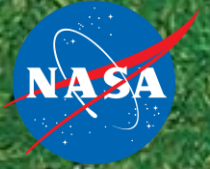


National Aeronautics and
Space Administration



Scan the to QR Code to
help us gather feedback!



EXPLORE EARTH

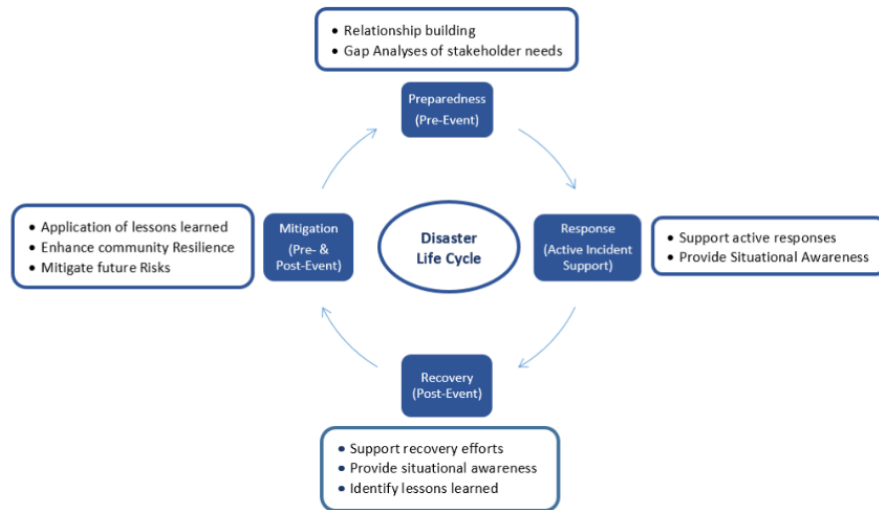
NASA Disasters Mapping Portal

Garrett Layne

Wednesday July 13, 2022

<https://disasters-nasa.hub.arcgis.com/>

NASA Disasters Program



- Program Mission: The Disasters Program mission is to use Earth observation to inform disaster risk reduction and resilience across the disaster cycle from local to global scales.
- Program Goals:
 - Harness NASA Capabilities for Disaster Risk Reduction (DRR) and resilience.
 - Engage stakeholders in the use of Earth Observations (EO) throughout the disaster lifecycle.
 - Demonstrate the value and impact of EO to support decision making and actions.
 - Grow as a trusted source for delivering useful results.

Major Disasters the Program has Responded to since 2020

- **2022**

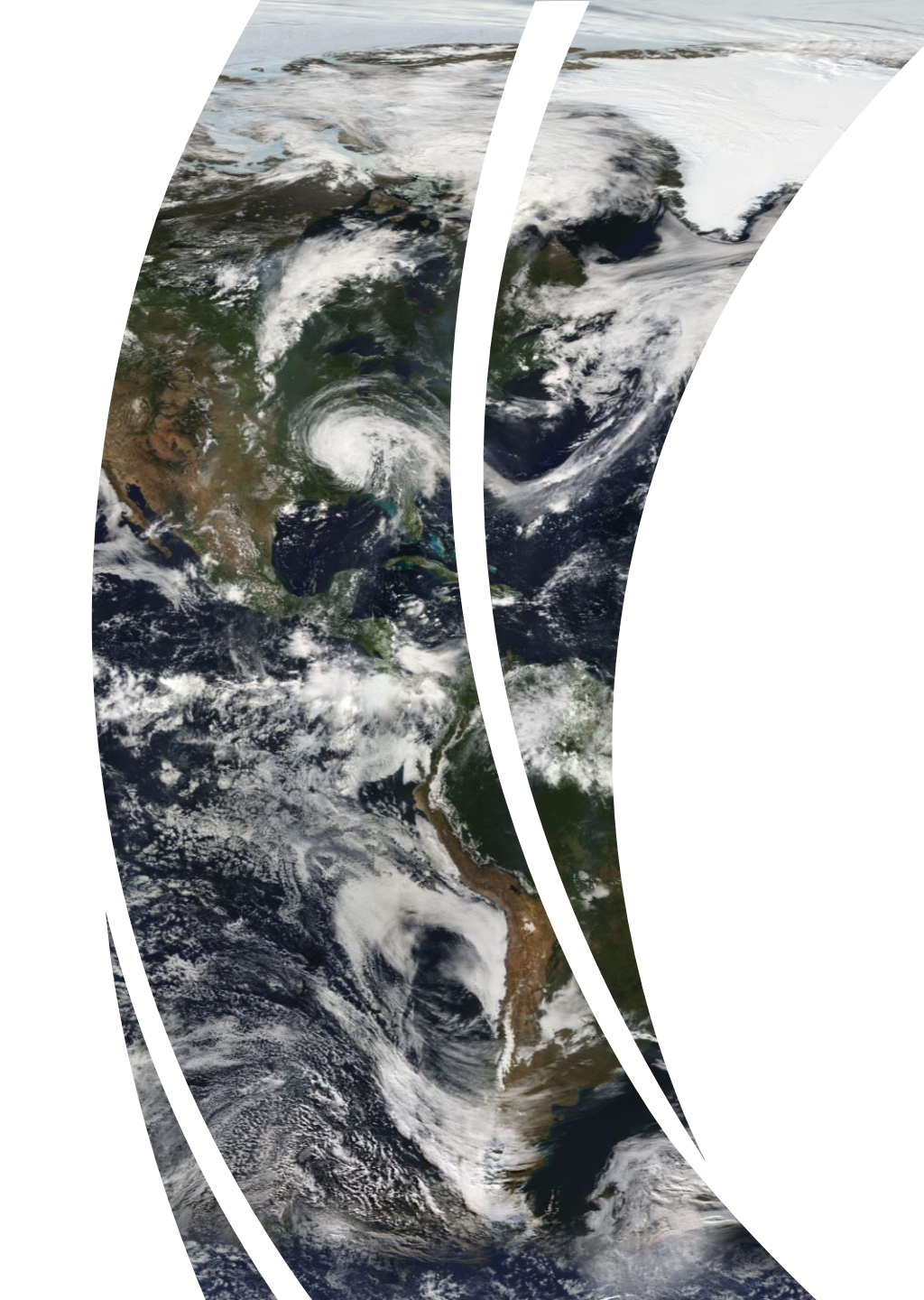
- Tonga Volcano Eruption

- **2021**

- December 10-11, 2021 US Tornado Outbreak
- Hurricane Ida
- La Palma Volcano Eruption
- Haiti Earthquake
- La Soufriere Volcano Eruption

- **2020**

- Atlantic Hurricane Season
 - Eta, Iota, Laura, Delta
- Western US Fire Season
- Puerto Rico Earthquake
- April 2020 US Tornado Outbreak
- Australia Fires



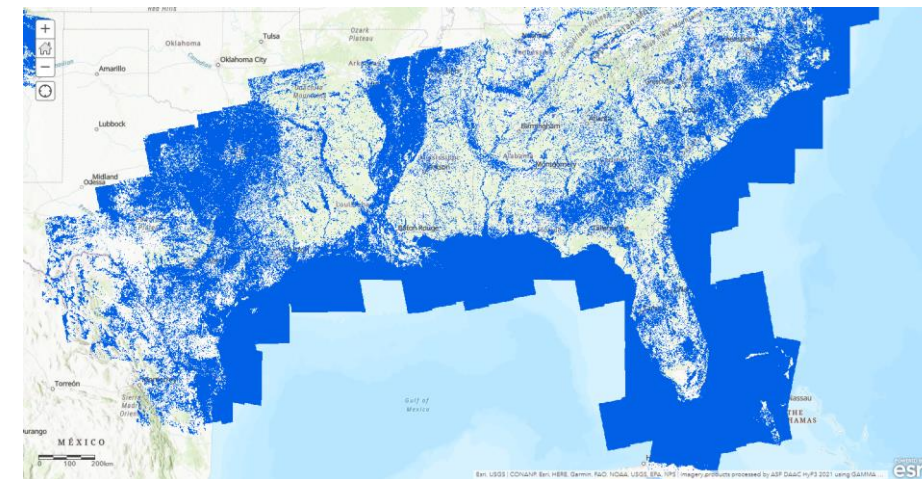
What is the NASA Disasters Mapping Portal?

<https://disasters-nasa.hub.arcgis.com/>

- The hub of geospatially enabled NASA disaster products
- Uniform format allows easy ingestion by emergency managers and the public
- Designed to cater to GIS and remote sensing users of all levels
- All data is free and openly available without any login requirements
- Every product has REST and WMS endpoints
- Two types of products:
 - Event-based Products
 - Near Real-Time Products

What's New on the Portal

- Recently upgraded to Enterprise 10.9.1
- Added data download capabilities for most products
- Expanded WMS capabilities
- Near Real-Time Products
 - LIS Soil Moisture Percentile: 10cm, 100cm, 200cm (CONUS only)
 - LIS Soil Moisture (10cm and 40cm), Greenness Fraction, Snow Depth for Alaska
 - VIIRS Black Marble Nighttime Blue/Yellow Composite (Global)
 - MODIS and VIIRS True Color and False Color Optical Imagery (Global)
 - Global Landslide Hazard: LHASA 2.0 (Global)
- Automated Synthetic Aperture (SAR) imagery and water extent image services from the Alaska Satellite Facility for the Gulf and Atlantic Coasts of the United States
- 3-meter data from Planet Labs



Using Planet Data

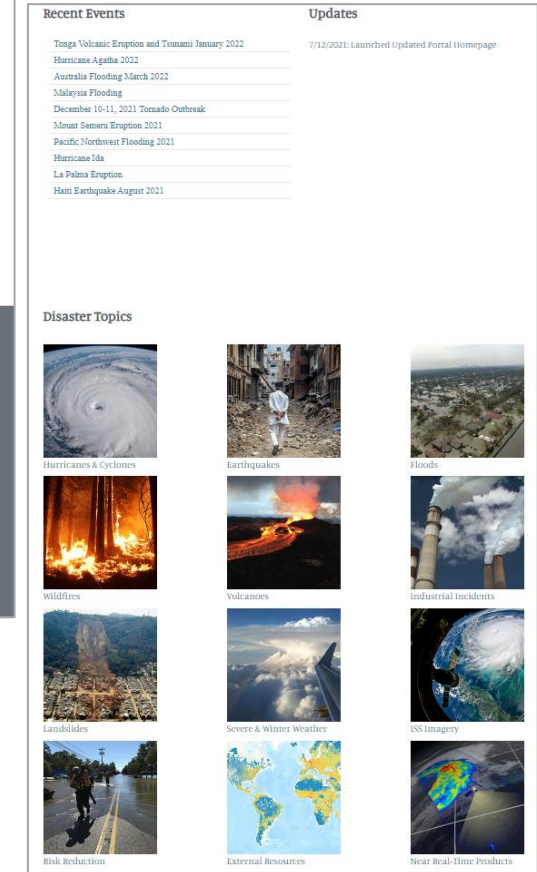
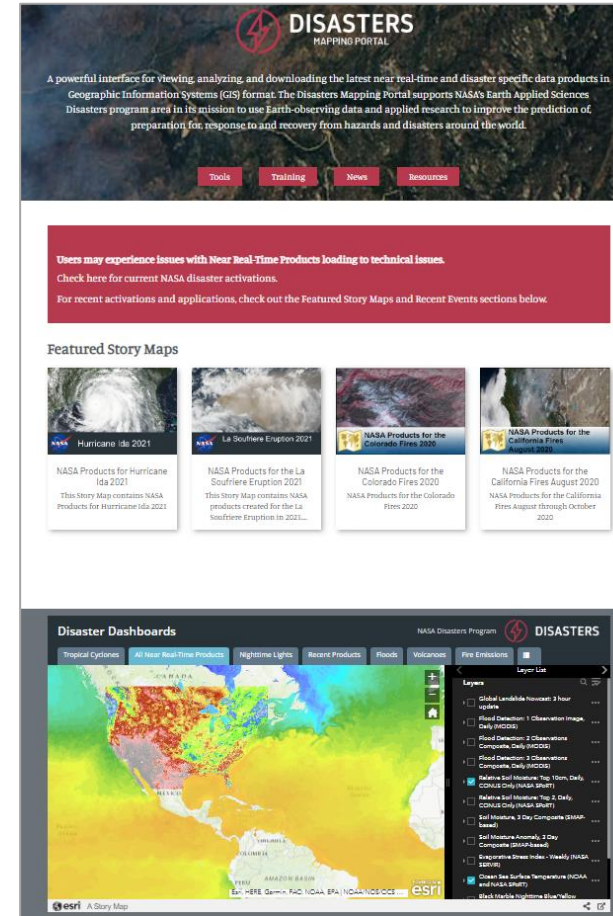


