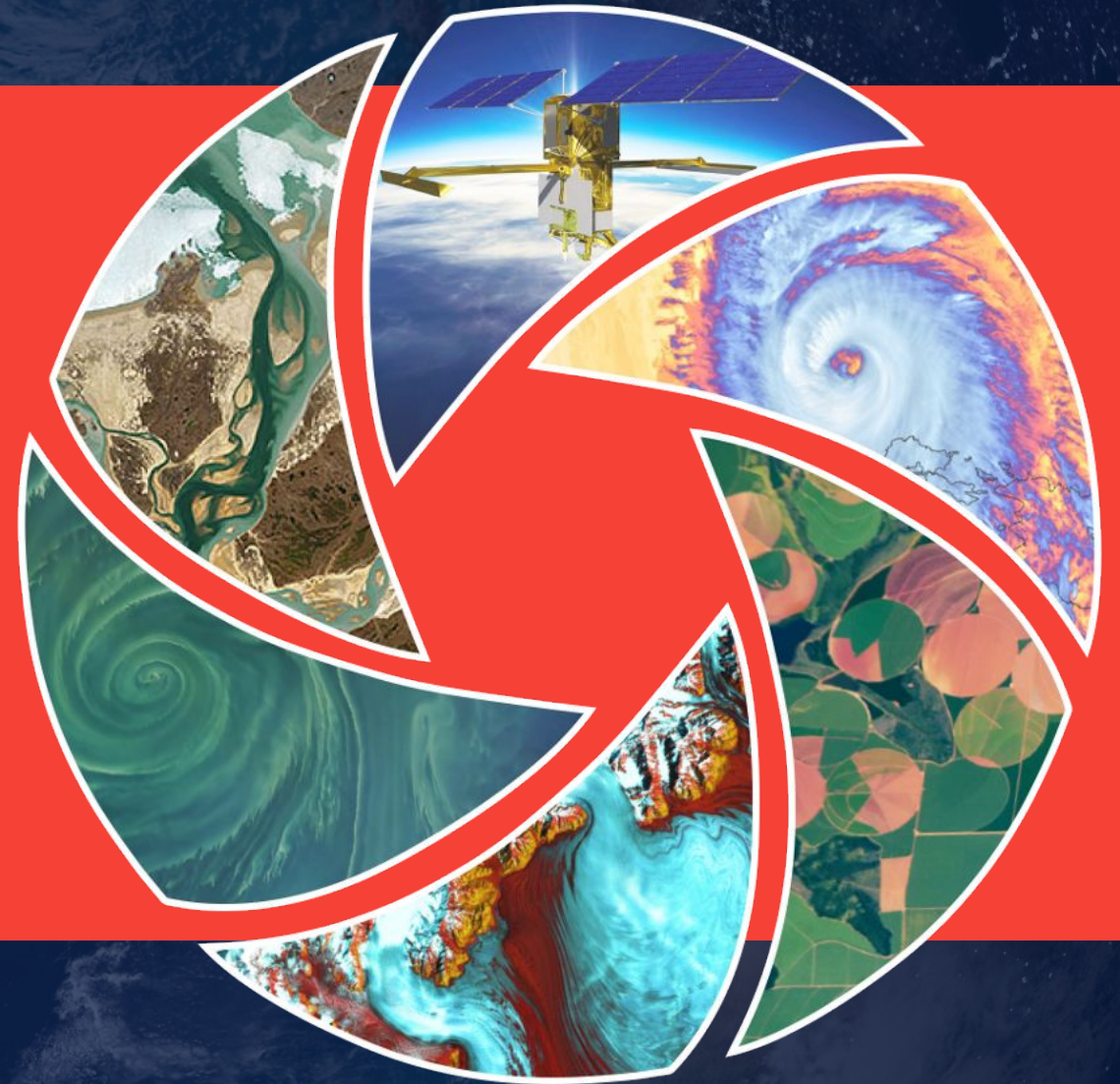


# AQ Data Pathfinder for Your SD4EJ Applications

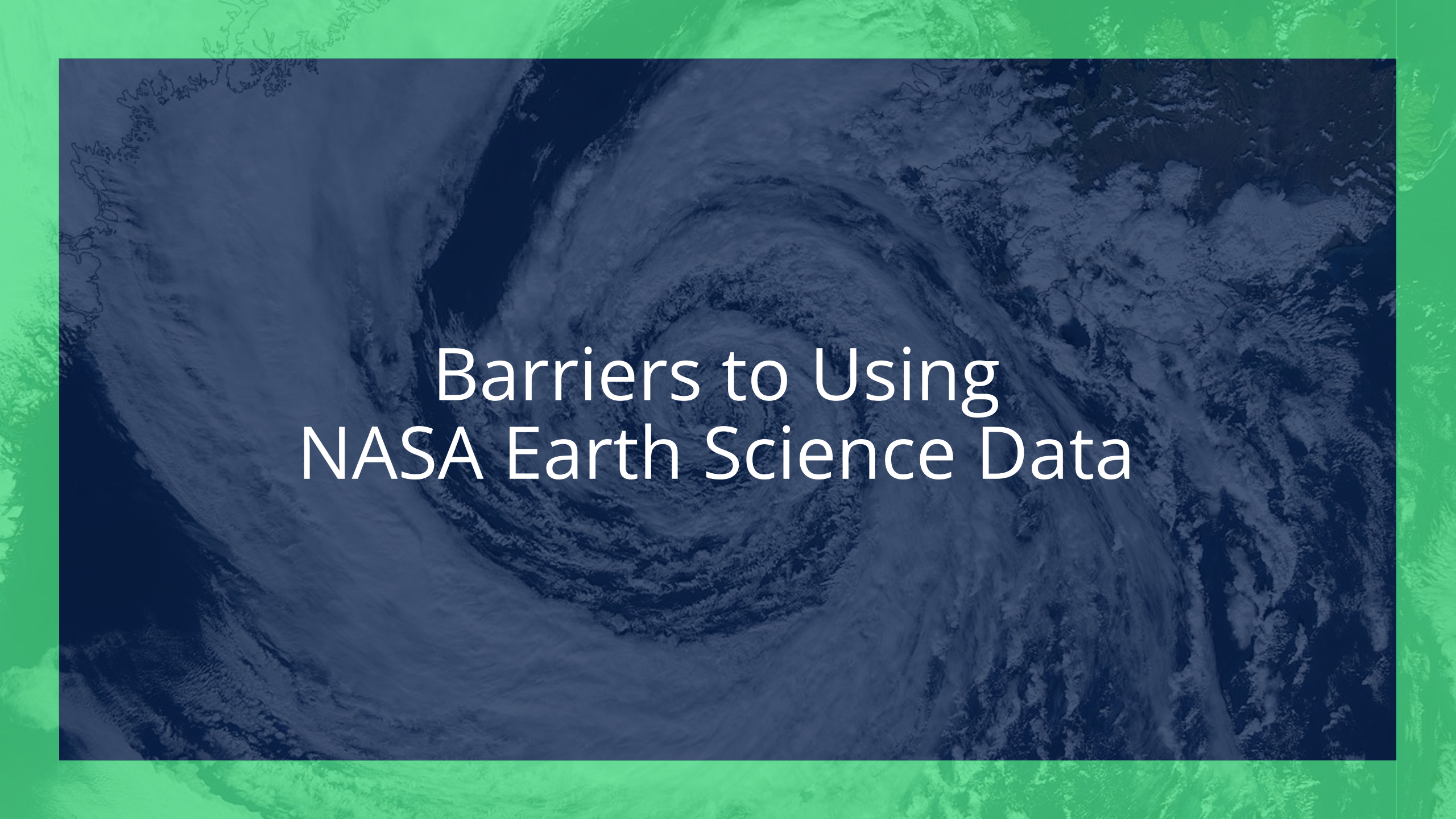
Elizabeth Joyner, Community Coordinator, Earth Science  
Data Systems, Science Systems and Applications, Inc.



