
2025-06-02

SWIPE

TEMPORAL
profile

SCENE B
2026-01-06

ANIMATE

SPECTRAL
profile

VIEW CHANGE
Scene A - Scene B

ANALYZE

CHANGE
detection

SCENE SELECTION

PAST 12 MONTHS 

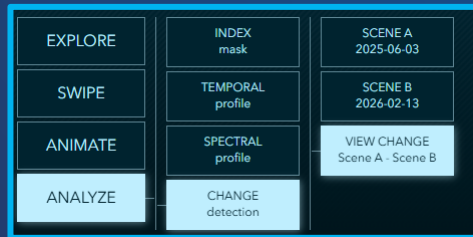
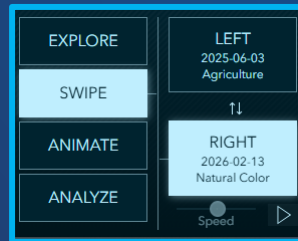
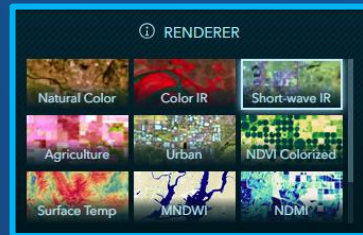
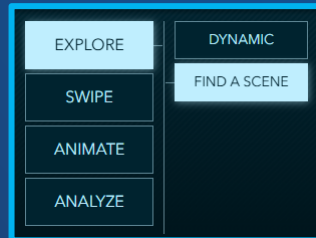
Jan 06, 2026 

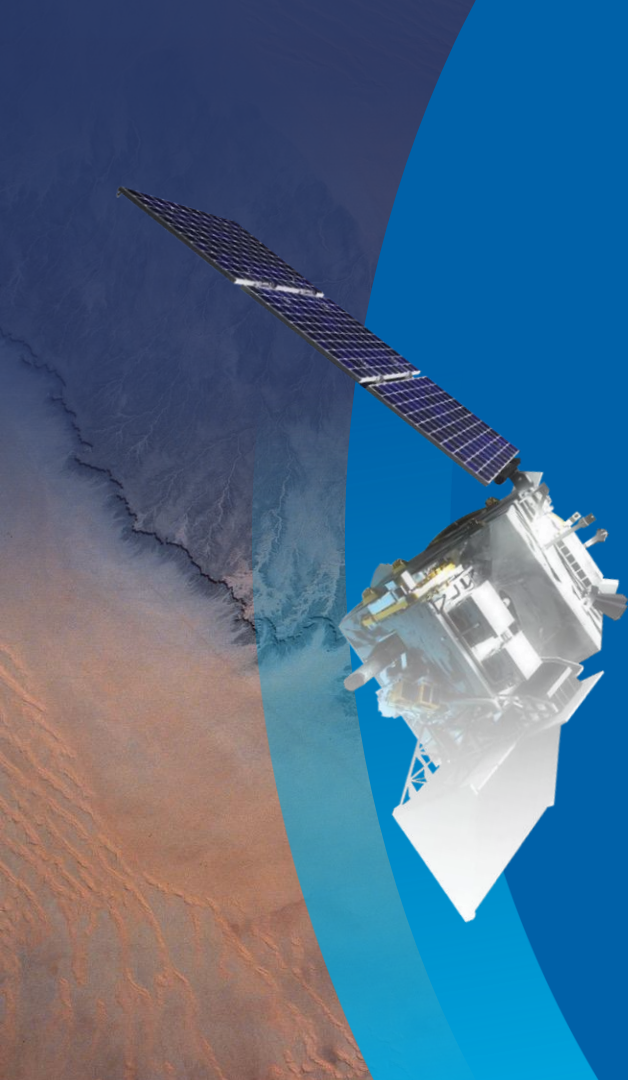
CLOUD 50%  



Capabilities

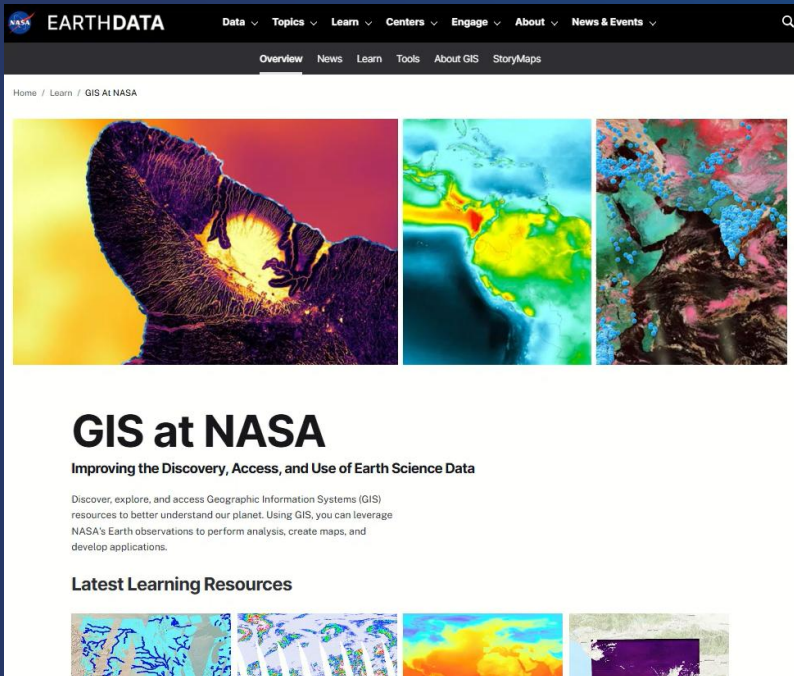
- Interactive Find a Scene by location, sensor, time, & cloud cover
- Select imagery renderings (e.g. SWIR to visualize forest burn scars)
- On-the-fly multispectral band combinations & indices
- Visual change by time, & comparison of different renderings, with Swipe & Animation modes
- Dynamic statistical change analysis
- Additional analysis to include threshold masking & temporal profiles