- Top: Ashfall and destroyed vegetation on an island in Tonga after the Hunga Tonga-Hunga Ha'apai Volcano Eruption
- Left: Planet data processed for the December 10-11, 2021 United States Tornado Outbreak
- Left Inset: Mayfield, KY Planet image with NWS Path and Damage Points



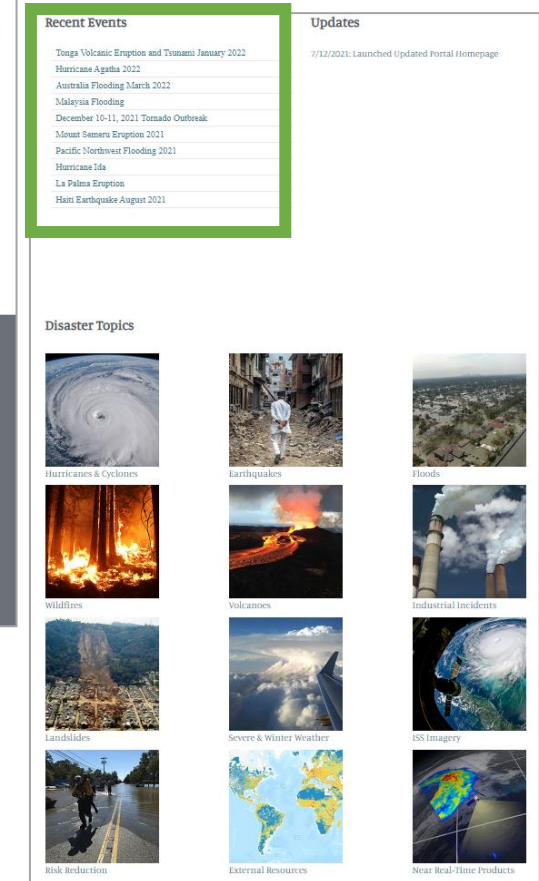
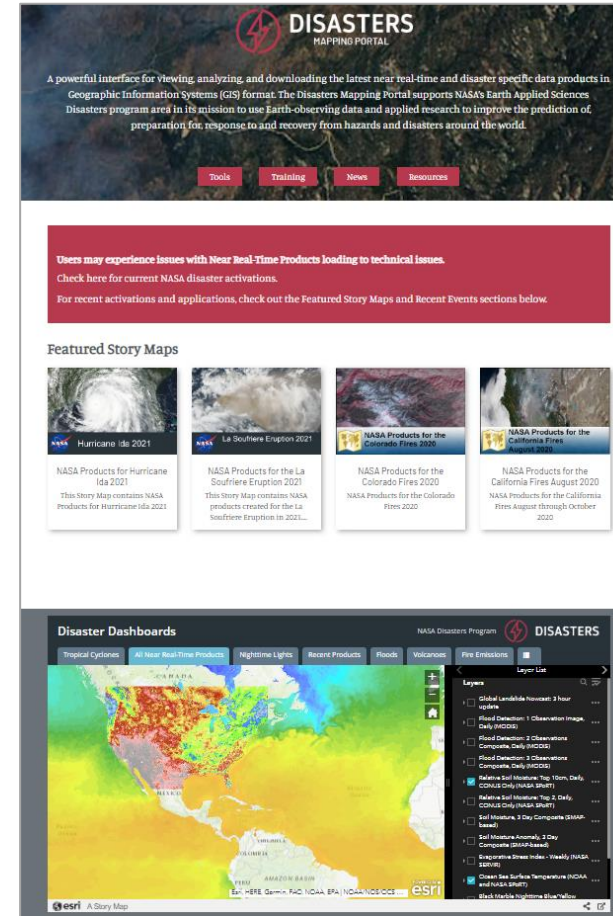
Portal Home

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Product Gallery

Hurricane Ida, August 2021

- Event-specific products
- Relevant Near Real-Time Products
- Relevant Dashboards
- Story Map (if created)

DISASTERS NASA Products for Hurricane Ida 2021 Search Menu

ARIA Damage Proxy Map (Copernicus Sentinel-1) on 9/3/2021 for Hurricane Ida 2021

Black Marble High-Definition for New Orleans due to Hurricane Ida 2021

Black Marble Nighttime Blue/Yellow Composite (VIIRS / Suomi-NPP) for Hurricane Ida 2021

LIS Soil Moisture Percentile: 0-10 cm

LIS Soil Moisture Percentile: 0-100 cm

LIS Soil Moisture Percentile: 0-200 cm

NASA Products for Hurricane Ida 2021

Near Real-Time Products for Tropical Cyclones

Optical Imagery (Satellogic) on 8/30/2021 for Hurricane Ida 2021

RGB Composite (Copernicus Sentinel-1) for Hurricane Ida 2021

SAR Hurricane Monitoring for the Gulf and East Coast (Copernicus Sentinel-1, Alaska Satellite Facility)

Shortwave Infrared Imagery (Copernicus Sentinel-2) for Hurricane Ida

True Color Imagery (Copernicus Sentinel-2) for Hurricane Ida

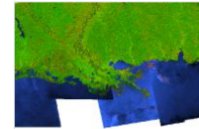
UAVSAR Imagery for Hurricane Ida 2021

Water Extents (Copernicus Sentinel-1) for Hurricane Ida 2021

Item Details Page

- Date of Image(s)
- Summary
- Suggested Usage
- Satellite/Sensor
- Credits
- Esri REST Endpoint – For all Esri and some open-source software
- WMS Endpoint – For open-source software
- Terms of Use – Open to all users
- Data Download

Edit thumbnail



Add to Favorites

RGB Composite (Copernicus Sentinel-1) for Hurricane Ida 2021

Edit

Map Image Layer by gwlayne

Created: Sep 1, 2021 Updated: Sep 13, 2021 View Count: 245

Description

Edit

Dates of Images:

8/17/2021, 8/18/2021, 8/22/2021, 8/23/2021, 8/24/2021, 8/29/2021, 8/30/2021, 8/31/2021, 9/4/2021, 9/5/2021, 9/7/2021

Date of Next Image:

Unknown

Summary:

The Alaska Satellite Facility has developed a false color Red, Green, Blue (RGB) composite image of the Sentinel-1A/B Synthetic Aperture Radar (SAR) instrument which assigns the co- and cross-polarization information to a channel in the RGB composite. When used to support a flooding event, areas in blue denotes water present at the time of the satellite overpass before or after the start of the flooding event.

Suggested Use:

In this image, water appears in blue, vegetated areas in shades of green and urban areas in bright orange. It is recommended to use this product with ancillary information to derive flooded areas.

Satellite/Sensor:

Copernicus Sentinel-1 Synthetic Aperture Radar (SAR).

Resolution:

30 meters

Credits:

NASA/MSFC, ESA Copernicus

Esri REST Endpoint:

See URL section on the right side of page.

WMS Endpoint:

Data Download:

https://maps.disasters.nasa.gov/download/gis_products/event_specific/2021/hurricane_ida/sentinel1/rgb/

Open in Map Viewer Classic

Open in Scene Viewer

Open in ArcGIS Desktop

Share

Metadata

Item Information

Learn more



Top Improvement: Add a longer summary

Details

Source: Map Service

Size: 1 KB

★★★★★



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Edit



Owner

Change owner

GL gwlayne

Folder

Move

hurricane_ida_2021

Tags

Edit

NASA, NASA Disasters Program, Hurricane Ida, Louisiana, Sentinel-1, Copernicus, ESA, SAR, Flooding

Credits (Attribution)

Edit

NASA/MSFC, ESA Copernicus

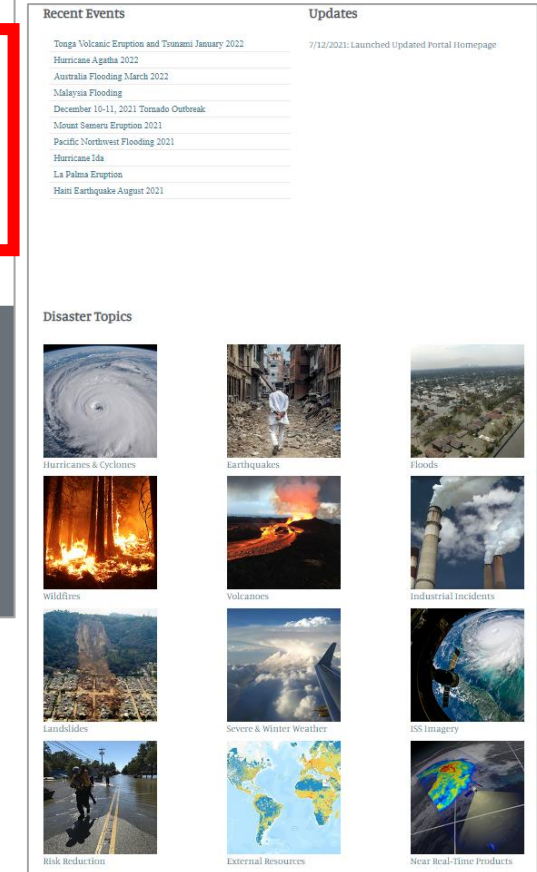
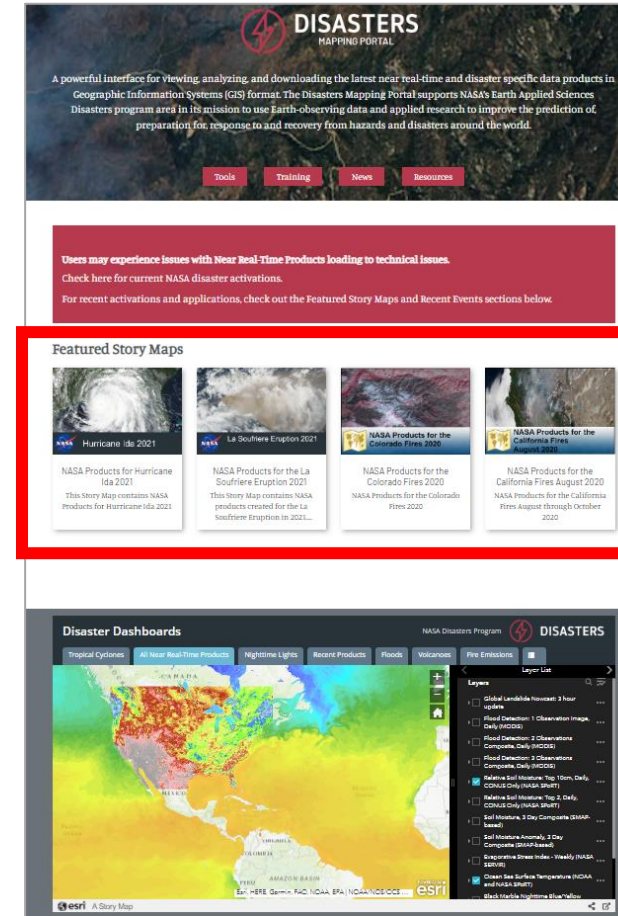
URL

