



EARTH SCIENCE
DATA SYSTEMS

Access NASA Data for Your Earth Science Research Applications... in the Peace Garden State

Elizabeth Joyner
Community Coordinator
Earth Science Data Systems
NASA Headquarters



About Me...

1 From SC

2 Space Grant Scholarship Awardee

3 Former Employee of Space Grant

4 Former Teacher & Researcher

5 Proud Mom of two

5 Girl Scout Troop Leader

5 New to ES&DS



EARTH SCIENCE
DATA SYSTEMS

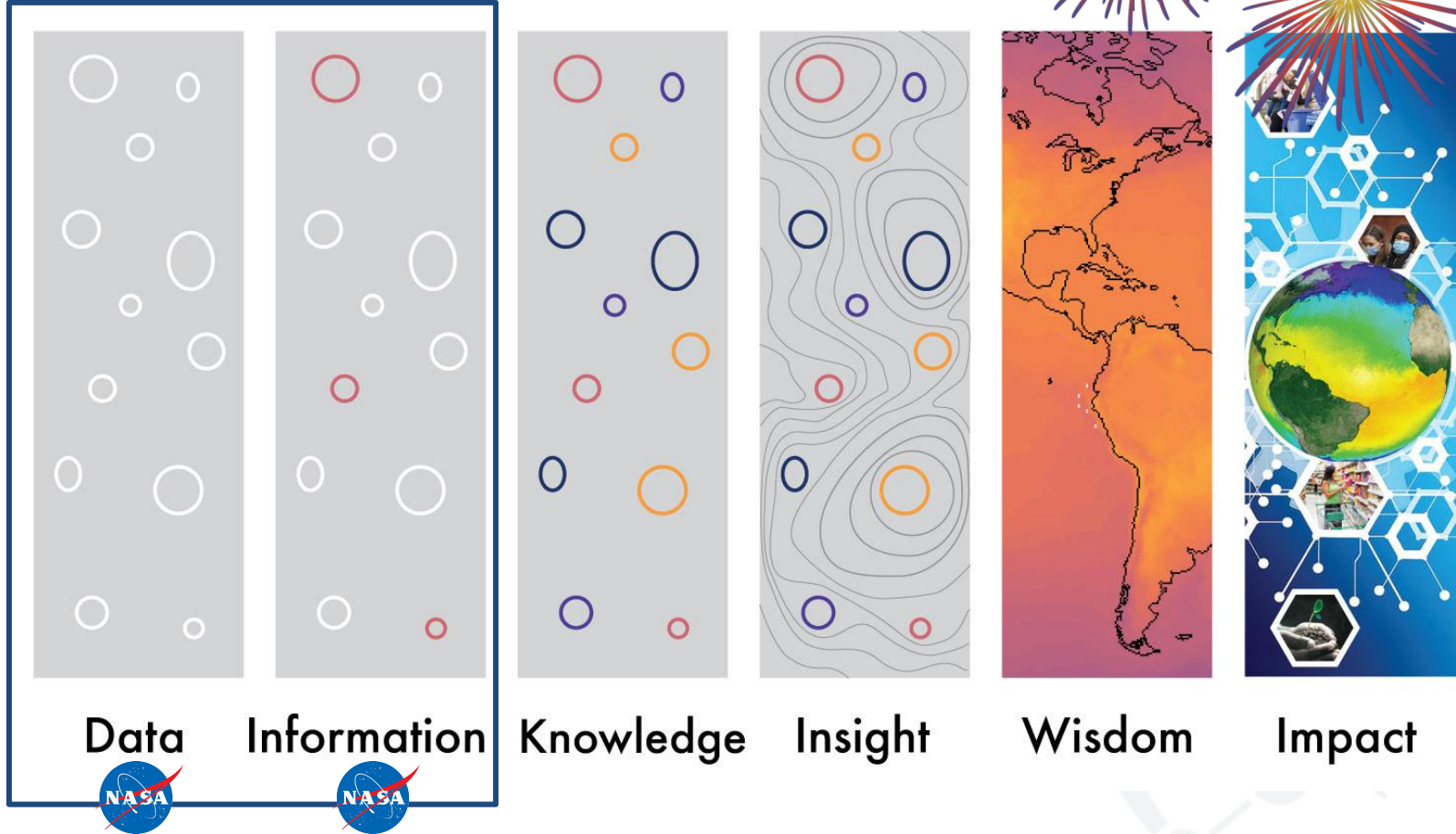




Image
credit:
AP
News



Data-Information-Knowledge-Wisdom Hierarchy (DIKW Hierarchy)