NASA Earth Science GIS GIS Resources

Our GIS Homepage



EARTHDATA Data Topics Learn Centers Engage About News & Events

Overview News Learn Tools About GIS StoryMaps

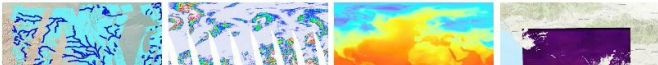
Home / Learn / GIS at NASA

GIS at NASA

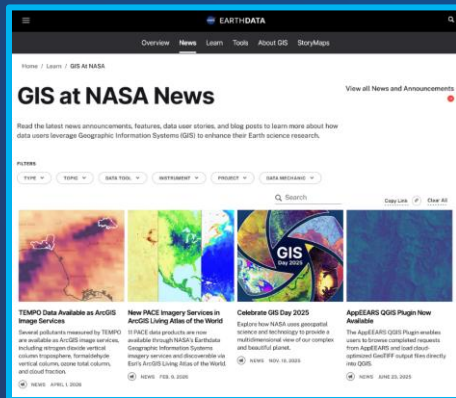
Improving the Discovery, Access, and Use of Earth Science Data

Discover, explore, and access Geographic Information Systems (GIS) resources to better understand our planet. Using GIS, you can leverage NASA's Earth observations to perform analysis, create maps, and develop applications.

Latest Learning Resources



<https://earthdata.nasa.gov/learn/gis>



EARTHDATA Overview News Learn Tools About GIS StoryMaps

Home / Learn / GIS at NASA

GIS at NASA News

Read the latest news announcements, features, data user stories, and blog posts to learn more about how data users leverage Geographic Information Systems (GIS) to enhance their Earth science research.

Filter by: TYPE, TOPIC, DATA TOOL, INSTRUMENT, PROJECT, DATA MESSAGE, Date Last, View All

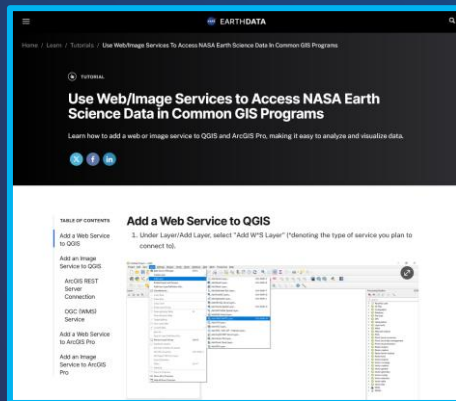
TEMPO Data Available as ArcGIS Image Services
Several products measured by TEMPO are available as ArcGIS Image Services, including nitrogen dioxide vertical column, tropospheric, and surface-level vertical column, as well as total column, and cloud fraction.

New PACE Imagery Services in ArcGIS Living Atlas of the World
PACE data products are now available through NASA's Earthdata Geographic Information Systems Imagery services and discoverable in Earth's Living Atlas of the World.

Celebrate GIS Day 2025
Explore how NASA uses geospatial science and technology to provide a multidimensional view of our complex and beautiful planet.

AppEARS QGIS Plugin Now Available
The AppEARS QGIS Plugin enables users to browse computer resources from AppEARS and load them as layers in QGIS.

NEWS APRIL 16, 2025 NEWS APRIL 16, 2025 NEWS APRIL 16, 2025 NEWS APRIL 23, 2025



EARTHDATA Home / Learn / Tools / Use Web/Image Services to Access NASA Earth Science Data in Common GIS Programs

Use Web/Image Services to Access NASA Earth Science Data in Common GIS Programs

Learn how to add a web or image service to QGIS and ArcGIS Pro, making it easy to analyze and visualize data.