View

<https://maps.disasters.nasa.gov/ags04/>

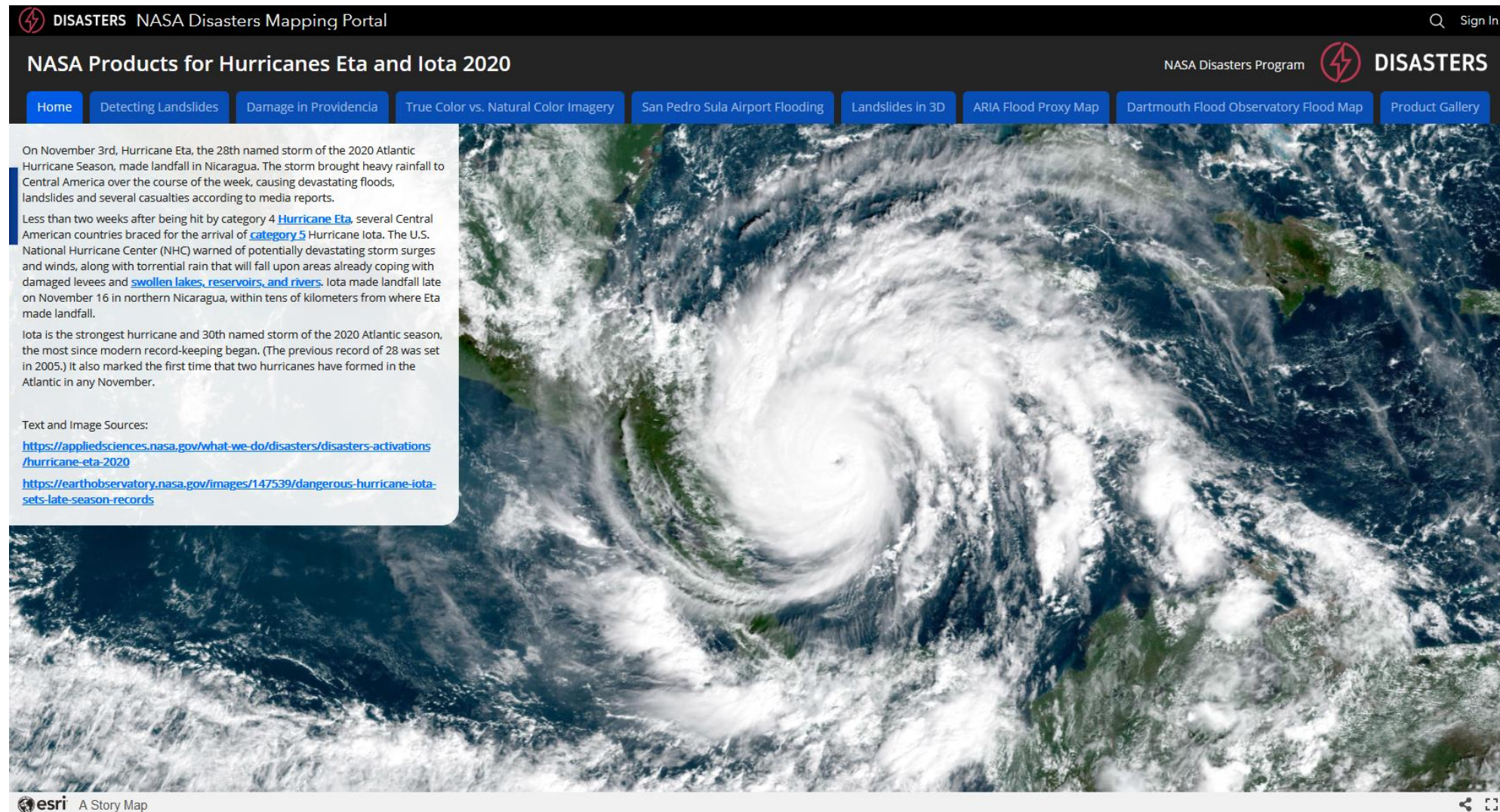
Portal Home

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Featured Story Maps

- Tell the disaster's story
- Show what's possible with NASA products
- Highlight notable products and disaster impacts
- Cater to new users and those less familiar with NASA and satellite data



The screenshot shows the NASA Disasters Mapping Portal interface. At the top, it says "DISASTERS NASA Disasters Mapping Portal" and "NASA Disasters Program DISASTERS". Below the header is a navigation bar with buttons for "Home", "Detecting Landslides", "Damage in Providencia", "True Color vs. Natural Color Imagery", "San Pedro Sula Airport Flooding", "Landslides in 3D", "ARIA Flood Proxy Map", "Dartmouth Flood Observatory Flood Map", and "Product Gallery". The main content area features a large satellite image of a hurricane over the ocean. To the left of the image is a text box with the following content:

On November 3rd, Hurricane Eta, the 28th named storm of the 2020 Atlantic Hurricane Season, made landfall in Nicaragua. The storm brought heavy rainfall to Central America over the course of the week, causing devastating floods, landslides and several casualties according to media reports.

Less than two weeks after being hit by category 4 [Hurricane Eta](#), several Central American countries braced for the arrival of [category 5](#) Hurricane Iota. The U.S. National Hurricane Center (NHC) warned of potentially devastating storm surges and winds, along with torrential rain that will fall upon areas already coping with damaged levees and [swollen lakes, reservoirs, and rivers](#). Iota made landfall late on November 16 in northern Nicaragua, within tens of kilometers from where Eta made landfall.

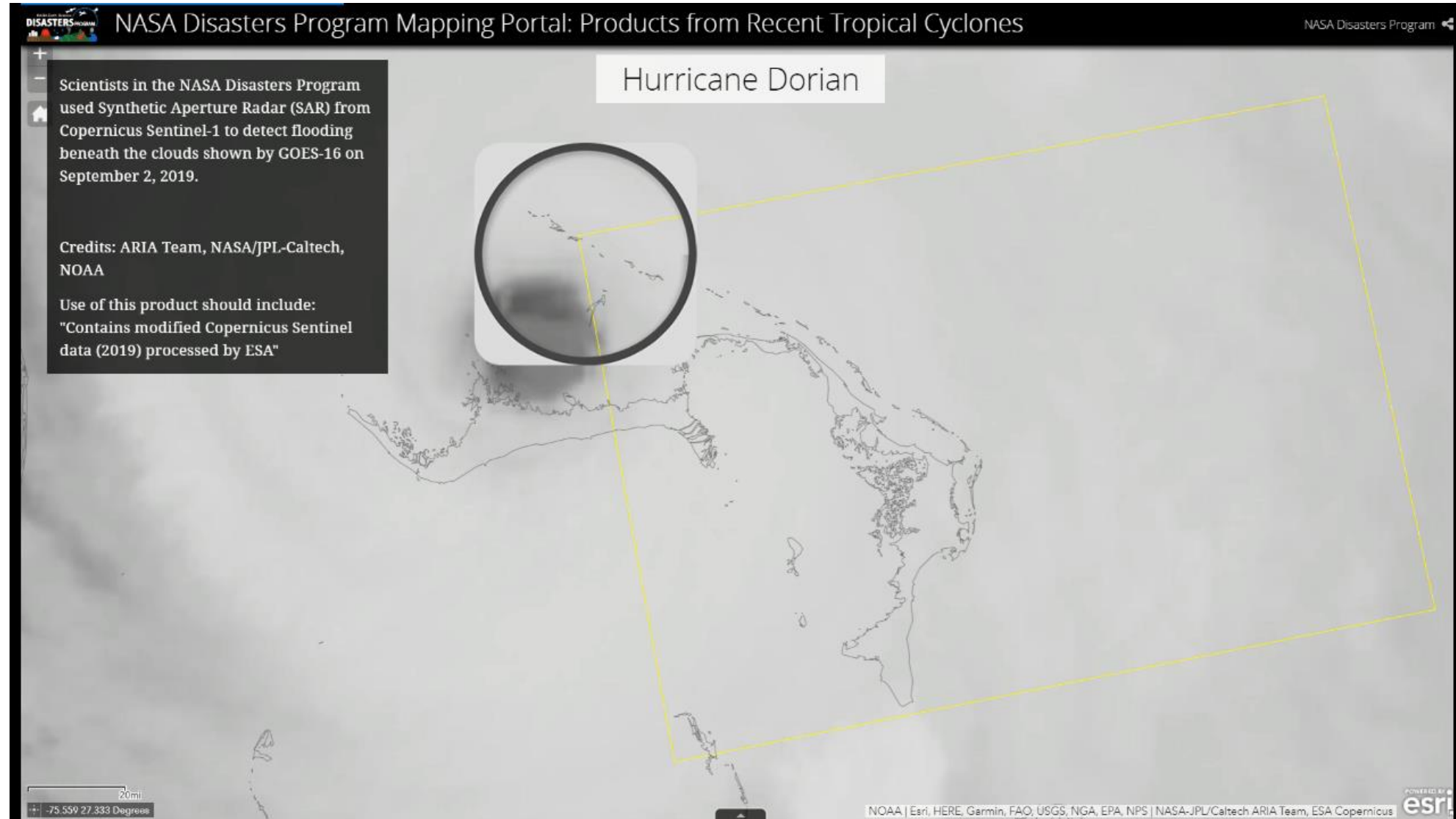
Iota is the strongest hurricane and 30th named storm of the 2020 Atlantic season, the most since modern record-keeping began. (The previous record of 28 was set in 2005.) It also marked the first time that two hurricanes have formed in the Atlantic in any November.

Text and Image Sources:
<https://appliedsciences.nasa.gov/what-we-do/disasters/disasters-activations/hurricane-eta-2020>
<https://earthobservatory.nasa.gov/images/147539/dangerous-hurricane-iota-sets-late-season-records>

At the bottom left of the map, it says "esri A Story Map".

