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# NASA Environmental Justice Data Search Interface Overview

Helen Blue Parache  
9:45- 10:15 AM

Break out room 10:15- 10:25 AM  
10:25 -10:30 Share out

# SCIENCE DISCOVERY ENGINE

Empowering open science, the Science Discovery Engine allows you to explore the universe, from the tiniest of cells to the vastness of space, through discovery of NASA's science data, documentation, and code. [Read More](#)

Earth Science ^

Q Type to search...



## EARTH DAY 2024



Earth Day, celebrated annually on April 22, is a global event dedicated to promoting environmental protection and sustainability. This year, NASA is highlighting how its fleet of satellites equipped with remote sensing instruments enable us to better understand the complex patterns and processes of our planet's oceans. You can explore NASA's ocean observation resources in the Earth Science focus area of the SDE.

## ENVIRONMENTAL JUSTICE



The environmental justice data search interface enables users to explore NASA Earth science datasets related to disasters, climate change, urban flooding, extreme heat, food availability, water availability, health and air quality, and human dimensions.

BETA

# ENVIRONMENTAL JUSTICE DATA SEARCH INTERFACE

Q Type to search...



Search

In order to search within a focus area, type your query and click the focus area below.

Or, click a focus area to view all datasets within.

CLIMATE CHANGE

DISASTERS

EXTREME HEAT

FOOD AVAILABILITY

HUMAN DIMENSIONS

HEALTH & AIR QUALITY

URBAN FLOODING

WATER AVAILABILITY



Enabling Open Science to  
explore and discover NASA Data,  
documentation, and code

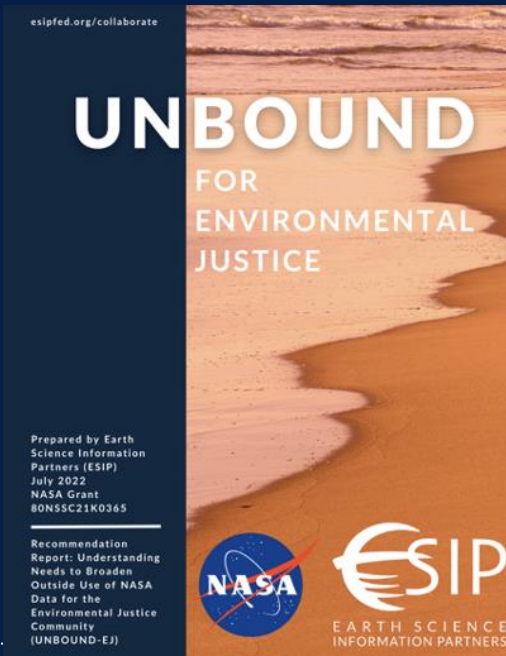
# Science Discovery Engine

**1**  
**Identified Gap  
Between Users  
& NASA Data**

**2**  
**Leveraged  
NASA Data  
Services**

**3**  
**Feature  
& Data  
Prioritization**

**4**  
**Data  
Workflow  
Process**



- NASA data available publicly
- Datasets relevant to environmental justice
- Users expressed challenges with discovery of relevant data

*UNBOUND EJ Report*

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The Science Discovery Engine is a unified search experience that enables discovery of NASA's open science information. Users can access:

- Metadata about science data
- Code
- Documentation
- Images
- Tutorials
- Mission and instrument information



We tailored aspects of the SDE UX for EJ data users

# 1 Identified Gap Between Users & NASA Data

# 2 Leveraged NASA Data Services

# 3 Feature & Data Prioritization

# 4 Data Workflow Process

| Feature                                | Priority                               |
|----------------------------------------|----------------------------------------|
| Change background on hover             | P1 <input checked="" type="checkbox"/> |
| Help Tutorial                          | P1 <input checked="" type="checkbox"/> |
| Filter by indicator                    | P1 <input checked="" type="checkbox"/> |
| Filter by intended use                 | P1 <input checked="" type="checkbox"/> |
| View by list                           | P1 <input checked="" type="checkbox"/> |
| View by columns (table mode)           | P1 <input checked="" type="checkbox"/> |
| View dataset overview                  | P1 <input checked="" type="checkbox"/> |
| Share dataset                          | P1 <input checked="" type="checkbox"/> |
| View tool tips for metadata categories | P1 <input checked="" type="checkbox"/> |