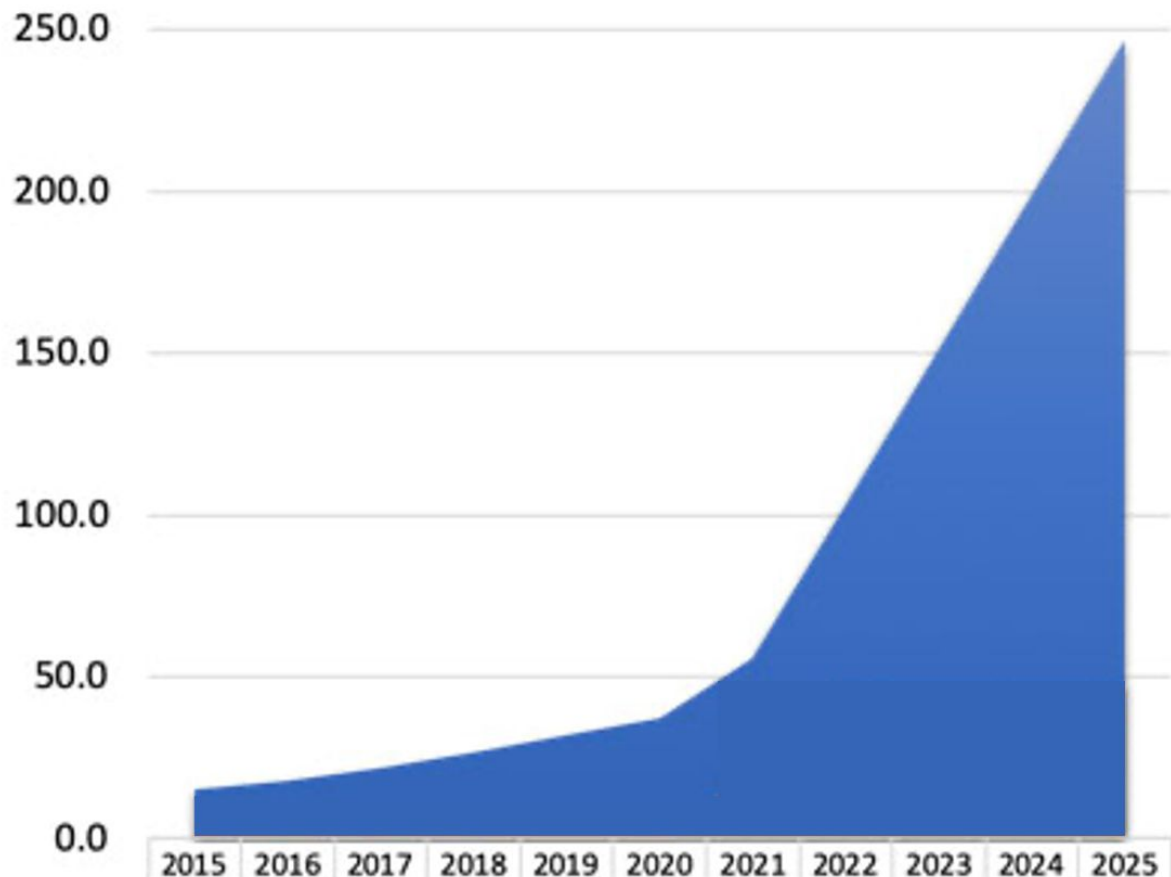
Update to this one

---<https://svs.gsfc.nasa.gov/4654>



23:06:30

PETABYTES



	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
■ Archive Size (PB)	15.0	17.7	21.6	26.8	32.0	37.2	55.6	103.4	151.1	198.9	246.6
■ Annual Growth (PB)	2.6	2.8	3.9	5.2	5.2	5.2	18.4	47.7	47.7	47.7	47.7

?