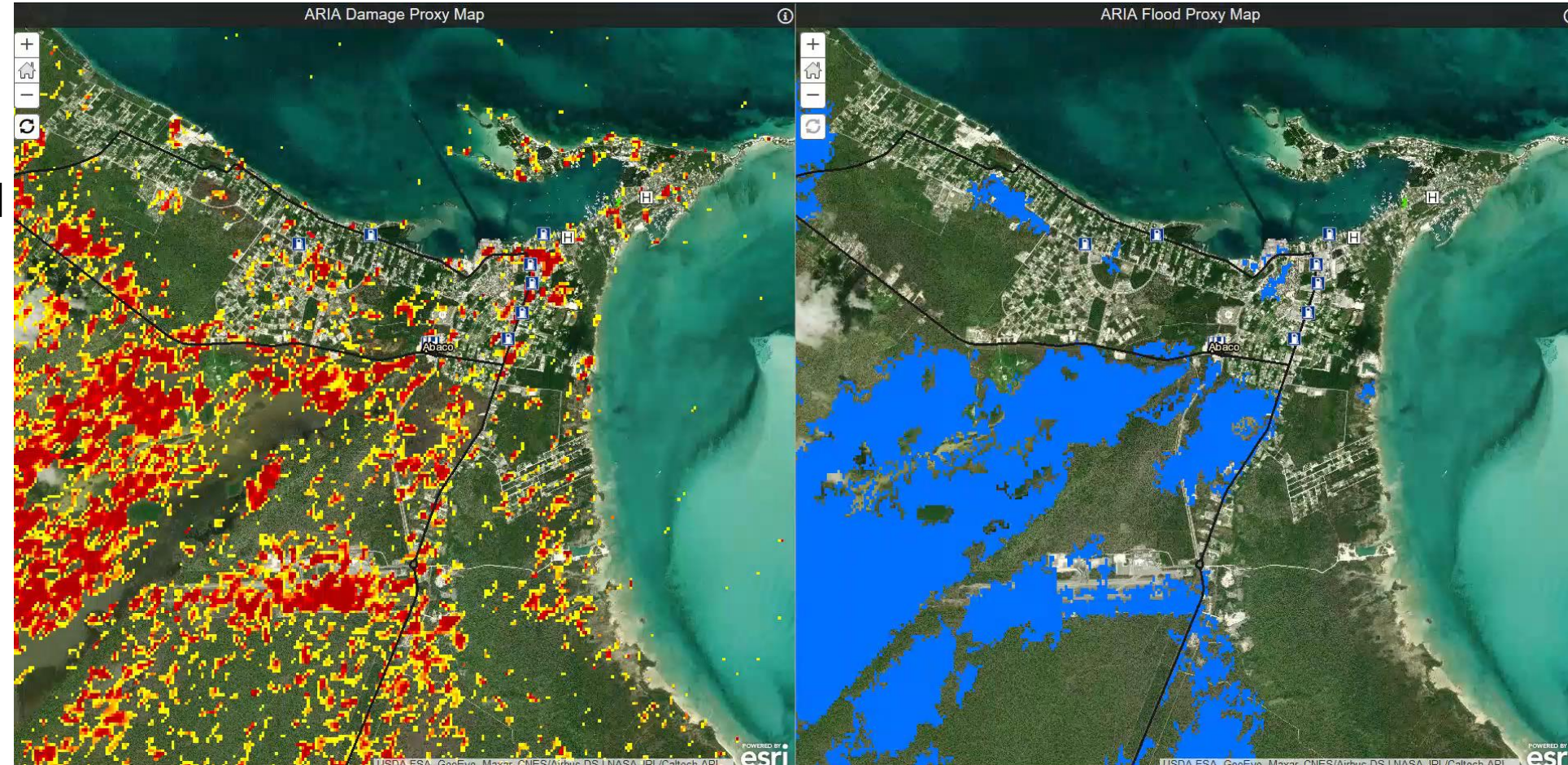
Interactive widgets and web apps

- Help explain products
- Explain the differences between different types of sensors
- Show ways to use data
- Sentinel-1 Flood Proxy Map overlaid with GOES 16 image at the same time



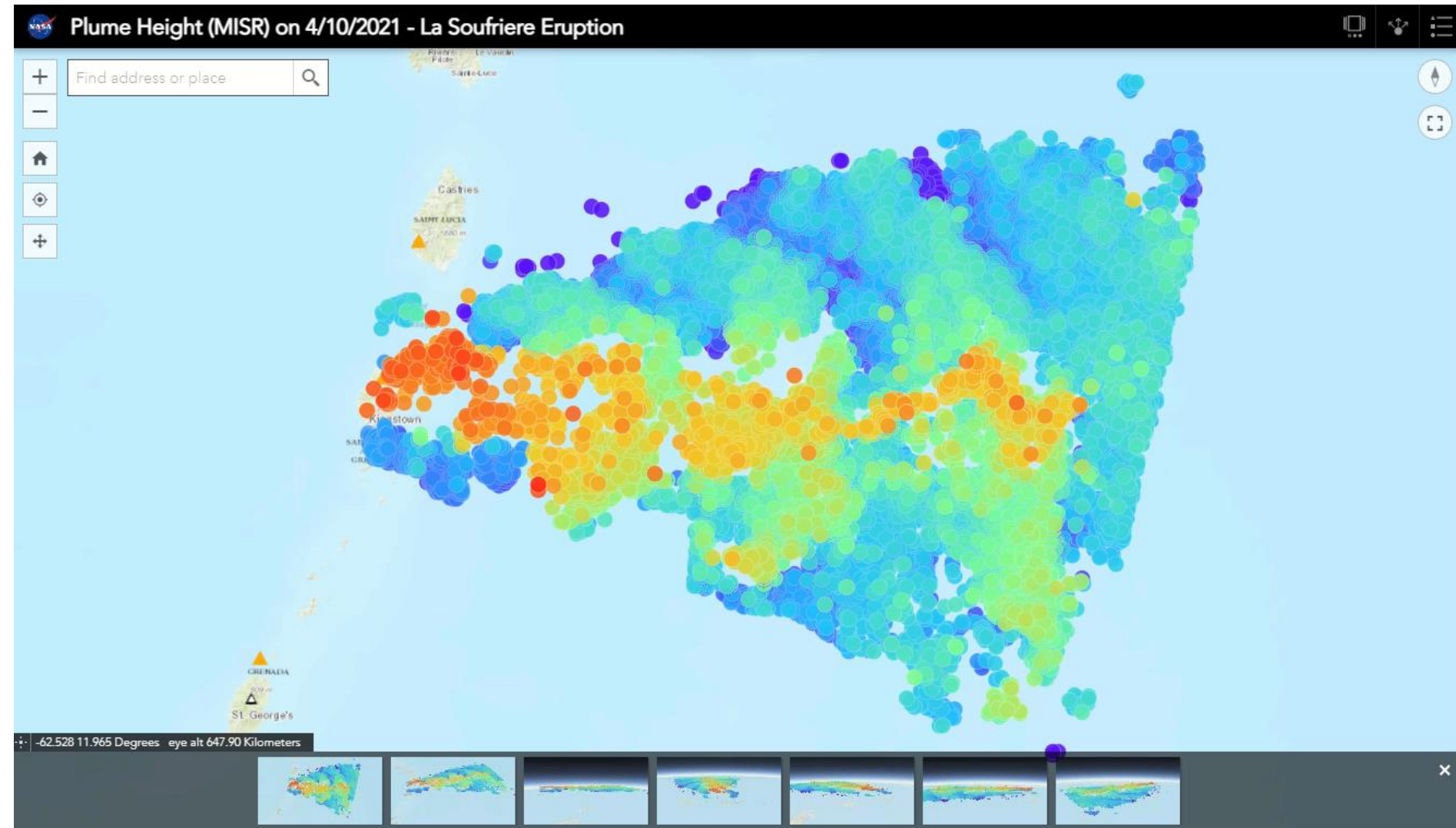
Show What's Possible

- Damage and Flood Proxy Maps
- Resolution: 30m
- SAR-based change detection
- Combine with infrastructure data to show potentially damaged or flooded assets



Engaging Applications

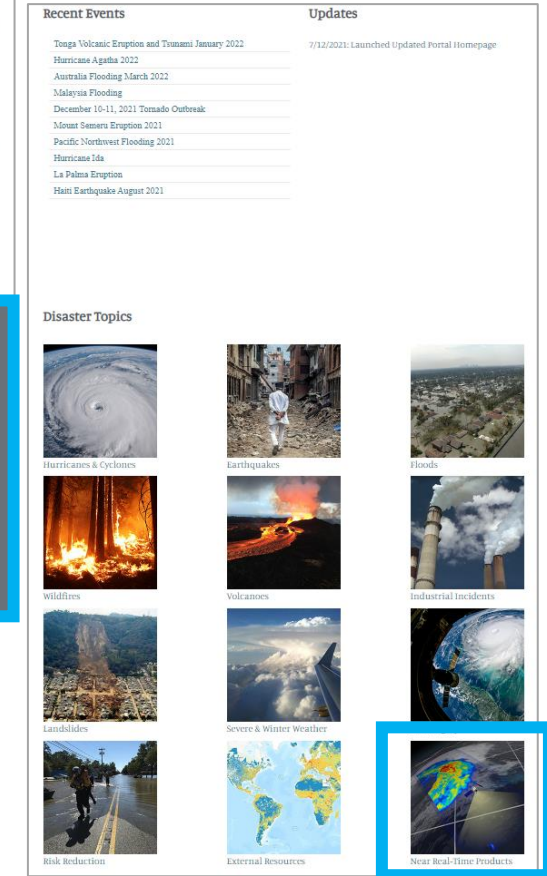
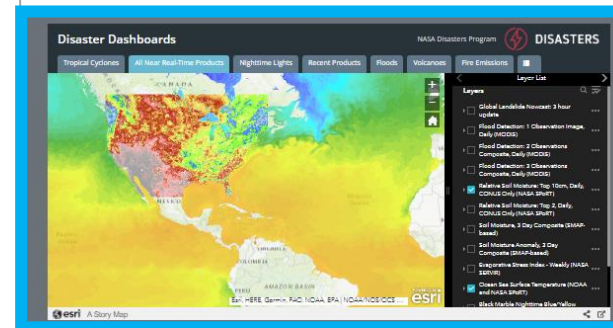
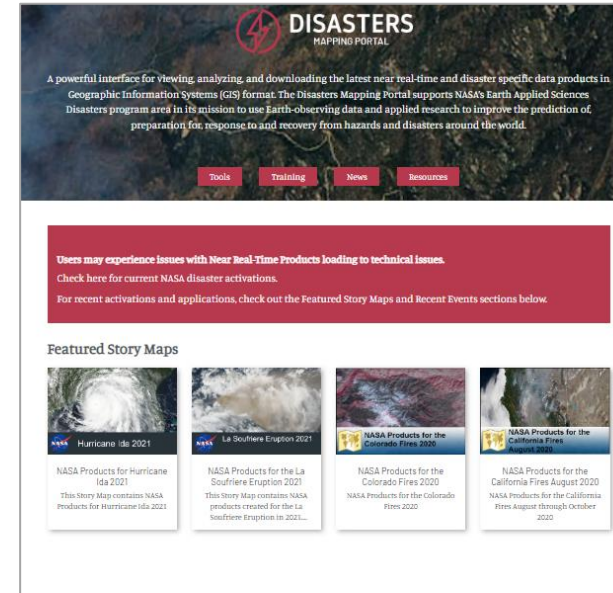
- MISR 3D volcanic plume heights
- Shows the height and structure of the volcanic plume at La Soufriere
- Gives a better understanding of the distribution and transport of the volcanic plume