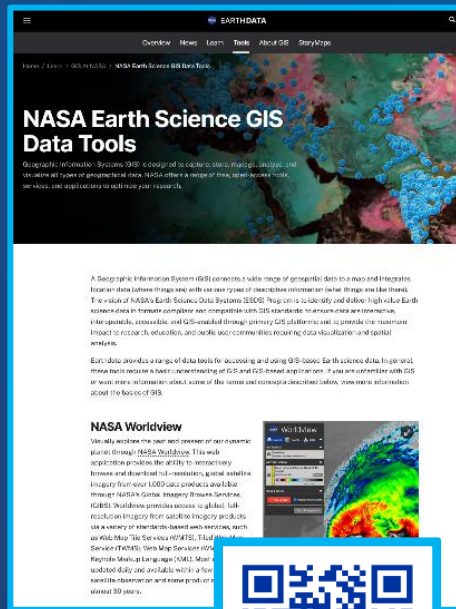
Add a Web Service to QGIS

1. Under Layer/Add Layer, select "Add WFS Layer" (denoting the type of service you plan to connect to).

2. In the Add New Layer dialog, select "WFS" under the "Type" dropdown.

3. In the "URL" field, enter the URL of the WFS service you want to add.

4. Click "OK" to add the layer.



EARTHDATA Overview News Learn Tools About GIS StoryMaps

Home / Learn / GIS at NASA / NASA Earth Science GIS Data Tools

NASA Earth Science GIS Data Tools

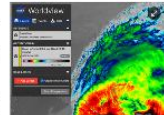
Geographic Information Systems (GIS) is designed to capture, store, manipulate, analyze, and visualize all types of geospatial data. NASA offers a range of free, open-source tools, webinars, and opportunities to help you learn more.

A Geographic Information System (GIS) converts a wide range of geospatial data to a map and integrates location data with other data sets to provide a visual representation of the data. It can be used to analyze and visualize data from various sources, including satellite imagery, ground-based observations, and historical data. GIS is used in a wide range of fields, including urban planning, environmental management, and disaster response.

Earthdata provides a range of data tools for accessing and using QGIS-based Earth science data. To get started, users must have a basic understanding of GIS and QGIS-based applications. If you are unfamiliar with QGIS or want more information about some of the tools and resources described below, visit the information about the basics of GIS.

NASA Worldview

Worldview is the web-based version of our data visualization tool. This web application provides the ability to interactively browse and visualize real-time satellite imagery from over 1,000 data products available through NASA's Earth Science Data Archive (ESDA). Worldview provides access to global, full-resolution imagery from satellite imagery products via a variety of standards-based web services, such as Web Map Tile Service (WMTS), Tile Map Service (TMS), and Web Feature Service (WFS). Worldview also provides access to a variety of other data products, including satellite imagery, ground-based observations, and historical data.




Which of the access methods you saw today are you most likely to integrate into your workflow?

How interested are you in emerging technologies, such as STAC and Cloud Connections?

Would a Viewer application be valuable and useful?

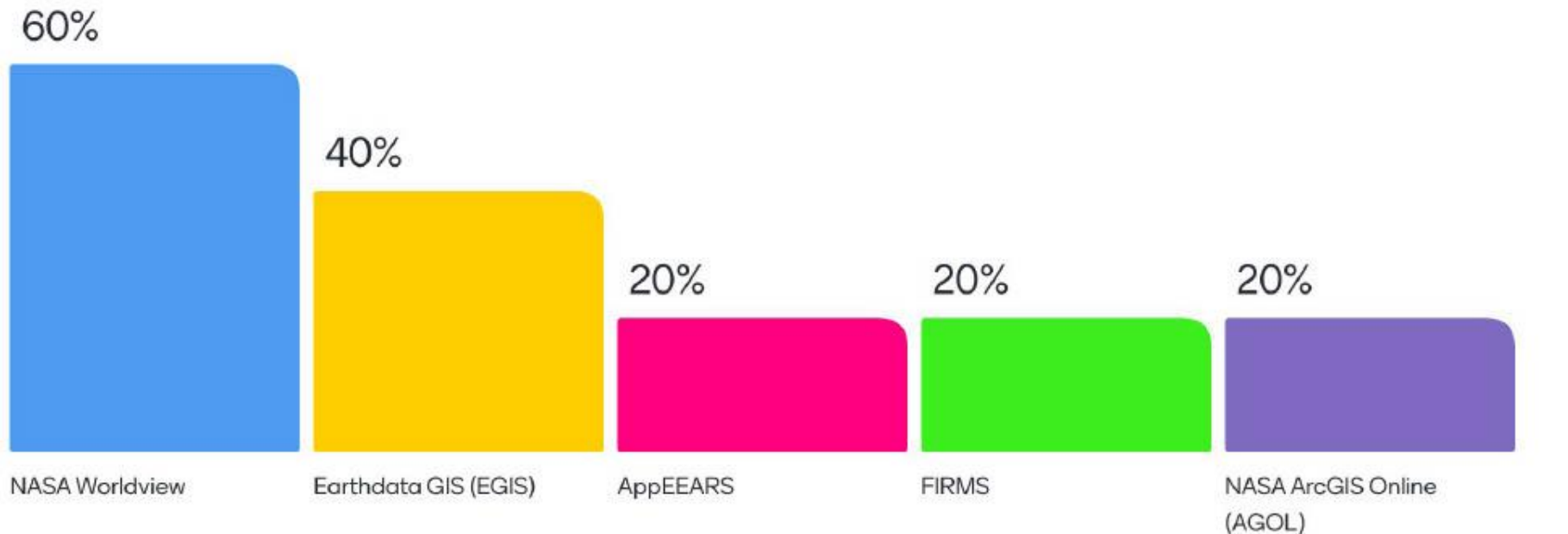
What are your requirements for using HLS data in GIS tools?

Are there other NASA data that you'd like to see as image service?