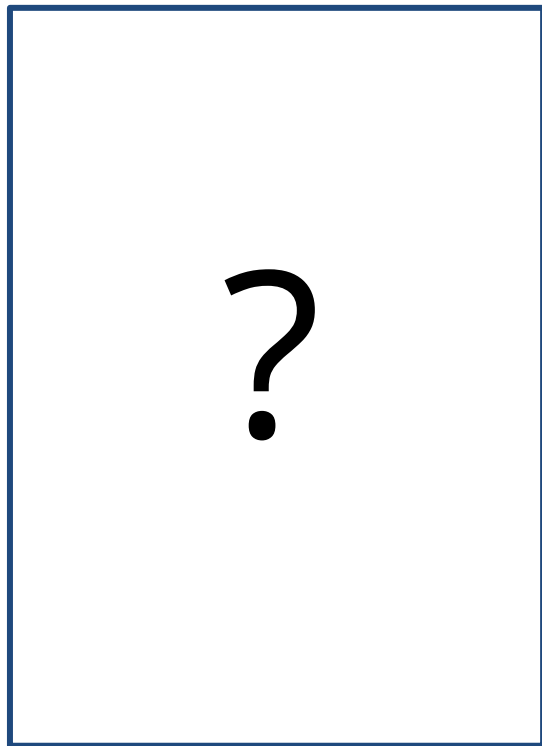


Challenges for Data Users

**1.
Data
Discovery**

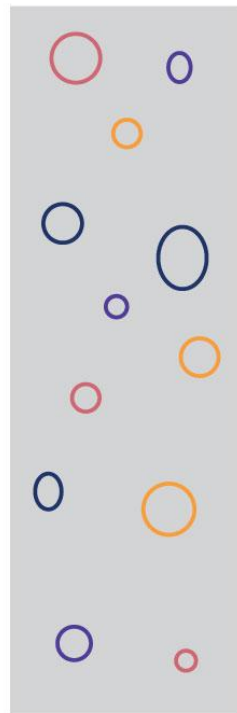
**2.
Dataset
Selection**

**3.
Data
Application**



Data

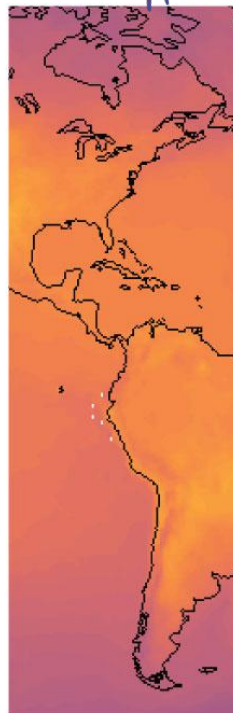
Information