Esri, HERE, Garmin, FAO, USGS | Source: USGS, NGA, NASA, CGIAR, GEBCO, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen and the GIS User Community | Active Aerosol Plume (AAP) Project, V. Flower, R. Kahn, K. Ju... Powered by Esri

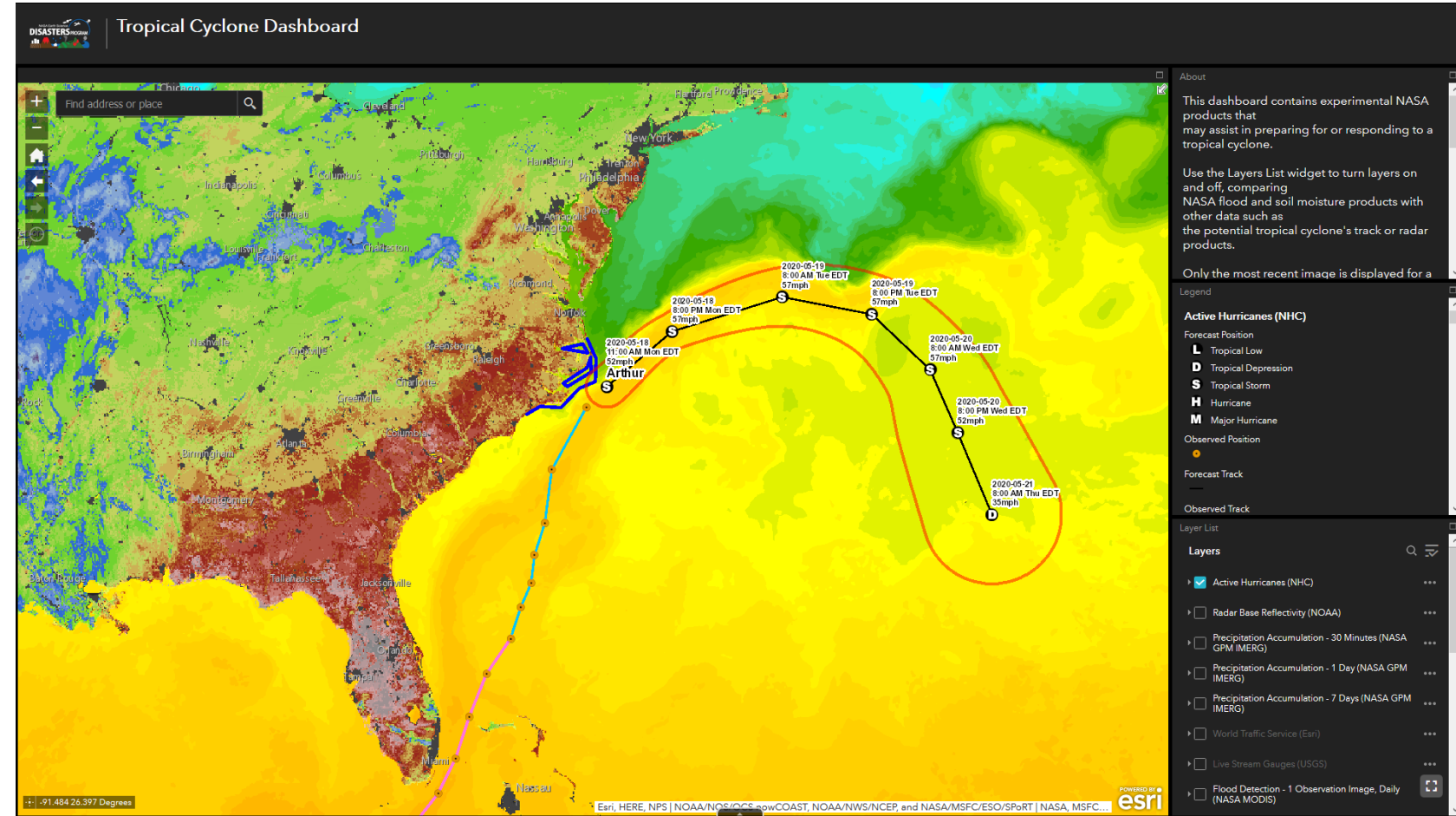
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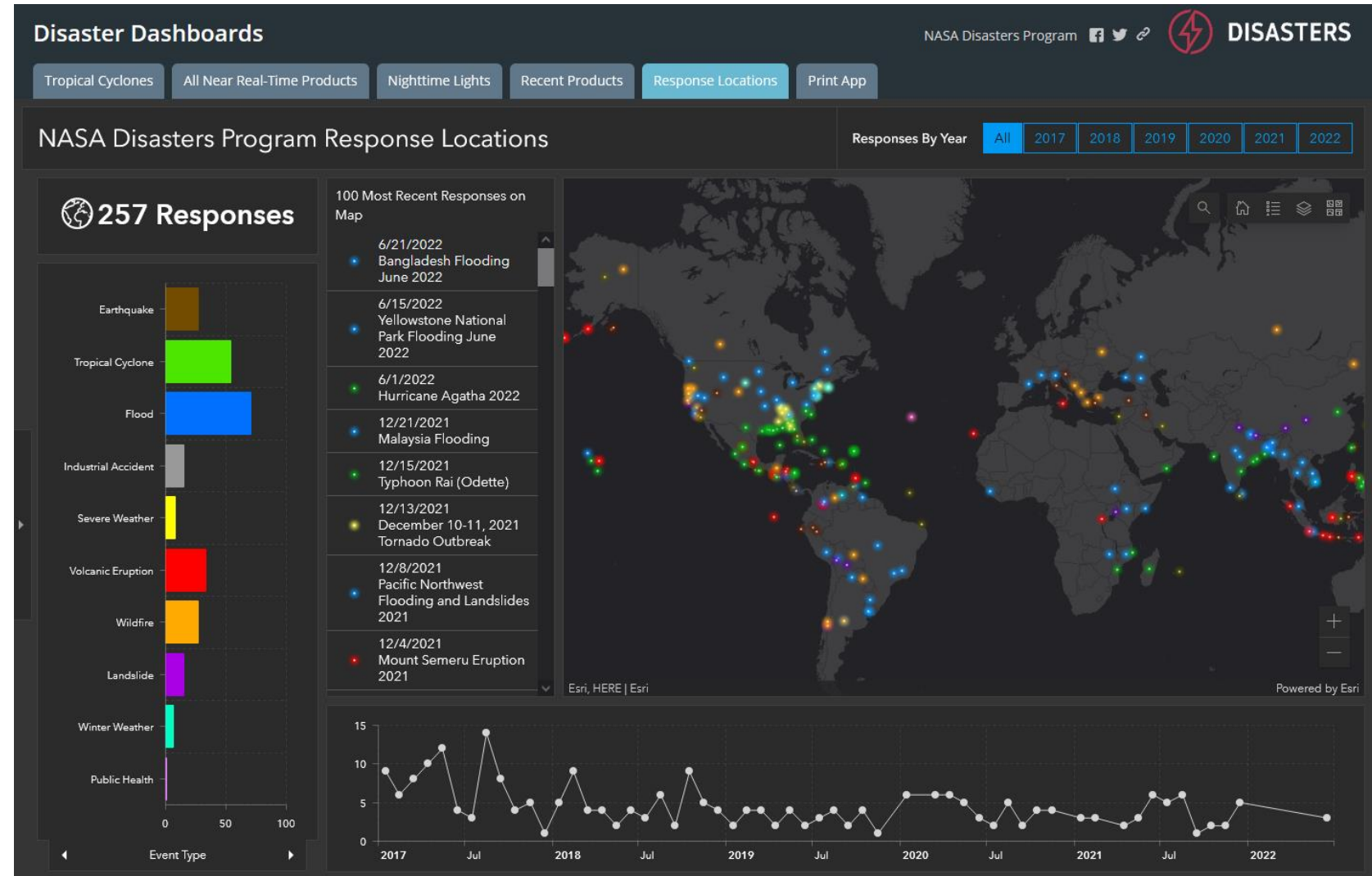
Tropical Cyclone Dashboard

- Demonstrate ways to combine NASA data with other sources
- Layers include:
 - Soil Moisture (NASA)
 - MODIS Flood Products (NASA)
 - Hurricane Forecast Track (NOAA)
 - Radar (NOAA)
 - Stream Gauges (USGS)
 - Sea Surface Temp. (NOAA/NASA SPoRT)
 - GOES Imagery (NOAA)



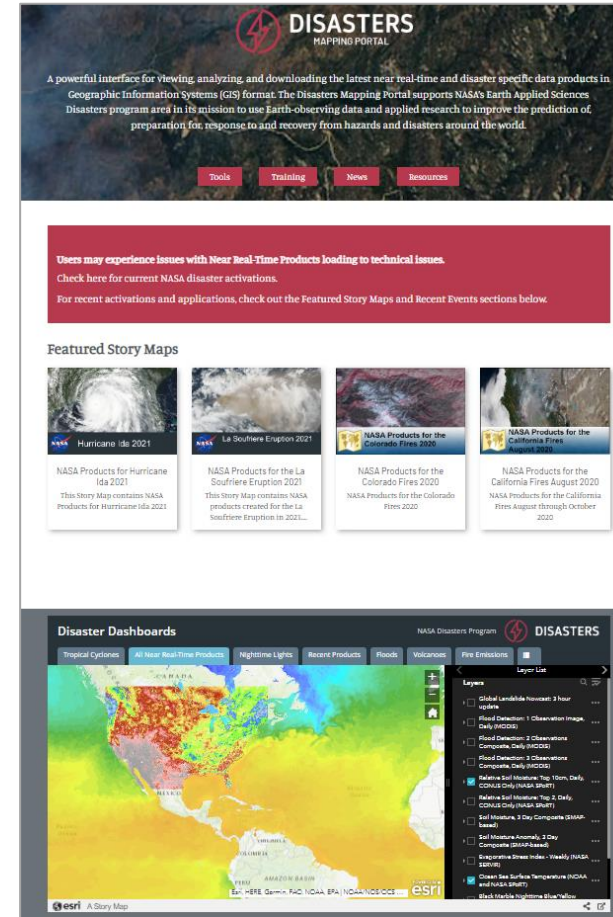
Response Locations Dashboard

- Interactive dashboard showing where the NASA Disasters Program has activated since 2017
- Allows users to query by year, hazard type, and location using the map
- Users can discover GIS products created for the event, if applicable