Day 1: HLS in Various Environments - ESRI

(1/5) Have you used any of the following GIS NASA tools or services? (select all that apply)



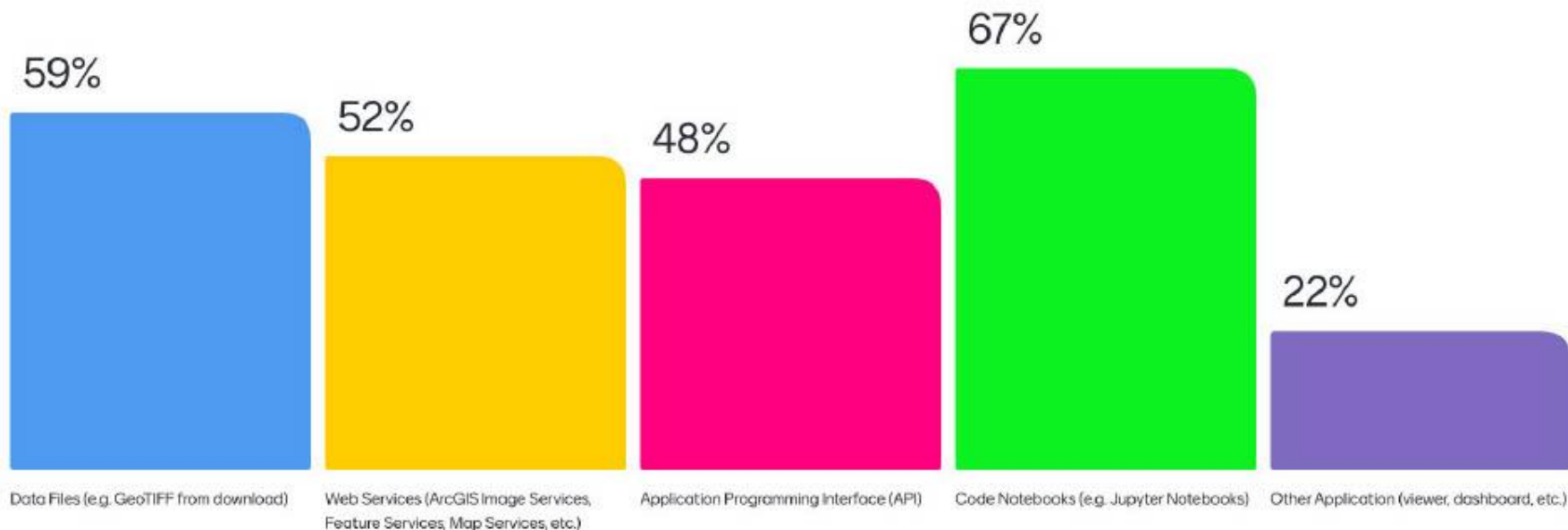
3



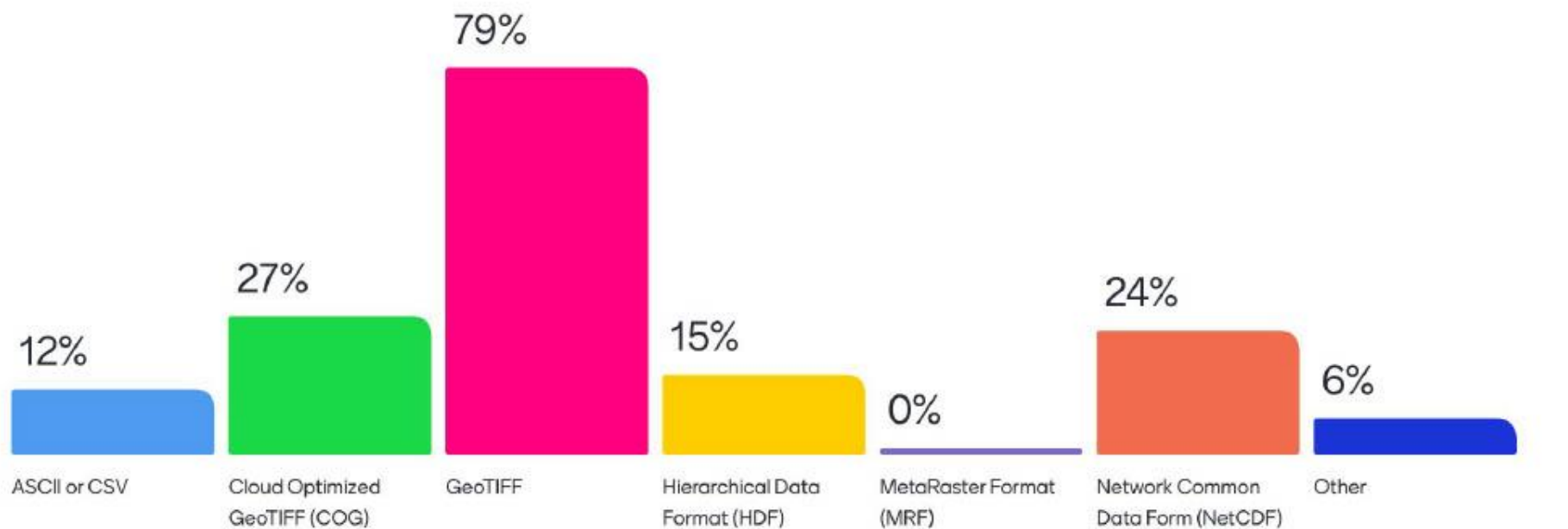
25 / 25



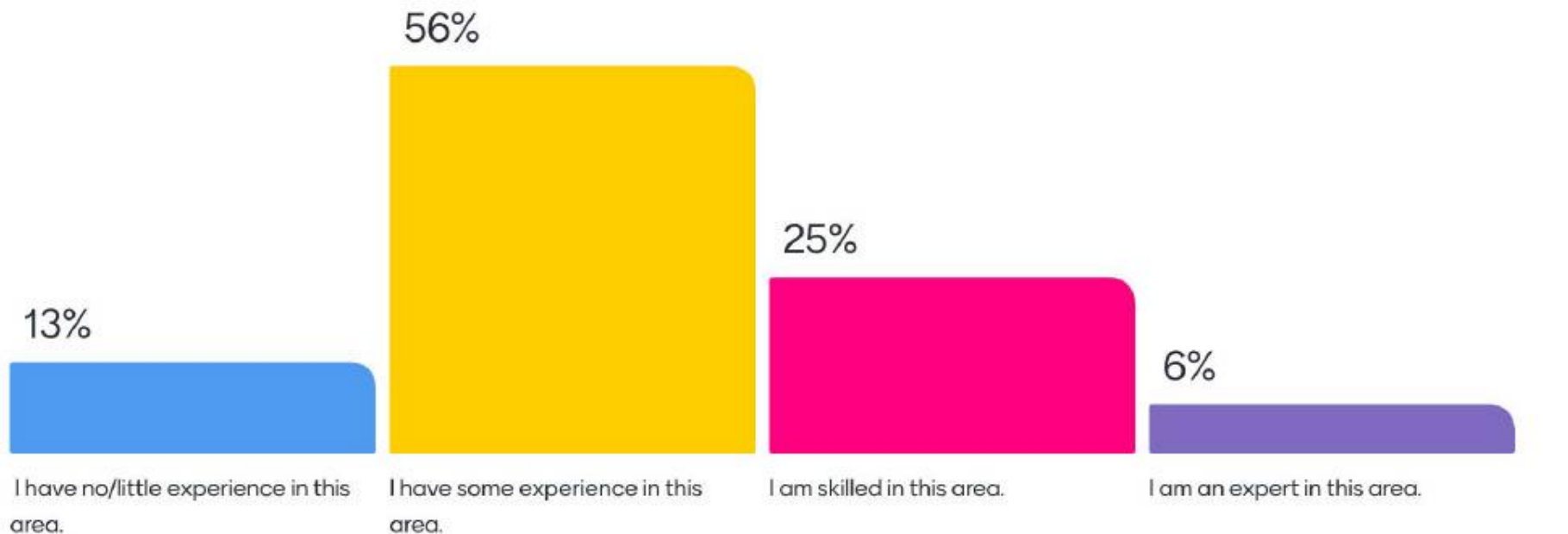