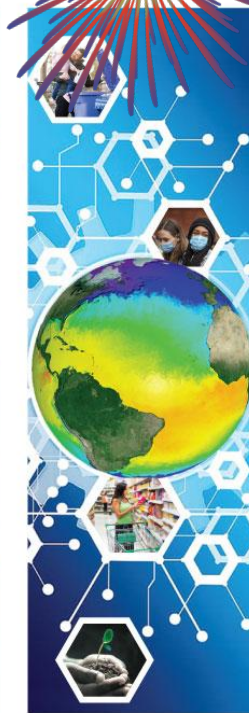
Knowledge



Insight



Wisdom



Impact





Data Users' Driving Questions:

**Data
Discovery**

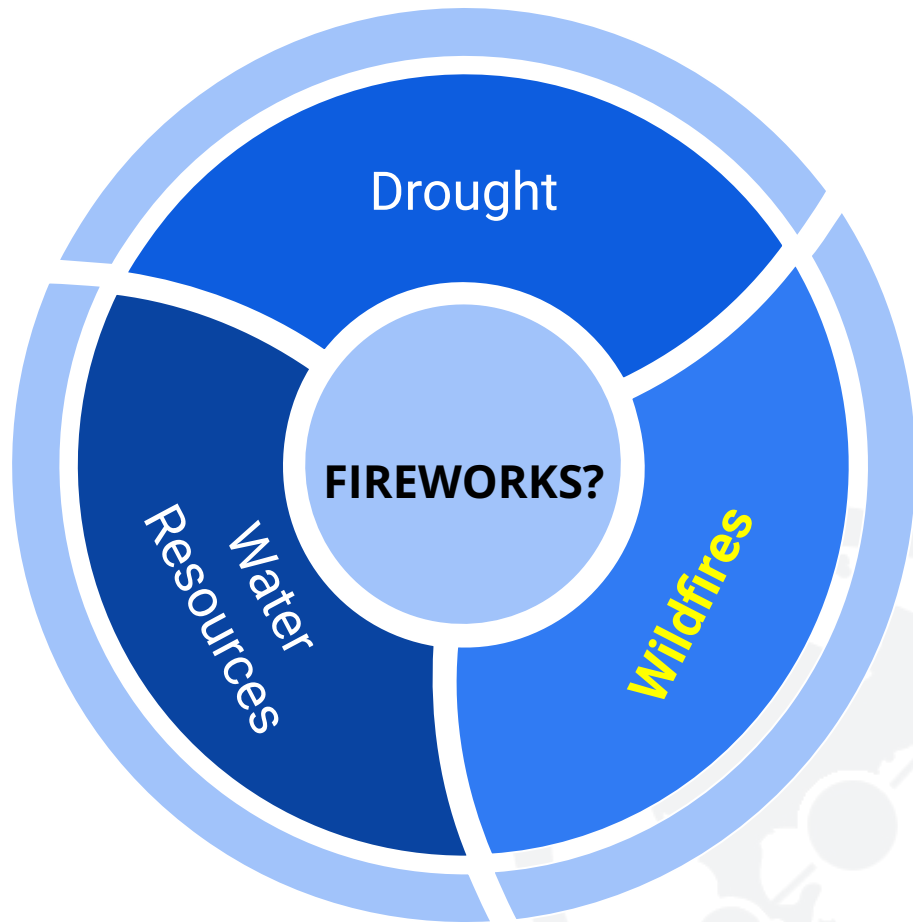
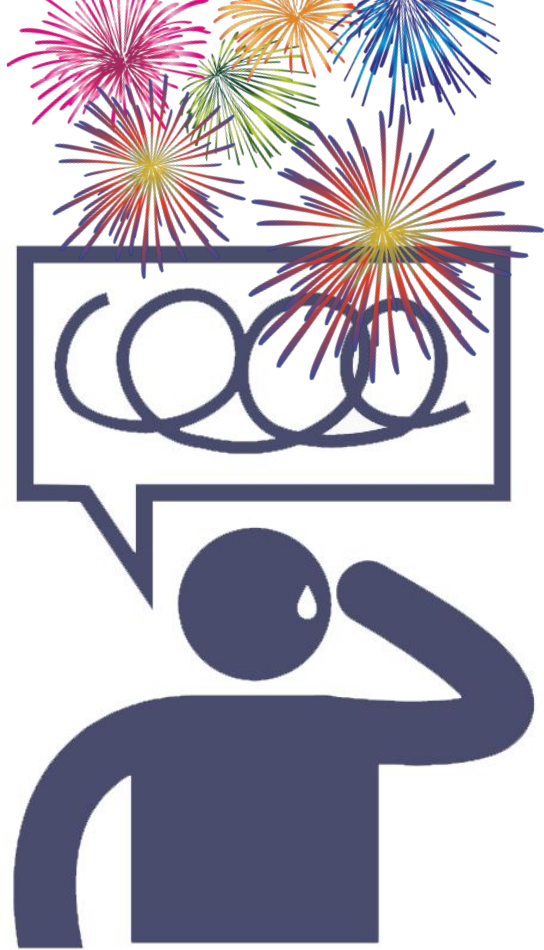
**Dataset
Selection**