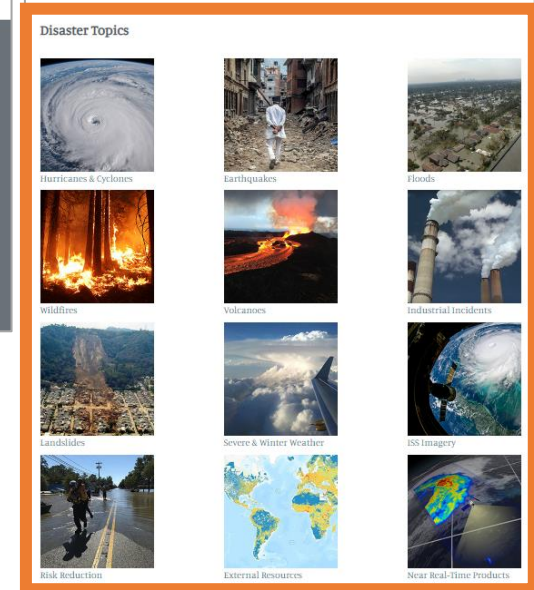


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Recent Events	Updates
Tonga Volcanic Eruption and Tsunami January 2022	7/12/2021: Launched updated Portal Homepage
Hurricane Agatha 2022	
Australia Flooding March 2022	
Malaysia Flooding	
December 10-11, 2021 Tornado Outbreak	
Mount Semera Eruption 2021	
Pacific Northwest Flooding 2021	
Hurricane Ida	
La Palma Eruption	
Haiti Earthquake August 2021	



Hurricanes and Cyclones Page

- Response Location Dashboard
- Past event Story Maps and Product Galleries

NASA's fleet of Earth observing satellites can provide a wealth of information before, during, and after a hurricane or cyclone makes landfall. This page contains all of the hurricanes and cyclones the Disasters Program has responded to.

NASA Disasters Program Response Locations

Responses By Year: All, 2017, 2018, 2019, 2020, 2021, 2022

65 Responses

100 Most Recent Responses on Map

- 6/1/2022 Hurricane Agatha 2022
- 12/15/2021 Typhoon Rai (Odette)
- 10/25/2021 Hurricane Rick
- 8/27/2021 Hurricane Ida
- 7/1/2021 Hurricane Fina

Tropical Cyclone: 64

Event Type: Tropical Cyclone

Line Graph: Responses by Year (2017-2022)

Tropical cyclones develop primarily in the summer months in regions with very warm sea surface temperatures, high low-level humidity and resulting instability that favors the development of thunderstorms, low amounts of vertical wind shear, and within the lower latitudes where these environments combine with a Coriolis force sufficient for establishing a surface area of lower pressure. As they build in intensity, tropical waves and disturbances progress through categories of tropical depressions and named tropical storms, then to hurricanes and major hurricanes, the latter defined as a category three or higher on the Saffir-Simpson hurricane scale.

Event Response Story Maps

These Story Maps contain NASA Products created for these events and other information to help interpret the data.

Hurricane Ida 2021

NASA Products for Hurricane Ida 2021

Explore

NASA Products for Hurricanes Eta and Iota 2020

NASA Products for Hurricanes Eta and Iota 2020

Explore

NASA Products for Hurricane Laura 2020

NASA Products for Hurricane Laura 2020

Explore

NASA Products: Cyclone Kenneth 2019

NASA Products for Cyclone Kenneth 2019

NASA Products for Cyclone Kenneth

Explore

Hurricane Dorian 2019

Hurricane Dorian 2019

NASA Storymap and products for Hurricane Dorian 2019.

Explore

NASA Products: Cyclone Idai 2019

NASA Products for Cyclone Idai 2019

NASA Products for Cyclone Idai 2019

Explore

NASA Products: Hurricane Michael

NASA Products for Hurricane Michael 2018

NASA Products for Hurricane Michael 2018

Explore

Recent NASA Products: Hurricane Florence

NASA Products for Hurricane Florence

A collection of NASA's products used in response to Hurricane Florence

Explore

Event Product Galleries

Click the links below to open the Product Gallery and discover NASA Products created for a specific event response.

Western Hemisphere Storms

- Hurricane Agatha 2022
- Hurricane Ida 2021
- Hurricane Elsa 2021
- Hurricane Zeta 2020
- Hurricanes Eta and Iota 2020
- Hurricane Delta 2020
- Hurricane Sally 2020
- Hurricane Laura 2020
- Hurricane Isaias 2020
- Tropical Storms Amanda/Cristobal 2020
- Hurricane Karen 2019
- Hurricane Dorian 2019
- Hurricane Barry 2019
- Hurricane Willa 2018
- Hurricane Michael 2018
- Hurricane Florence 2018
- Hurricane Lane 2018

Eastern Hemisphere Storms

- Cyclone Nisarga 2020
- Cyclone Amphan 2020
- Cyclone Harold 2020
- Typhoon Kammuri 2019
- Typhoon Hagibis 2019
- Cyclone Fani 2019
- Cyclone Kenneth 2019
- Cyclone Idai 2019
- Super Typhoon Yutu 2019
- Tropical Cyclone Gita 2018

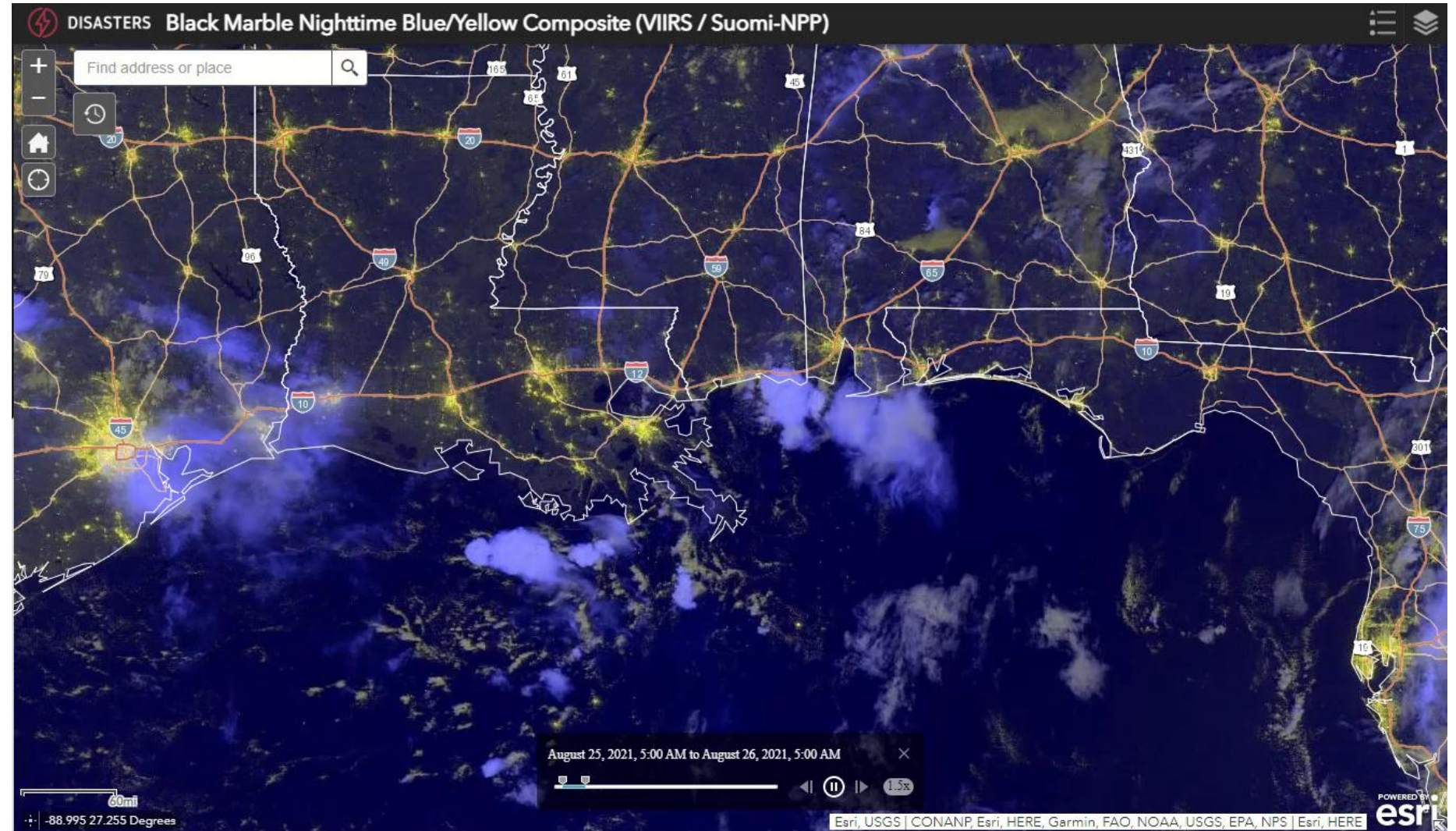
Near Real-Time Products

- Global unless noted otherwise
- Coarser resolution
- Automatically updated every few hours to daily or weekly
- Many products for the Caribbean
 - Black Marble Nighttime Blue/Yellow Composite
 - FIRMS Active Fire Points (MODIS, VIIRS)
 - Global Landslide Nowcast
 - Flood Detection – 2, 3 Observations (MODIS)
 - Precipitation Accumulation – 30 min, 3 hour, 1 day (GPM IMERG)
 - Soil Moisture and Soil Moisture Anomaly – 3-Day Composite (SMAP)
 - Evaporative Stress Index – weekly
 - Global Fire Emissions – Daily (VIIRS)
 - True Color Imagery – Daily (MODIS at 250m, VIIRS at 375m)
 - Natural Color Imagery – Daily (MODIS at 250m, VIIRS at 375m)