**EARTHDATA**

OPEN ACCESS FOR OPEN SCIENCE



A satellite image of a hurricane over the ocean, with a green overlay on the left and right sides. The hurricane is centered in the middle of the frame, showing a clear eye and spiral cloud bands. The text is overlaid on the center of the image.

# Barriers to Using NASA Earth Science Data



# Needs & Opportunities:

Most environmental scientists don't have the data skills they need.

The problem is "the growing gap between the accumulation of big data -- and researchers' knowledge about how to use it effectively."

-Survey of 700 NSF BIO PIs (Barone et al. 2018)

Earth Lab's Open Learning Portal: [earthdatascience.org](http://earthdatascience.org)



↑ least test drive it before you leave. So the other challenge that we have right now is that most environmental scientists don't have the data skills that they need. A survey of over 700

Ⓢ users last year!

## ☐ Monitoring the movement of wildfire smoke

“Most users do not know what data, sensor, satellite to use but they know what kinds of questions they are trying to answer.”

## and dust plumes

## ☐ Tracking the path of ash from volcanic

## eruptions

~ Jenny Bratburd, HAQAST

## ☐ Identifying concentrations of nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), and other pollutants near cities, suburbs, and major transportation systems

## ☐ Understanding how concentrations of these pollutants are changing over time

GIS



Water Quality



Biological Diversity & Ecological Conservation



Greenhouse Gases



Sustainable Development Goals



Agriculture & Water Resources



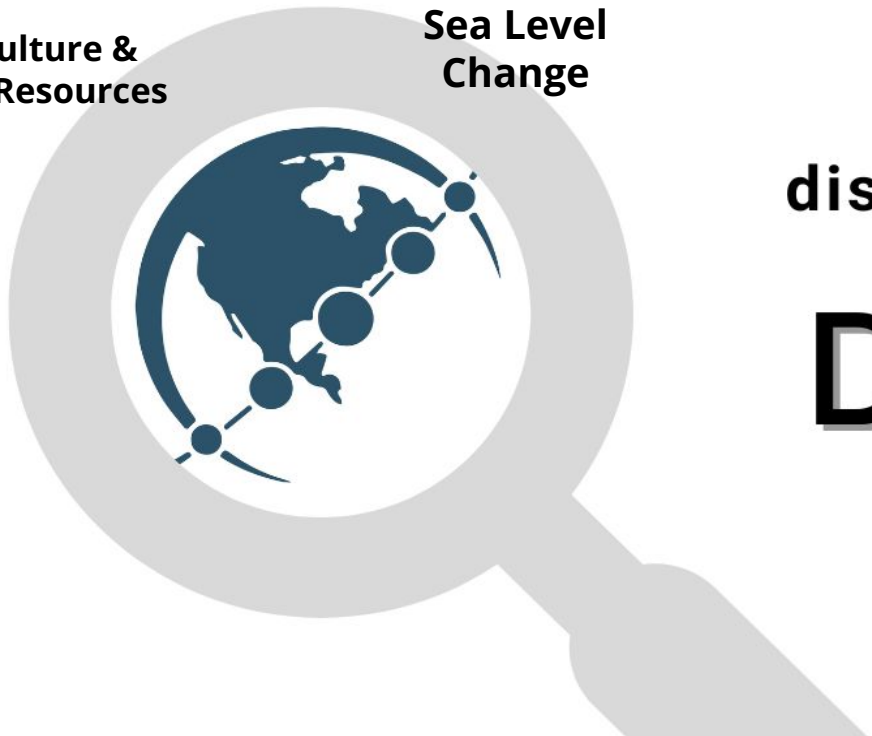
Sea Level Change



Disease



Air Quality



discover \* select \* use \* apply \* solve

# Data Pathfinders

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



Landslides



Tropical Cyclones



Floods



Extreme Heat

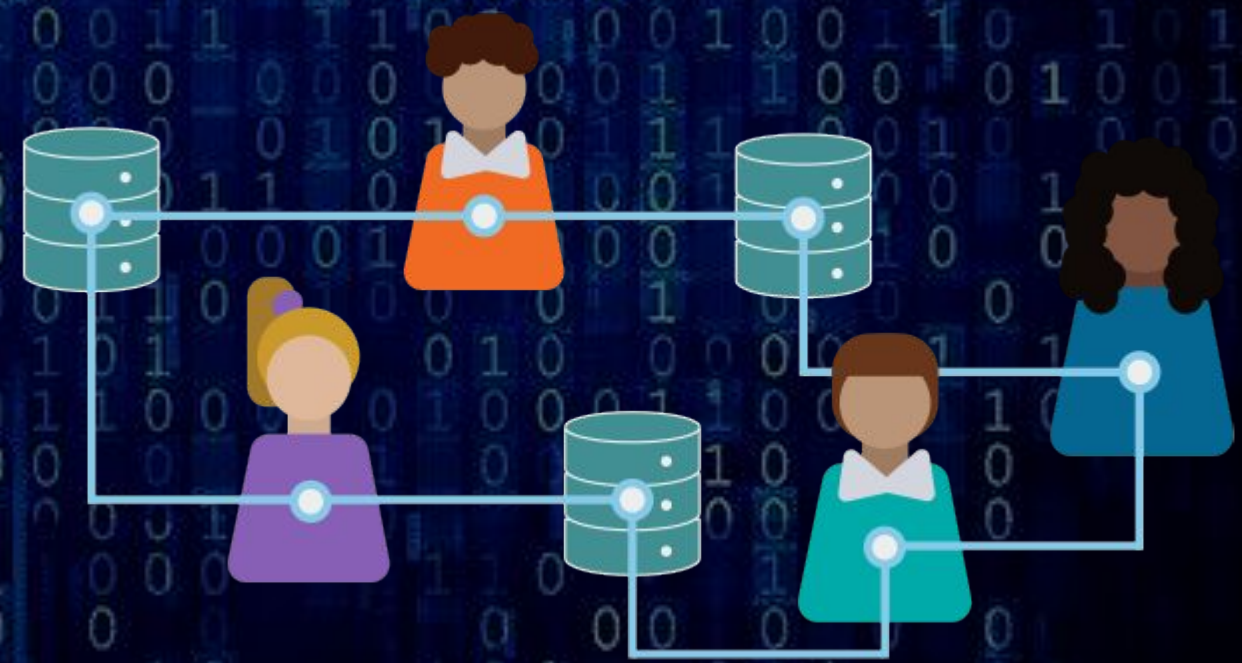
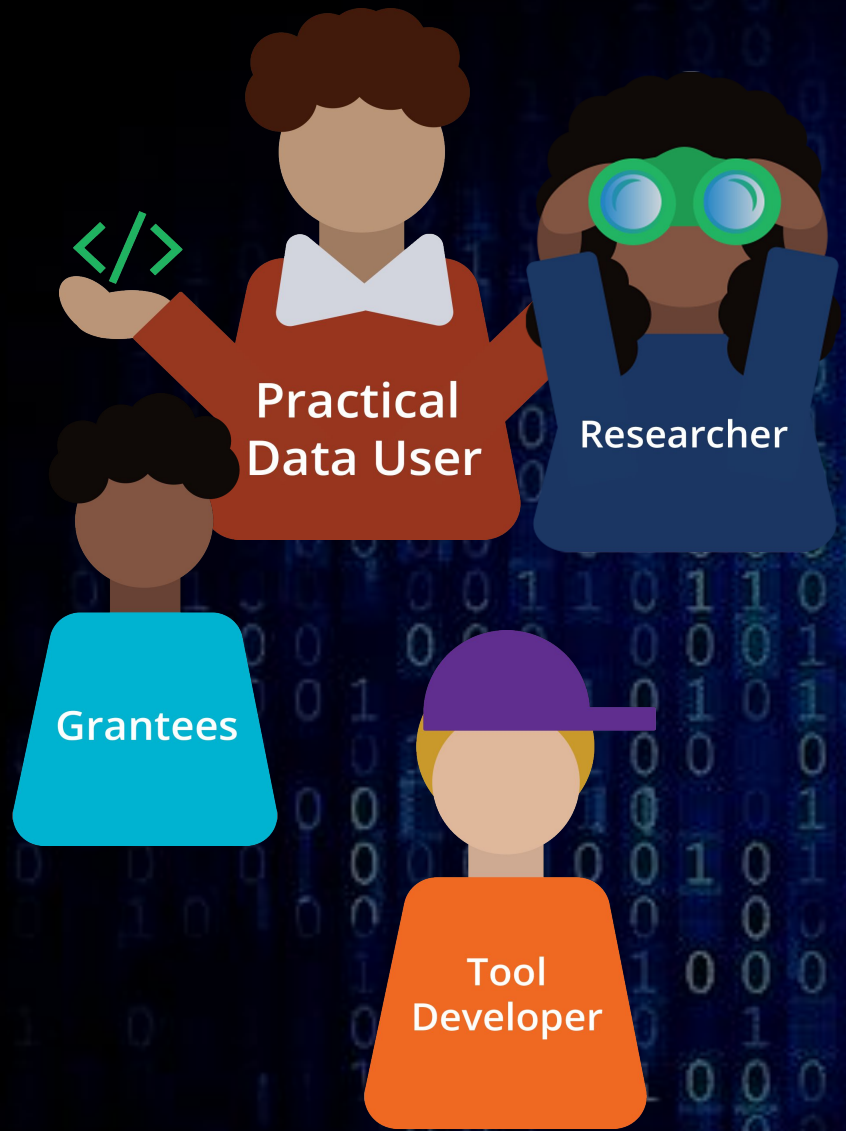