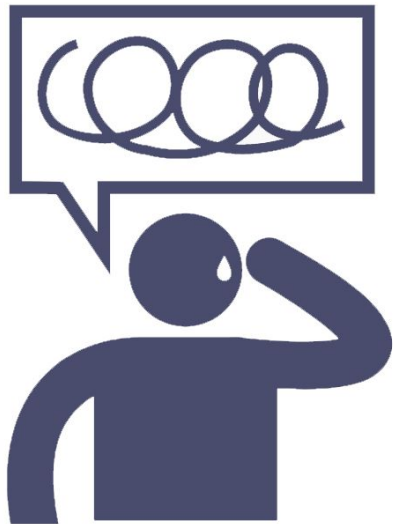
**Data
Application**

- **What data do I need to research this phenomenon (fireworks)?**

nasa/**earthdata-**
search







EARTHDATA Find a DAAC - EARTHDATA SEARCH

wildfires 121 Matching Collections

Filter Collections

Categories

Features

- Available from AWS Cloud
- Customizable
- Map Imagery

Keywords

Platforms

Instruments

Organizations

Projects

Processing Levels

Data Format

Tiling System

Horizontal Data Resolution

Latency

Additional Filters

- Include collections without granules
- Include only EOSDIS collections

MODIS/Terra+Aqua Direct Broadcast Burned Area Monthly L3 Global 500m SIN Grid V061

70,472 Granules • 2000-02-01 ongoing - The Terra and Aqua combined MCD64A1 Version 6.1 Burned Area data product is a monthly, global gridded 500 meter (m) product containing per-pixel burned-area and quality information. The MCD64A1 burned-area mapping...

GEOS5 MCD64A1 v061 - LP DAAC

MODIS/Terra+Aqua Direct Broadcast Burned Area Monthly L3 Global 500m SIN Grid V006

68,318 Granules • 2000-11-01 ongoing - The Terra and Aqua combined MCD64A1 Version 6 Burned Area data product is a monthly, global gridded 500 meter (m) product containing per-pixel burned-area and quality information. The MCD64A1 burned-area mapping a...

GEOS5 MCD64A1 v006 - LP DAAC

Global Fire Atlas with Characteristics of Individual Fires, 2003-2016

182 Granules • 2003-01-01 to 2016-12-31 - The Global Fire Atlas is a global dataset that tracks the day-to-day dynamics of individual fires to determine the timing and location of ignitions, fire size, duration, daily expansion, fire line length, speed, and direction of spre...

GEOS5 CMS_Global_Fire_Atlas_T642 v1 - ORNL_DAAC

NACP: Forest Carbon Stocks, Fluxes and Productivity Estimates, Western USA, 1979-2099

11 Granules • 1979-01-01 to 2099-12-31 - This dataset contains annual estimates of carbon stocks, fluxes, and productivity over forested land in 11 states of the western USA (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washin...

GEOS5 NACP_Forest_Conservation_1662 v1 - ORNL_DAAC

ABoVE: Synthesis of Burned and Unburned Forest Site Data, AK and Canada, 1983-2016

2 Granules • 1983-01-01 to 2016-08-08 - This dataset is a synthesis of field plot characterization data, derived above-ground and below-ground combusted carbon, and acquired Fire Weather Index (FWI) System components for burned boreal forest sites across Alas...

GEOS5 ABoVE_Plot_Data_Burned_Sites_1744 v1 - ORNL_DAAC

ABoVE: Landsat-derived Burn Scar dNBR across Alaska and Canada, 1985-2015

4,625 Granules • 1985-01-01 to 2015-12-31 - This dataset contains difference Normalized Burned Ratio (dNBR) at 30-m resolution calculated for burn scars from fires that occurred within the Arctic Boreal and Vulnerability Experiment (ABoVE) Project domain in Alas...

GEOS5 ABoVE_Fire_Severity_dNBR_1584 v1 - ORNL_DAAC

ABoVE: Characterization of Carbon Dynamics in Burned Forest Plots, NWT, Canada, 2014

3 Granules • 2015-06-14 to 2015-06-14 - This dataset provides field data from boreal forests in the Northwest Territories (NWT), Canada. Data were burned by wildfires in 2014. Data are fieldwork in 2015.