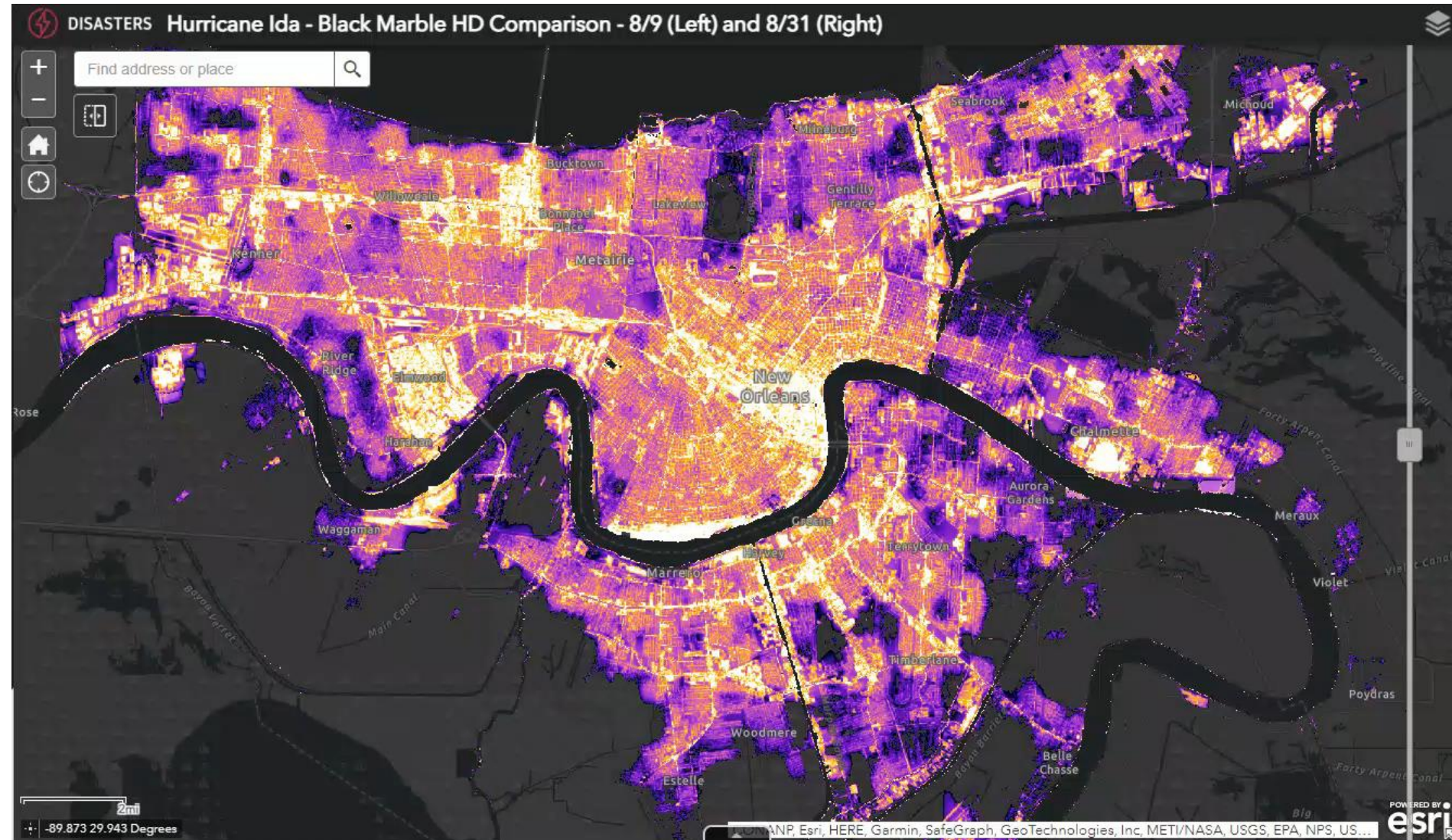
Hurricane Ida 2021

- Black Marble Nighttime Blue/Yellow Composite
- VIIRS/Suomi-NPP
- Resolution: 750 meters
- Near Real-Time Product, Updates Daily
- Data available within 3 hours of satellite overpass



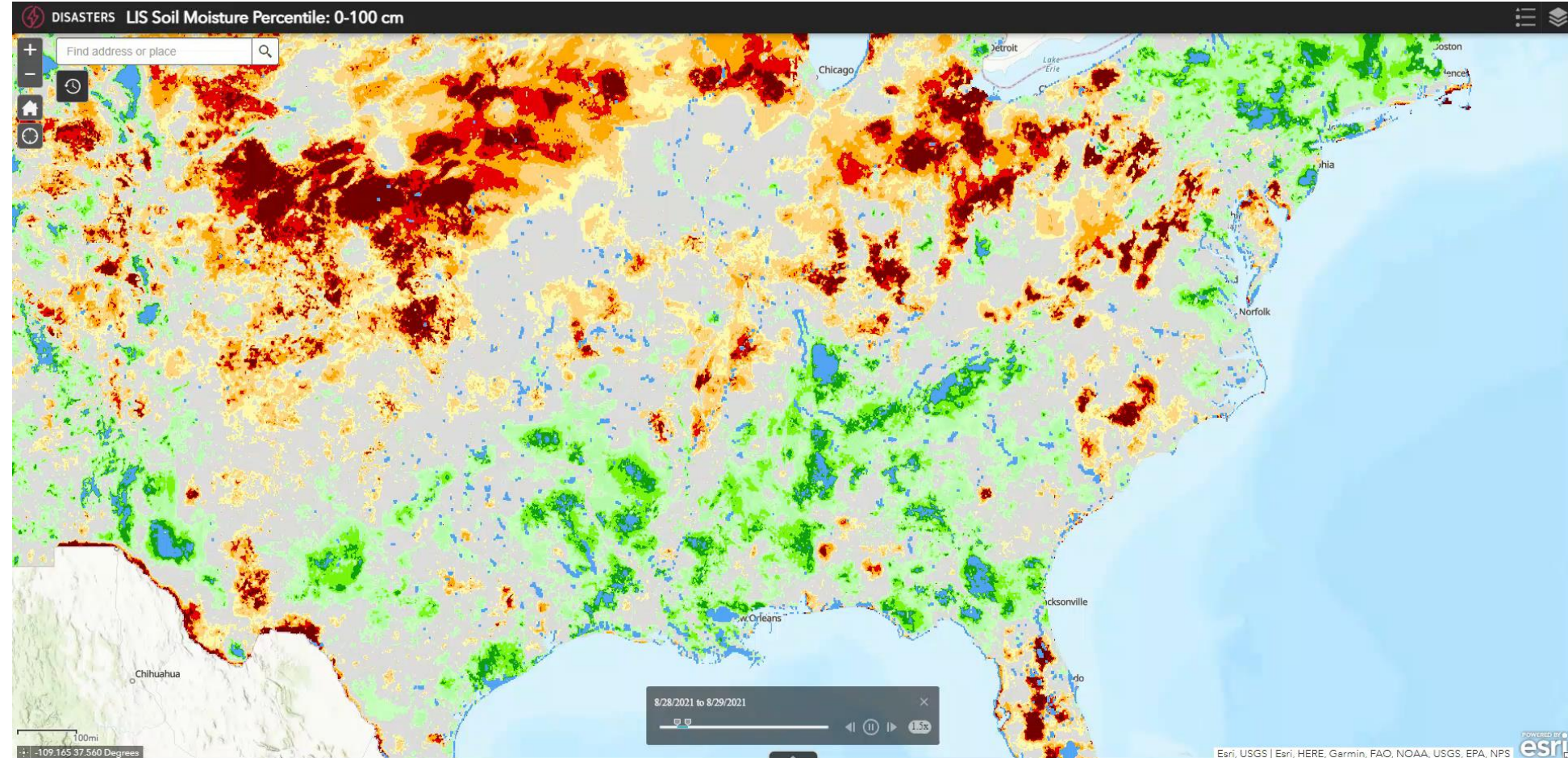
Hurricane Ida 2021

- Black Marble High Definition
- Resolution: 30 meters
- Created for event
- Usually takes 3-5 days to get produced



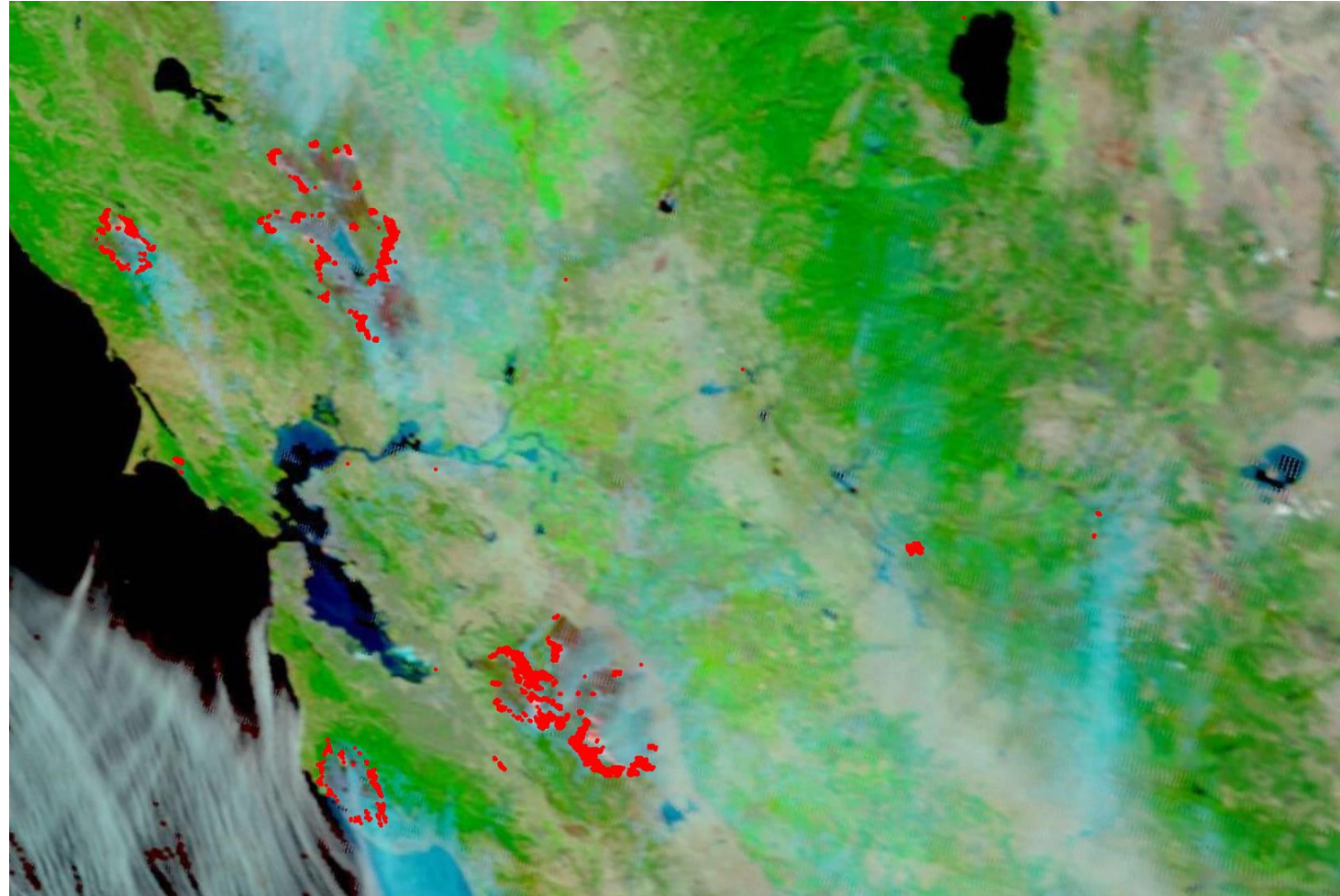
Hurricane Ida 2021

- Land Information System (LIS) Soil Moisture Percentile: 0-100cm
- Resolution: 3 km
- Near Real-Time Product, Updates Daily