(2/5) How do, or would, you prefer working with NASA data?



(3/5) Which raster data formats do you prefer to work with? (select all that apply)

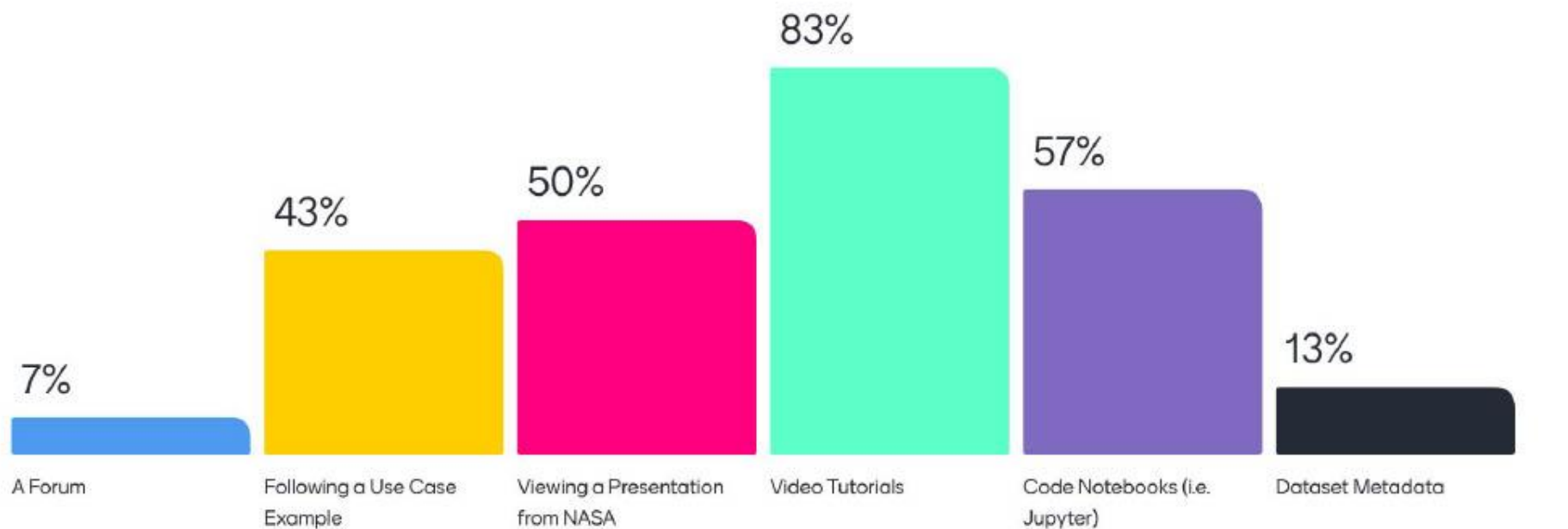


(4/5) How would you rate your knowledge or skills working with data using programmatic languages (Python, R, etc.)?