Data Discovery

Guides selection based on theme & topic

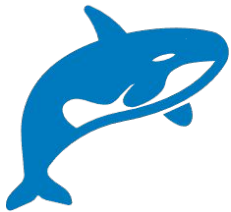
Dataset Selection

Links commonly used datasets

Data Application

Showcases tools & apps from NASA & Others





Biological Diversity and Ecological Forecasting



Agriculture and Water Resources



Wildfires



Water Quality



Sustainable Development Goals



Disasters



Diseases



Geographic Information System



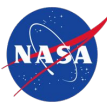
Greenhouse Gases



Health and Air Quality



Sea Level Change



Data Users' Driving Questions:

1.
**Data
Discovery**

2.
***Dataset
Selection***

3.
**Data
Application**

- How much detail do I need?
- How frequently do I need the data?

Data Discovery

Guides selection based on theme & topic

Dataset Selection

Links commonly used datasets

Data Application

Highlights tools & apps from NASA & Others



About the Data



Find and Use Near Real-Time Risk and Response Data



Find and Use Fire Forecasting Data



Find and Use Post-Fire Impact Data



Tools for Data Access and Visualization



Other NASA Assets of Interest



External Resources

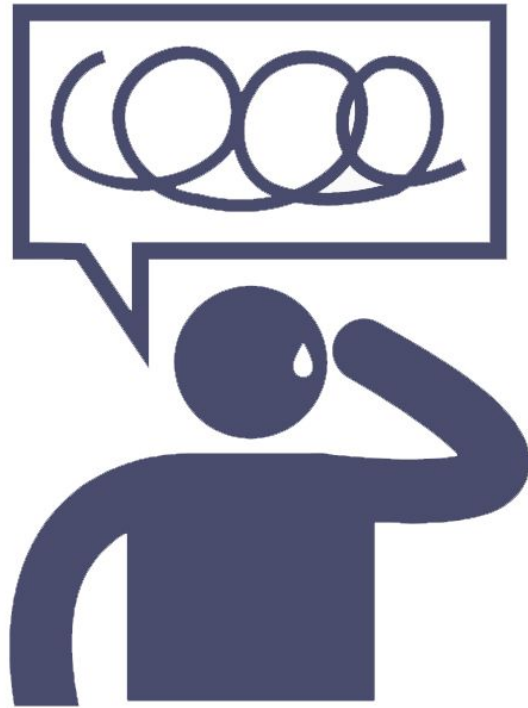


Benefits and Limitations of Remote Sensing Data



Measurement	Satellite	Sensor	Spatial Resolution	Temporal Resolution
Active Fire and Thermal Anomalies, Aerosol Optical Depth, Land Surface Reflectance, Land Surface Temperature, Vegetation Indices	Terra and Aqua	Moderate Resolution Imaging Spectroradiometer (MODIS)	250 m, 500 m, 1000 m, 5600 m	1-2 days
Active Fire and Thermal Anomalies, Land Surface Reflectance, Land Surface Temperature, Vegetation Indices	NOAA/NASA Suomi National Polar-orbiting Partnership (NPP)	Visible Infrared Imaging Radiometer Suite (VIIRS)	375 m and 750 m	1-2 days
Active Fire and Thermal Anomalies, Land Surface Reflectance	NOAA-20 Joint Polar Satellite System (JPSS)	VIIRS	375 m and 750 m	1-2 days
Aerosol Index, Sulfur Dioxide	Aura	Ozone Monitoring Instrument (OMI)	13 km x 24 km	daily
Aerosol Index, Sulfur Dioxide	NASA/NOAA Suomi NPP	Ozone Mapping and Profiler Suite (OMPS)	50 km x 50 km	101 minutes, daily
Carbon Monoxide, Sulfur Dioxide	Aqua	Atmospheric Infrared Sounder (AIRS) Level 2 and 3 products	1° x 1°	daily, 8-day, monthly
Elevation	Space Shuttle	Shuttle Radar Topography Mission (SRTM)	30m	
Elevation, Land Surface Temperature	Terra	Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER)	15 m, 30 m, 90 m	Variable
Land Surface Reflectance	NASA/USGS Landsat 8	Operational Land Imager (OLI)	15, 30, 60m	16 days
Land Surface Temperature, Evapotranspiration, Evaporative Stress Index	International Space Station <small>Note: data are available in areas of 51.6° S to 51.6° N</small>	Ecosystem Spaceborne Thermal Radiometer Experiment on Space Station (ECOSTRESS)	70 m	~ 1-7 days
Precipitation	Integrated multi-satellite data	Integrated Multi-satellite Retrievals for GPM (IMERG)	0.1° x 0.1° or 0.25° x 0.25°	half hourly, daily, monthly
Precipitation, Soil Moisture	Global Change Observation Mission - Water 1	Advanced Microwave Scatter Radiometer-2 (AMSR2)	2 km	daily
Smoke Plumes	NASA/NOAA Geostationary Operational Environmental Satellite-East (GOES-East) and GOES-West	Advanced Baseline Imager (ABI)	1 km	10 min
Smoke Plumes	Japan Meteorological Agency Himawari-8	Advanced Himawari Imager	1 km	10 min
Soil Moisture	Soil Moisture Active Passive (SMAP)	Radar (active) and a radiometer (passive)	9 km, 36 km	1 day