Wildfires



Earthquakes & Volcanoes

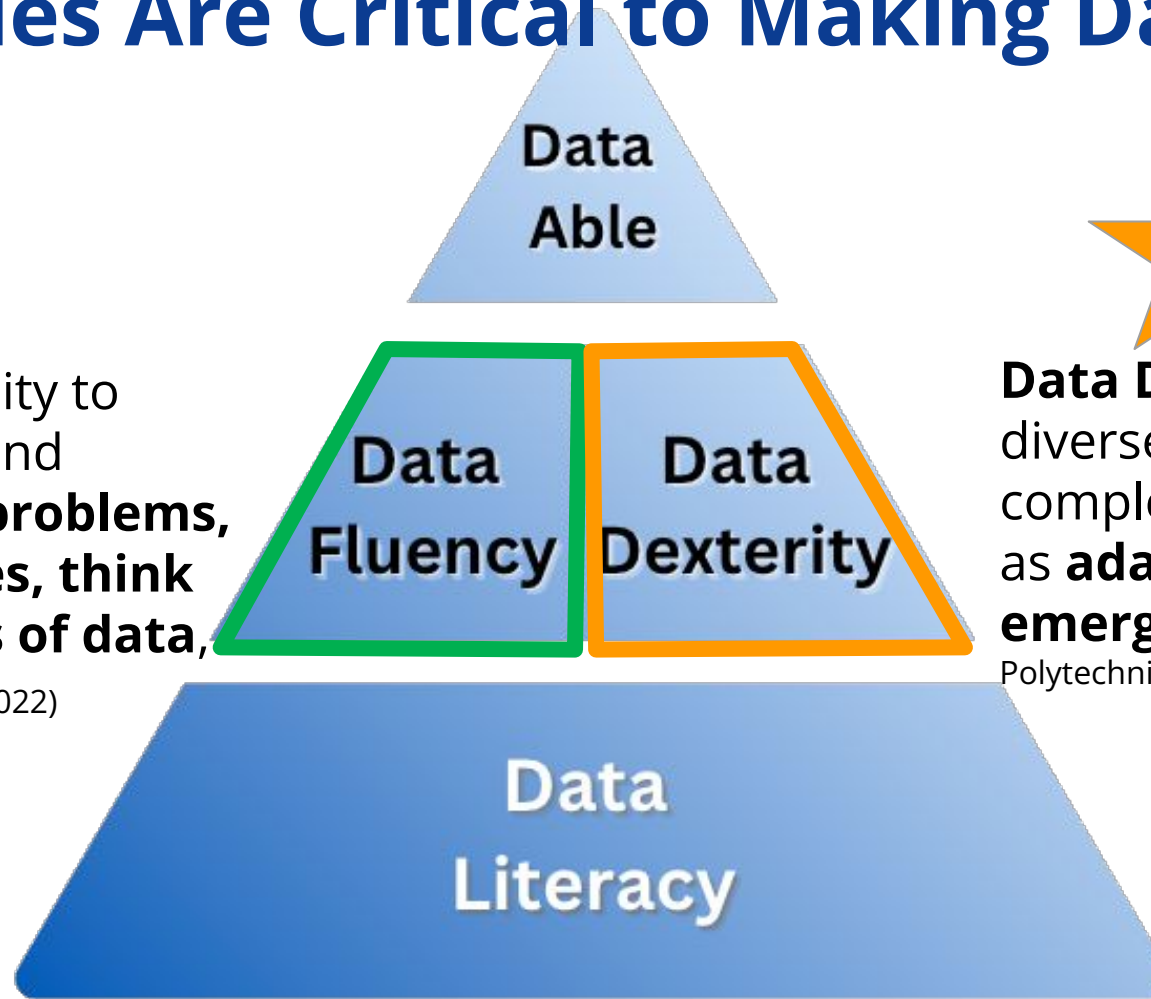




# Know Our Audience: Data Abilities Are Critical to Making Data Accessible



**Data Fluency** - Ability to explore, visualize, find patterns, **identify problems, investigate sources, think about ethical uses of data,** etc. (Concord Consortium, 2022)



**Data Dexterity** - Ability to use diverse datasets to define and solve complex real-world problems, as well as **adapt and adopt existing and emerging technologies.** (Rensselaer Polytechnic Inst, 2022)

**Data Literacy** - Ability to collect, organize, visualize, analyze, interpret, and share data for yourself and other people to use and understand. (Dataspire, 2021)



# Popular Resources & Their Characteristics

## Giovanni

## Earthdata Search

### Worldview

- Data Exploration Tool
- Easy, Intuitive Learning Curve
- Cannot Download data directly
- Highly Visual User Interface
- Imagery Only
- Level 2 & 3
- Parameters span a variety of Earth science disciplines

- Easy-Moderate learning curve
- Designed for basic analysis (20+ types) No error bars, limited statistics, coarser resolution
- Limited to GES DISC Holdings Mostly *(also LAADS, LPDAAC, and OBDAAC)*
- Download data in a variety of formats (CSV, GEOTIFF, NetCDF)
- Level 3 & 4
- Can be slow
- Parameters span a variety of Earth science disciplines

- Intermediate-Advanced learning curve
- Provides comprehensive access to NASA's Earth science data holdings
- Provides the data for the user to analyze as needed for science
- Offers data from all of NASA's DAACs & partners
- Variety of data formats
- Provides all levels of NASA data (1-4)
- Parameters span the Earth science disciplines