(5/5) How do you prefer to learn about using NASA data in GIS?





HLS in Various Environments

Questions from the Audience

What other **questions do the participants have** that we haven't answered yet?

What else could the presenters help with?

Participants, please post your questions in the Webex Q&A



Tuesday May 12, 2026 starting at 4:40 pm CDT

Session 4: Resources, Feedback, & Next Steps

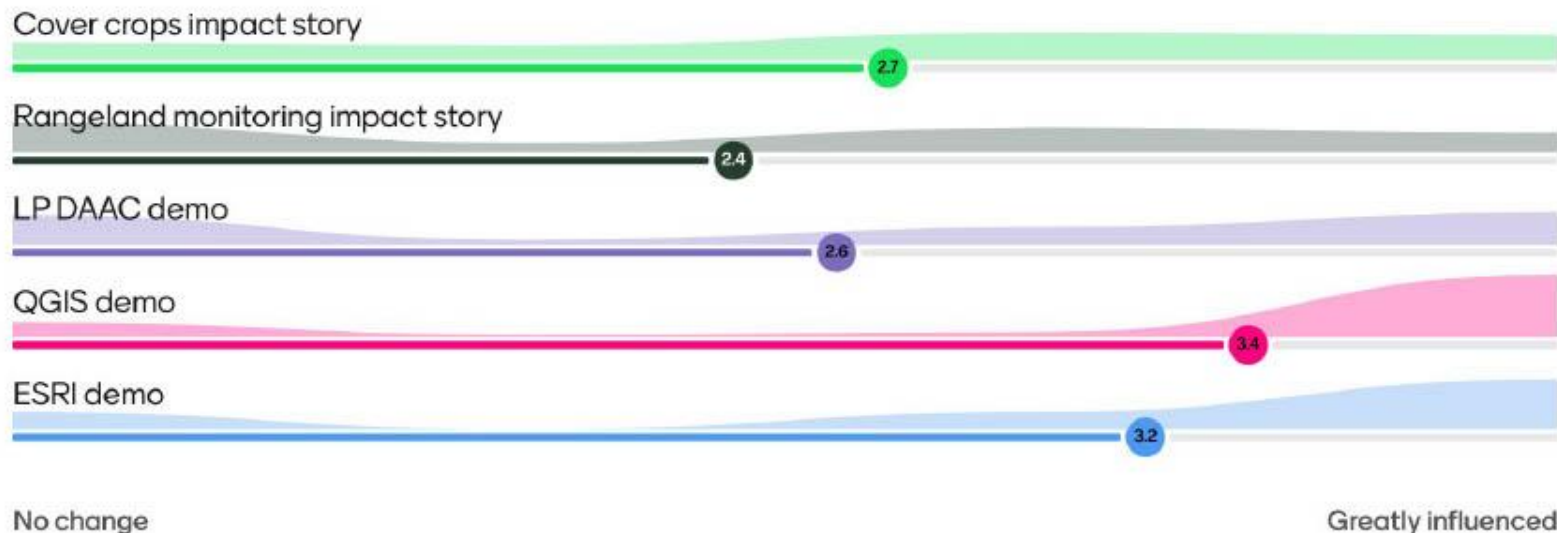
Goals:

- Summarize Day 1 and provide resources for continued feedback
- Preview Day 2 and post-workshop opportunities

Time (CDT)	Topics	Format	Speaker
4:40 - 4:50 (10 min)	Summary, Resources, & Next Steps	 Presentation & Interactive	Stephanie Jiménez, NSITE & UAH



(1/1) Rank how today's sessions influenced your interest or further use of HLS



Day 1 Summary: Demonstrating meeting community needs and expanding on functionalities and collaborations