Measurement	Satellite	Sensor	Spatial Resolution	Temporal Resolution
Active Fire and Thermal Anomalies, Aerosol Optical Depth, Land Surface Reflectance, Land Surface Temperature, Vegetation Indices	T		500 m, 1	1-2 days
Active Fire and Thermal Anomalies, Land Surface Reflectance, Land Surface Temperature, Vegetation Indices	M M C (and	1-2 days
Active Fire and Thermal Anomalies, Land Surface Reflectance	M S (and	1-2 days
Aerosol Index, Sulfur Dioxide	A		x 24	daily
Aerosol Index, Sulfur Dioxide	M M		x 50	101 minutes, daily
Carbon Monoxide, Sulfur		Atmospheric Infrared		daily, 8-day.



- How much detail do I need?
- How frequently do I need the data?

Data Users' Driving Questions:

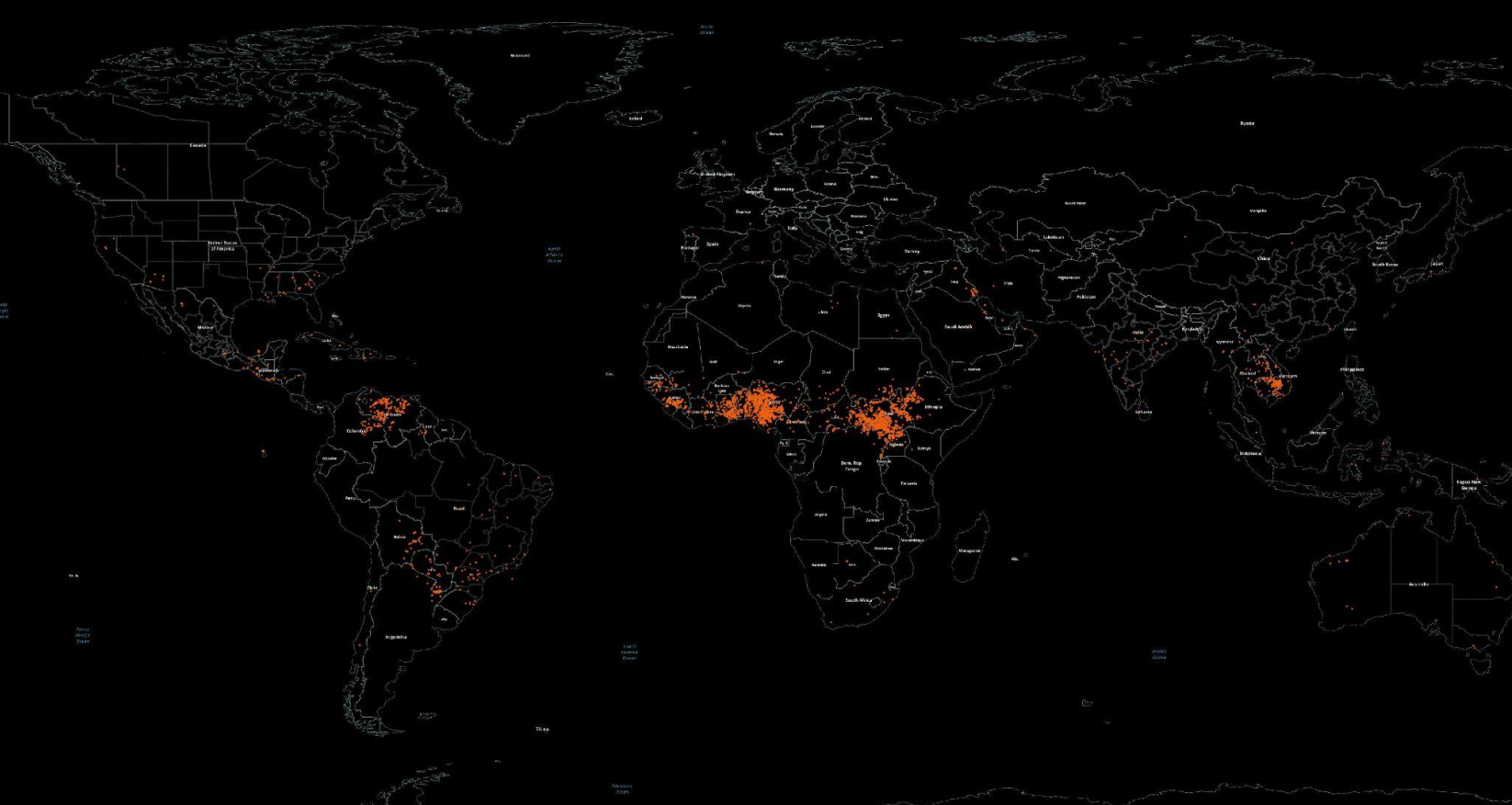
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**Dataset
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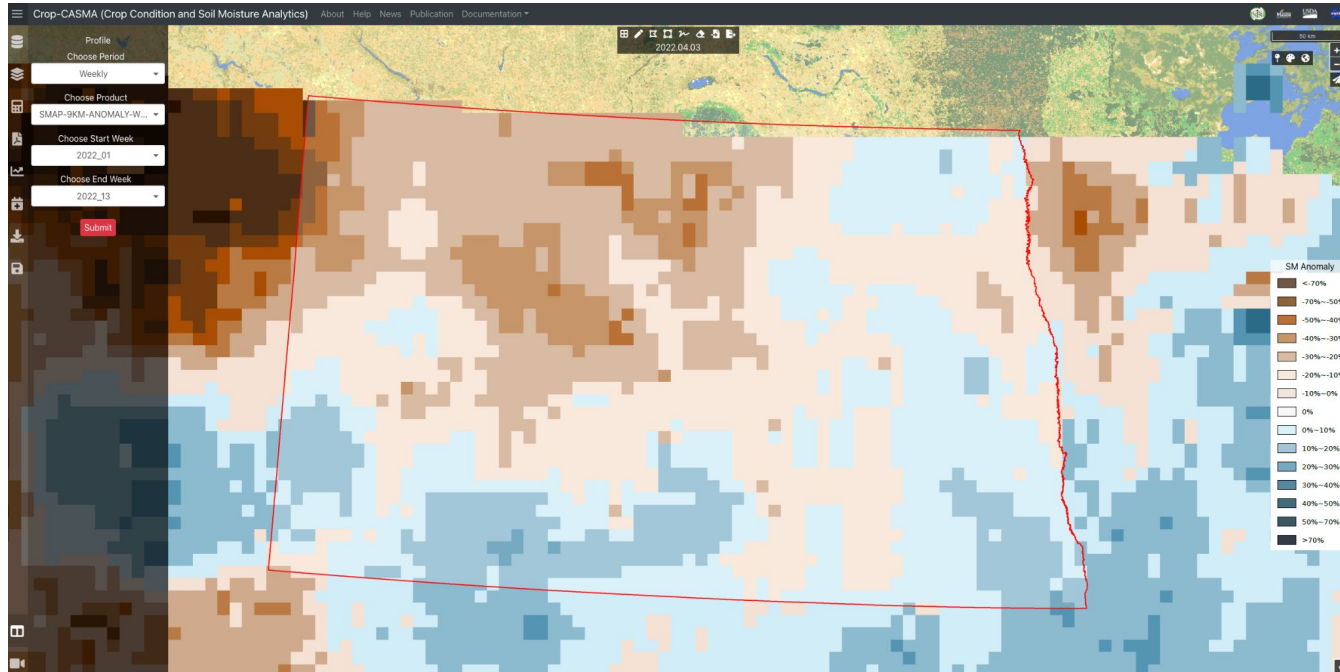
***Data
Application***