Scientific Value

Advanced Data Skills/Knowledge Required



# Air Quality Data Pathfinder



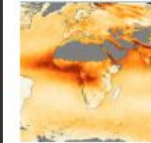
## Air Quality Data Pathfinder

### Getting Started with this Pathfinder

Who is the intended audience for this Pathfinder?	▼
Join our community of NASA data users.	▼
Where do I go when I need help?	▼

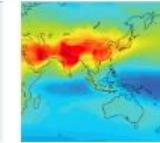
### Find the Data

This Data Pathfinder will help guide you through the process of selecting and using datasets applicable to air quality, and provides links to specific data sources. If you are new to remote sensing, the [What is Remote Sensing? Backgrounder](#) provides a comprehensive overview. In addition, NASA's Applied Remote Sensing Training Program (ARSET) provides numerous training modules, including [Fundamentals of Remote Sensing](#).



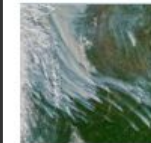
#### Aerosol Data

- Aerosol Optical Depth (AOD)
- Aerosol Index
- PM<sub>2.5</sub>
- Dust Score



#### Trace Gas Data

- Nitrogen Dioxide
- Sulfur Dioxide
- Carbon Monoxide
- Ozone
- Formaldehyde
- Ammonia



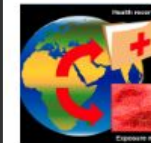
#### Land Surface Data

- Surface Reflectance
- Topography
- Soil Moisture



#### Weather Data

- Air Temperature
- Clouds
- Precipitation
- Wind
- Relative Humidity



#### Human Dimension Data

- Human Health
- Socioeconomic Variables

### Tools for Using the Data

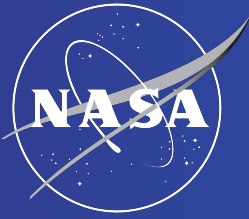
This section provides links to NASA and external tools and applications relevant to analyzing and visualizing agriculture and water management data referenced in this Data Pathfinder. NASA's Earth Science Data Systems (ESDS) Program maintains many more resources for data analysis that may be helpful. Explore the full list on the [NASA Earthdata Data Tools](#) page.

Find	▼
Prepare	▼
Visualize	▼
Download	▼
Analyze	▼
For Developers	▼

## Summary:

- 1.) Resources grouped by parameter
- 2.) Each parameter features a data table, organized by resolution for easy identification
- 3.) Data tools are better organized by the function of the tool to aid users' selection
- 4.) Resources are visibly incorporated for GIS users, programmers, and other advanced users.
- 5.) The pathfinder integrates many, many Earthdata and ARSET trainings for your just-in-time learning needs.





EARTHDATA Offers

# The Air Quality Data Pathfinder for Your Research & Applications

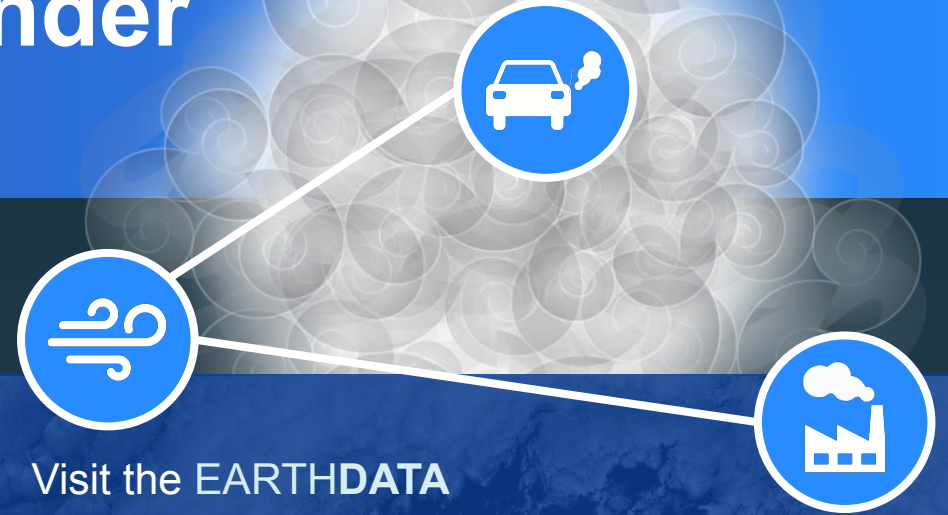
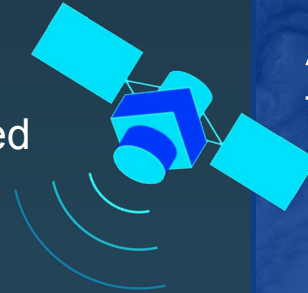
*Air pollution is one of the largest global environmental and health threats. NASA provides data resources to better understand the movement of pollutants and the impact of events leading to poor air quality. This Pathfinder helps you access, and leverage data acquired from NASA's satellite, airborne, and ground-based missions and campaigns.*