Access & Distribution

Research, Analyses, & Application

Impact & Feedback

NSITE &
Solution
Teams

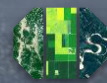
NASA
Worldview

LP
DAAC

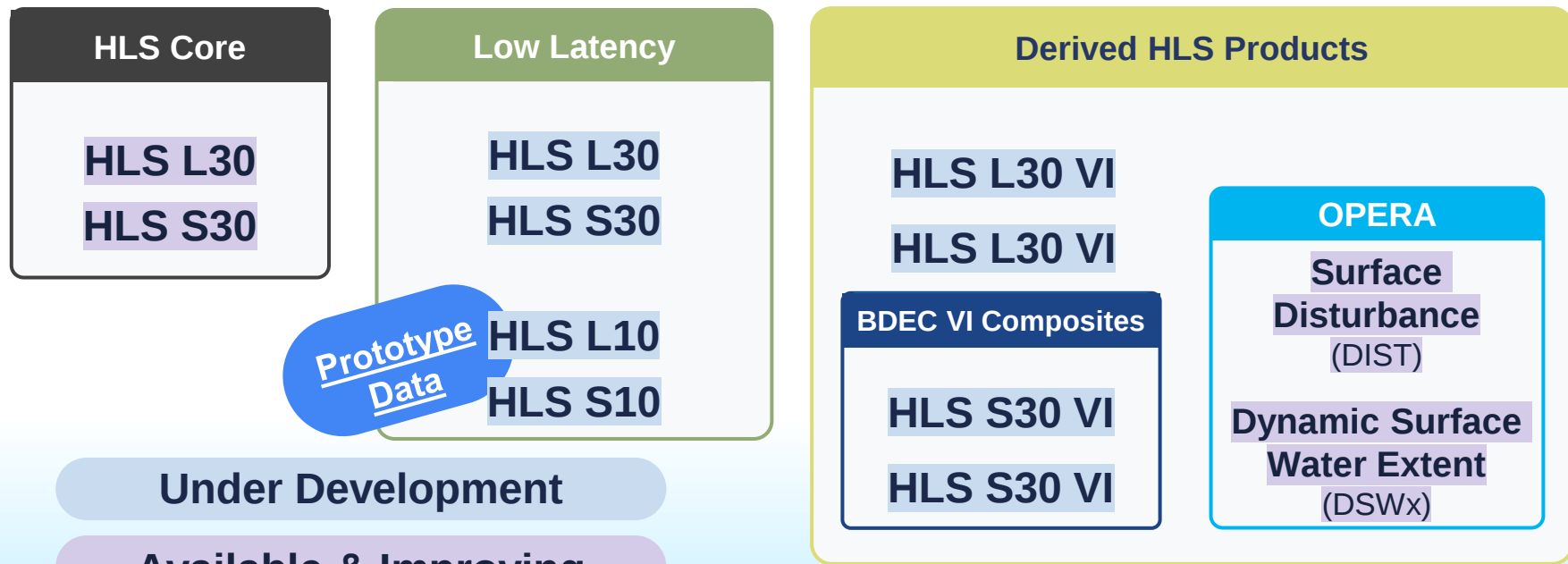
ESRI
Suite

QGIS
Plugins

USDA
ARS



Summary of HLS Related Products

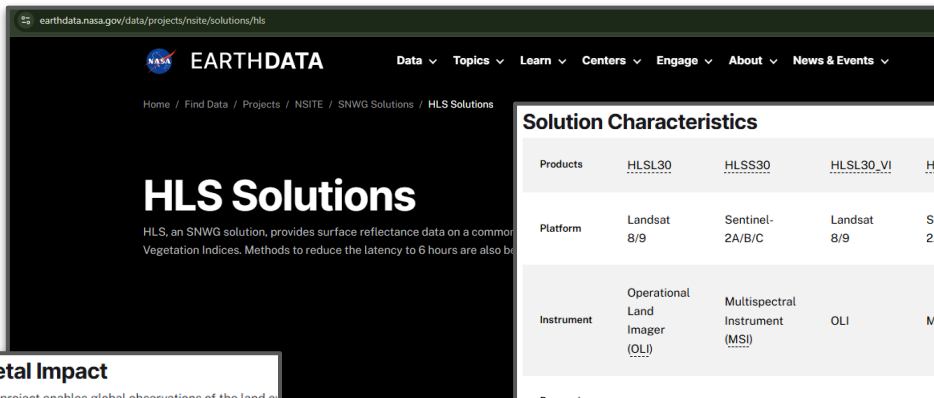


Products under development are open to iterative feedback and co-design with users.

NSITE LATEST ON HLS

The latest NASA led information and updates

- NSITE led HLS solution background
- Status for development and production for HLS core, HLS LL, HLS VI, HLS 10 m, and derived products
- Data fact sheets, and trainings
- Examples of societal impact
- Updates on workshops and open meetings



Societal Impact

The HLS project enables global observations of the land use and cover of land surface changes, disaster response, and agriculture. Considering the widespread usage of HLS among federal agencies, as a 6 hour latency — will also enhance agencies' ability to respond to spills, etc.

Below are "Data in Action" stories for HLS that demonstrate societal impact.

- SNWG's HLS product benefits USDA's adaptive range management
- USDA Uses HLS, an SNWG solution, Operationally to Track Crop Emergence in the Midwest Region
- USDA Uses HLS, an SNWG solution, to Track Crop Emergence in the Midwest Region

Solution Resources

Need help using this solution? For more information about HLS, visit the following resources:

- HLS data: [HLSS30](#), [HLSL30](#)
- HLS-VI data: [HLSS30_VI](#), [HLSL30_VI](#)
- HLS: SNWG Solution Fact Sheet
- HLS-VI: SNWG Solution Fact Sheet
- Training Resources: HLS
- HLS Learning Resources
- Training Resources: HLS-VI

Workshops and Open Meetings

Title and Registration Link	Description

Background

The Satellite Needs Working Group (SNWG) is a multi-agency effort to develop and implement a common set of surface reflectance products from Landsat 8/9 and Sentinel-2 (HLS) surface reflectance products (L30: Landsat and Sentinel-2) which include atmospheric compensation, globally in August 2021.