| Feature                                | Priority                               |
|----------------------------------------|----------------------------------------|
| Filter by geographic area              | P2 <input type="checkbox"/>            |
| Add or remove columns (compare mode)   | P2 <input checked="" type="checkbox"/> |
| Download dataset                       | P2                                     |
| Sort by newest first or alphabetical   | P3                                     |
| View dataset visualization             | P3                                     |
| View dataset images                    | P3                                     |
| Explore related source to a data set   | P3                                     |
| View related variables as an attribute | P3                                     |
| Explore source in SDE                  | P3 <input checked="" type="checkbox"/> |

P1: must-have, P2: good-to-have, P3: nice-to-have

☒: Complete, ☐: In progress

1

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# Geographic Search

The screenshot displays the NASA Earthdata Search web application. At the top, there is a search bar with the text 'Temperature' and a microphone icon. To the right of the search bar is a 'Select Interest Area' dropdown menu and a help icon. Below the search bar, the results are categorized under '300 Datasets'. There are three filters: 'Intended Use (3)', 'Sort: Newest First', and 'View: List View'. Below these filters, there are four icons representing different geographic areas: 'Global', 'Belgium', 'United States', and 'Australia'. The first dataset listed is 'Annual PM2.5 Concentrations for Countries and Urban Areas, v1 (1998–2016)'. The description for this dataset states: 'The Annual PM2.5 Concentrations for Countries and Urban Areas dataset provides air quality data for mineral dust and sea-salt filtered fine particulate matter of 2.5 micrometers or smaller (PM2.5) in countries and urban areas for environmental health research.' The second dataset listed is 'ARIA (Advanced Rapid Imaging and Analysis) DPM (Damage Proxy Map) Puerto Rico'. The description for this dataset states: 'The ARIA (Advanced Rapid Imaging and Analysis) DPM (Damage Proxy Map) Puerto Rico dataset shows areas of Eastern Puerto Rico that are likely to be damaged (shown by red and yellow pixels) as a result of Hurricane Maria.' The third dataset listed is 'ECOSTRESS Land Surface Temperature from Earthdata Search'. The description for this dataset states: 'The ECOSTRESS Land Surface Temperature dataset provides land surface temperature data and urban heat analysis for the city of Los Angeles. These data may aid mitigation strategies for urban heat and heat stress.'

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| EJ Indicator         | # of Datasets Tagged |
|----------------------|----------------------|
| Human Dimensions     | 34                   |
| Health & Air Quality | 25                   |
| Climate Change       | 24                   |
| Food Availability    | 17                   |
| Disasters            | 13                   |
| Extreme Heat         | 9                    |
| Urban Flooding       | 6                    |
| Water Availability   | 6                    |

**Total number of datasets: 90**

**Some datasets are tagged  
with multiple indicators**

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| Intended Use<br>(Paths in the Spreadsheet) | # of Datasets in this<br>Category |
|--------------------------------------------|-----------------------------------|
| Exploration                                | 5                                 |
| Basic Analysis                             | 60                                |
| Advanced Analysis                          | 25                                |

No experience with Earth Science data or data analysis software required.

Some experience using Earth data required.

Significant experience using Earth Science data required.



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The technical team identified best practices for data:

- Curation
- Cleansing and
- Storage in the interface

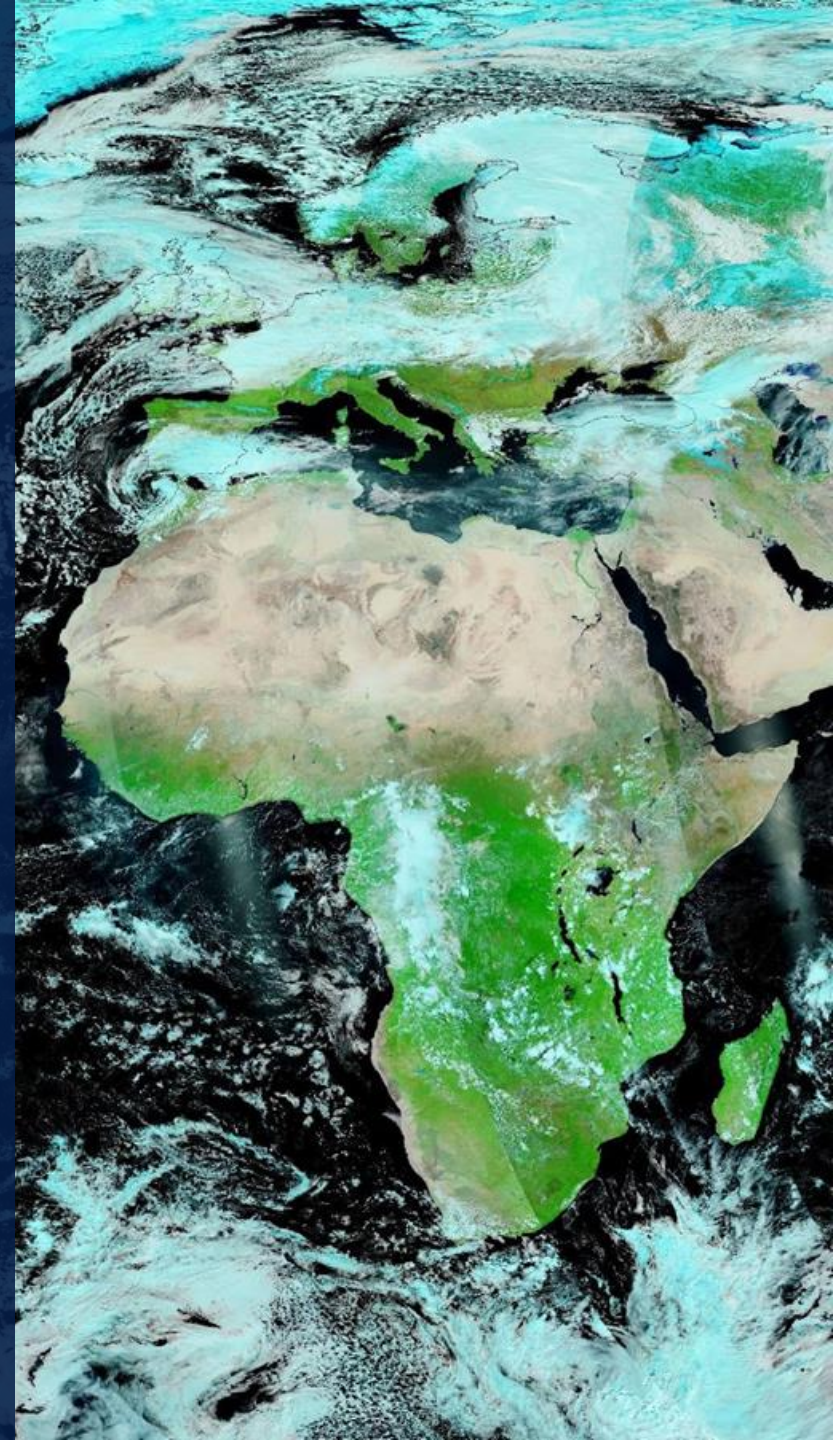
# Next Steps

- Incorporate datasets
  - remaining selected NASA datasets from EJ catalog
  - assess and incorporate new NASA datasets
- Incorporate new features
  - Filter by geographic area
  - Sort by newest first or alphabetical
  - Assess other requested features for feasibility
- Summer 2024 intern
  - Investigate new datasets and propose criteria for data inclusion
  - Assess accuracy of prototype workflow that, using AI, classifies datasets as relevant to EJ and assigns an indicator based on CMR metadata
- Collect user feedback!