## Available Data Types:

- Aerosols
- Trace Gases (e.g., Nitrogen Dioxide, Sulfur Dioxide, Carbon Monoxide, etc.)
- Weather (e.g., Air Temperature, Clouds, Precipitation, etc.)
- Land Surface (e.g., Soil Moisture, Surface Reflectance, Topography, etc.)
- Human Dimensions

Data are from satellites, airborne and ground-based platforms, and models, including:

- AIRS
- AMSR2
- GPM
- MODIS
- OLI/TIRS
- OMI
- OMPS
- SMAP
- TROPOMI
- VIIRS
- GEOS
- MERRA-2



Visit the EARTHDATA  
**Air Quality Data Pathfinder**  
for more information:

- Commonly Used Datasets for Air Quality Research and Applications
- Tools for Using Data
- Resources for Applying and Connecting NASA Data
- GIS Resources
- Tips for Getting Help and Connecting with NASA experts
- Tutorials and more!



# Postcards to distribute at your in person events



Front



## *From PM<sub>2.5</sub> to trace gases, NASA has you covered...*

Find freely and openly available data to aid in your research and decision-making.

### *Don't know where to start?*

This Pathfinder shows you where (and how) to begin.

### *Are you short on time and need quick insights?*

Let the Air Quality Data Pathfinder guide you to websites, applications, and tools to help you find the data you need for just-in-time exploration and analysis.

### *Do you have questions about data related to aerosols, trace gases, weather, land surface, human interactions, and more?*

You've landed in the right place. The Air Quality Data Pathfinder is your guide to common NASA datasets—along with the tools for using these data—to meet your growing needs.

### *Do you need air quality data for a specific date, time, or place?*

No problem. Find tools and services to help you search, download, and select just the data you need for the job.

NP-2023-05-055-LaRC

## *Air Quality Data Pathfinder*



NASA Data Pathfinders guide you through selecting datasets and resources, as well as visualizing and analyzing data using a variety of applications.

The Air Quality Data Pathfinder helps you address the following research interests:

- Monitoring the movement of wildfire smoke and dust plumes
- Tracking the path of ash from volcanic eruptions
- Identifying concentrations of nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), and other pollutants near cities, suburbs, and major transportation systems
- Understanding how concentrations of these pollutants are changing over time

*For global explorations and investigations of air quality, NASA has you covered.*



# Complete NASA's open science course!

Open Science 101: A community-developed introduction to **core open science skills**

- Know how to write a NASA open science and data management plan
- Learn about tools and best practices
- Increase the impact & visibility of your science
- Earn your digital NASA open science badge



Self-Paced  
Online Course



Online & In-person  
Workshops



**Enroll now!**





# Let's Stay Connected!



**Elizabeth Joyner**  
NASA Earth Science Data Systems  
Program Community Coordinator,...



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