Surface reflectance information is routinely used for disaster response, and season health as inferred from "vegetation indices" that relate multiple HLS products, value, time series, or anomaly. Agencies interested in this information should contact the SNWG.

Solution Characteristics

Products	HLSS30	HLSS30_VI	HLSS30_VI	HLSS30_LL	HLSS30_LL
Platform	Landsat 8/9	Sentinel-2A/B/C	Landsat 8/9	Sentinel-2A/B/C	Sentinel-2A/B/C
Instrument	Operational Land Imager (OLI)	Multispectral Instrument (MSI)	OLI	MSI	OLI
Processing Level	3	3	4	4	1C
Temporal Coverage	April 11, 2013 - Present	Nov. 29, 2015 - Present	April 11, 2013 - Present	Nov. 29, 2015 - Present	To Be Determined (TBD)
Temporal Resolution	1.6 days	1.6 days	1.6 days	1.6 days	Daily
Latency	2 days	2 days	2 days	2 days	Less than 6 hours
Spatial Coverage	Global Land (excludes Antarctica)	Global Land (excludes Antarctica)	Global Land (excludes Antarctica)	Global Land (excludes Antarctica)	Global Land (excludes Antarctica)
Spatial Resolution	30 m	30 m	30 m	30 m	30 m
Data Format	Cloud-optimized GeoTIFF	Cloud-optimized GeoTIFF	Cloud-optimized GeoTIFF	Cloud-optimized GeoTIFF	Cloud-optimized GeoTIFF

<https://www.earthdata.nasa.gov/data/projects/nsite/solutions/hls>

Earthdata HLS Page

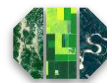
Expanding information on the data, tools, and learning

- HLS background
- Technical and science specifications for each HLS product
- Data access methods and tools for each HLS product
- News, stories, contact & Meet the Team
- Learning resources across NASA programs and other partners
- Publications & citations

The collage displays several key pages from the Earthdata HLS website:

- HLS News:** Features articles, resources, and filters for type and topic.
- HLS Data Access and Tools:** Provides information on exploring Harmonized Landsat and Sentinel-2 (HLS) data tools.
- HLS Learning Resources:** Offers webinars, tutorials, data recipes, and more to help users work with HLS. It includes a list of external resources and a search bar.
- HLS Datasets:** Lists various datasets such as "HLS Landsat Operational Land Imager Surface Reflectance and TOA Brightness Daily Global 30m v1.5" and "HLS Sentinel-2 Multi-spectral Instrument Surface Reflectance Daily Global 30m v2.0".
- HLS Data Tools:** Includes a table of tools like AppEARS and LP DAAC Data Prep Scripts.
- ALGORITHMS Overview:** Describes the HLS harmonization process, which takes advantage of the similarity in spectral bandpasses, spatial resolutions, and overpass time between Landsat 8/9 and Sentinel 2A/B/C satellites. It includes a flowchart titled "HLS Processing" showing the steps from input data to the final HLS product.

<https://www.earthdata.nasa.gov/data/projects/hls>



NASA Led

Summary of Ways to Access & Interact with HLS Data

Source	Resources	Available Products
Earthdata	Earthdata Search: HLS L30 v2.0 HLS S30 v2.0 HLS L30 VI HLS S30 VI and Earthdata GIS	
LP DAAC	HLS LP DAAC LP DAAC HLS Github Cloud-Native HLS Data Example	HLS L30 HLS S30
Code / Cloud Resources	SpatioTemporal Asset Catalog (STAC) API Modelling with HLS in R L30 AWS bucket S30 AWS bucket Access NASA Harmony	HLS L30 VI HLS S30 VI
Other NASA	Worldview tutorials The Application for Extracting and Exploring Analysis Ready Samples AppEEARS	



Commercial & Community Led

Summary of Ways to Access & Interact with HLS Data

Source	Resources	Available Products
Google Earth Engine	HLS L30 v2.0 HLS S30 v2.0	HLS L30 HLS S30 <i>DSWx-HLS (OPERA)</i>
Microsoft	Planetary Computer	HLS L30 HLS S30
ESRI	OPERA ArcGIS toolbox Prithvi Burn Scar Deep Learning Package Prithvi Crop Classification Deep Learning Package	HLS L30 HLS S30
Planet	Community page HLS via Planet	HLS L30 HLS S30
QGIS	OPERA plugins Landsat water mask plugin	HLS L30 HLS S30 <i>DSWx-HLS</i> <i>DIST-ALERT-HLS</i> <i>DIST-ANN-HLS</i>



Stay Connected to HLS Developers and the Community

Information Exchange and Reciprocal Communication

Community Forums

[EarthData Forum](#) | [Google Earth Engine Developers Group](#) | [Planet Insights Platform \(community page\)](#) | [ESRI Living Atlas of the World community](#) | [Microsoft Planetary Computer \(discussions\)](#)



Stay Connected About HLS

[Sign-up](#) for occasional HLS related emails

Direct Contact

About HLS (meet the team) page on [Earthdata website](#)



NSITE Newsletter

[Sign-up](#) for NSITE's quarterly email newsletter

<https://bit.ly/4uBbuvz>





*Post-Evaluation
(~3 min)*

NASA Earth | ***Thank you!***