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# Examples: Health & Air Quality



# Health & Air Quality / EJ Example: Aerosols and Their Impacts on Houston, TX

- This use case explored the relationships between urbanization, socioeconomic disparities, and environmental effects
- Incorporated the following datasets:
  - Aerosol optical depth (AOD)
  - Impervious surfaces
  - CDC's Social Vulnerability Index
- Initial findings show that trends are highly localized:
  - Galveston Bay: decrease in AOD from 2000 to 2019, potentially due to the Clean Air Act
  - Western Suburbs of Houston, TX: localized increase of AOD that correlates to urbanization

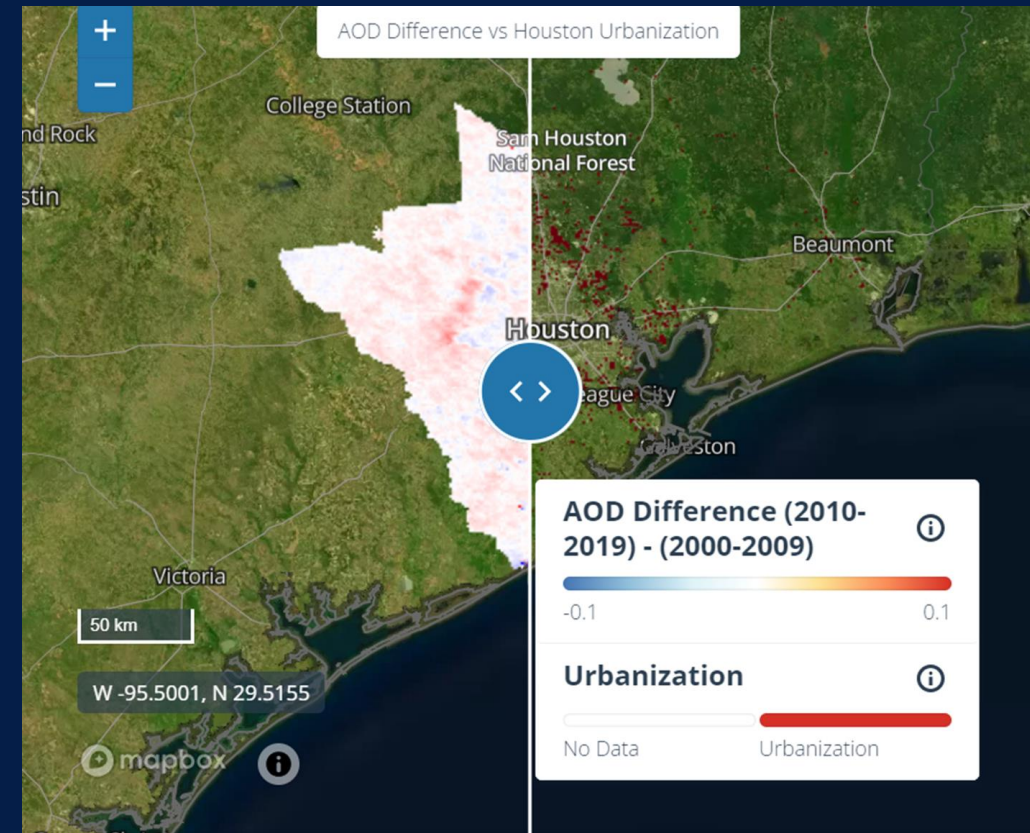


Figure 3: Aerosol Optical Depth Compared Decadally from 2000-2009 & 2010-2019 vs the Urbanization of the Houston metro from 2000-2019. The left portion of the map shows the subtracted difference in AOD over the last 20 years over the Houston metropolitan area.



# Science Discovery Engine

Demo!



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## 2024 TOTAL SOLAR ECLIPSE



On April 8, 2024, a total solar eclipse will cross North America, passing over Mexico, the United States, and Canada. A total solar eclipse happens when the Moon passes between the Sun and Earth, completely blocking the face of the Sun. The sky will darken as if it were dawn or dusk.

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# Your Turn to Explore with us!

STEP 1: Come up with a research question or thematic area of interest

STEP 2: Navigate to interface



STEP 3: Browse for datasets that are relevant to that area of interest, explore!

STEP 4: Complete the survey as you go!  
<https://forms.gle/4VPHc8hLZsNJ6VUU6>



**EARTHDATA**

# Science Discovery Engine Breakout Rooms

- Explore until 10:20 AM
- 10:20 -10:30 AM:
  - Share out what you've found.