- **How might I visualize the data?**
- **What tools help me analyze the data?**

Locations of Wildfires



Drought Indicators

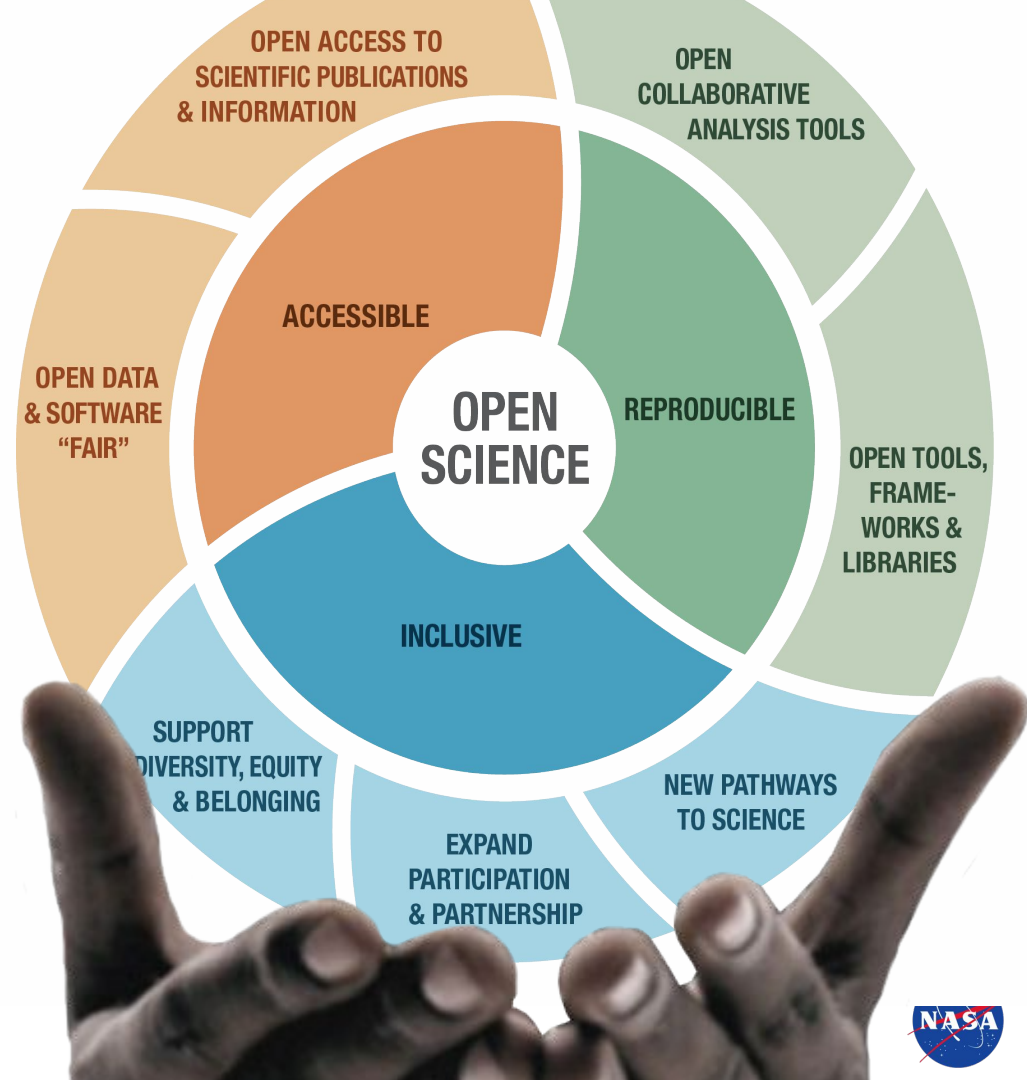


“Our current reports are at the state level. [But] one area of a state might be wet, while another dry. These new data deliver localized moisture readings – this is what matters to the farmer.”

Zhengwei Yang, U.S. Department of Agriculture National Agricultural Statistics Service



Open Data to Fuel Open Science



NASA'S VIRTUAL EARTH DAY EVENT

REGISTER AT go.nasa.gov/EarthDayEvent2022

Live Celebration April 22, 2022

On-Demand through May 2, 2022

SHARE THE SCIENCE



Live Talks

10:30 - 11:00 AM (ET)



Dr. Don Thomas
Former NASA
Astronaut

1:00 - 1:30 PM (ET)



Dr. Karen St. Germain
Director of NASA's
Earth Science Division

3:00 - 3:30 PM (ET)



Dr. Katherine Calvin
NASA Chief Scientist and
Senior Climate Advisor

Speaker Moderator



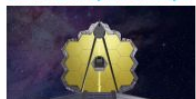
Dr. Trena Ferrell
NASA Earth Science
Education and Outreach Lead



Kahoot! GAMES

11:00 - 11:30 AM (ET)

Unfold the Universe with
NASA's Webb Space Telescope!



1:30 - 2:00 PM (ET)

Earth at Night



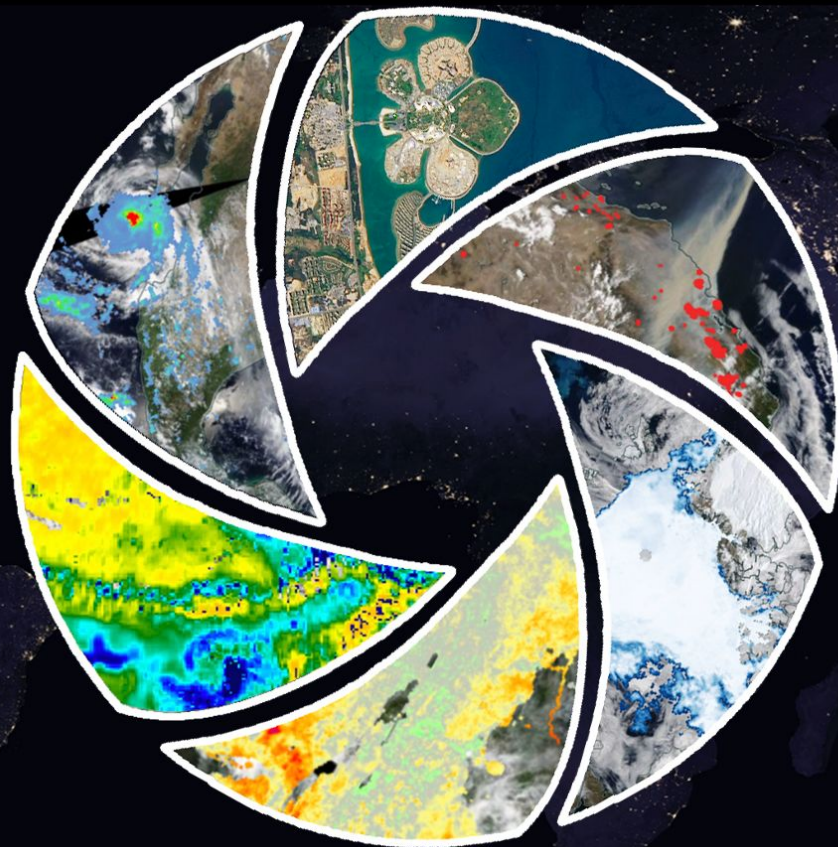
3:30 - 4:00 PM (ET)

Earth, Sun, and Moon



EARTHDATA

OPEN ACCESS FOR OPEN SCIENCE



earthdata.nasa.gov

Elizabeth Joyner | Elizabeth.r.joyner@nasa.gov



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Challenge 1.

1.
**Data
Discovery**

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