California Wildfires 2020

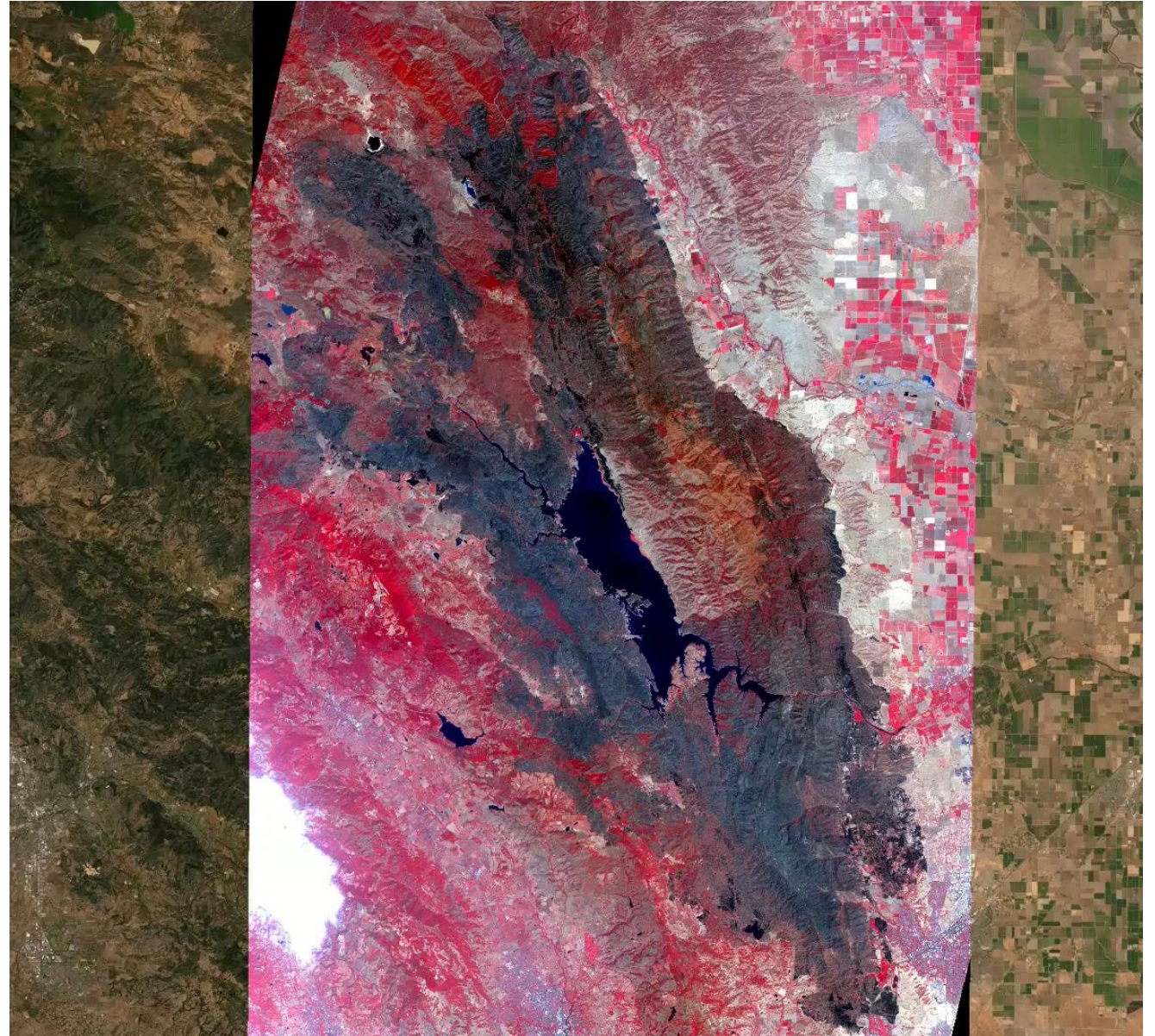
- Using Near Real-Time data to monitor and track the evolution of wildfires
 - MODIS and VIIRS Natural Color Imagery
 - FIRMS Active Fires Points
- Updates multiple times per day
- Moderate resolution at 500-750 meters
- Can see active hot spots, burn scars and smoke transport



FIRMS Active Fire Points and MODIS Terra Natural Color Imagery from 8/15/20 to 9/1/20

California Wildfires 2020

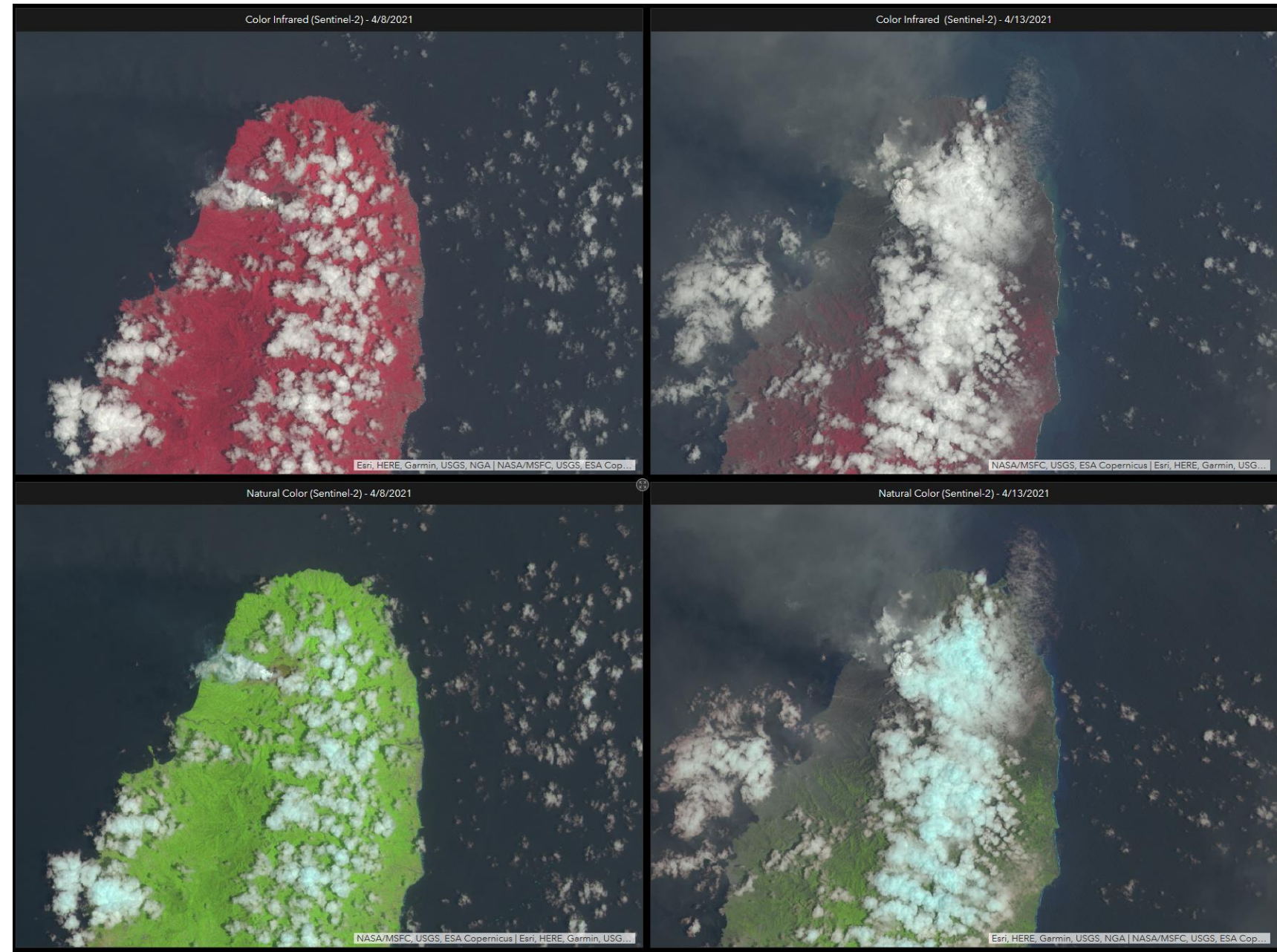
- FIRMS Active Fire Points
 - Daily global near real-time product
 - MODIS and VIIRS based
- ASTER Burn Scar
 - 15m resolution
 - Burned areas show as black/dark gray



FIRMS Active Fire Points (8/15/20 to 9/2/20) over an ASTER false color image (9/2/20)

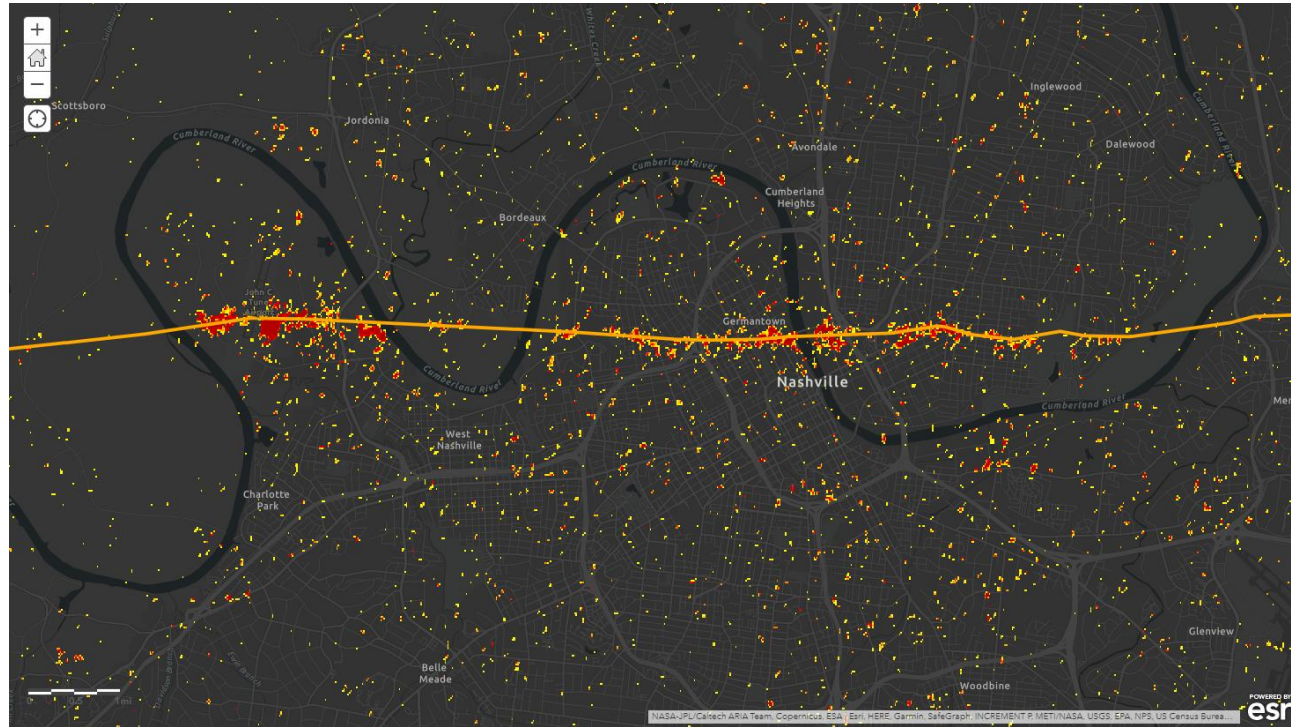
La Soufriere Volcano Eruption

- Copernicus Sentinel-2 False Color (Top) and Natural Color (Bottom) imagery
- Shows before and after the eruption
- Shows the benefits of different band combinations to see different features
- Resolution: 20 meters



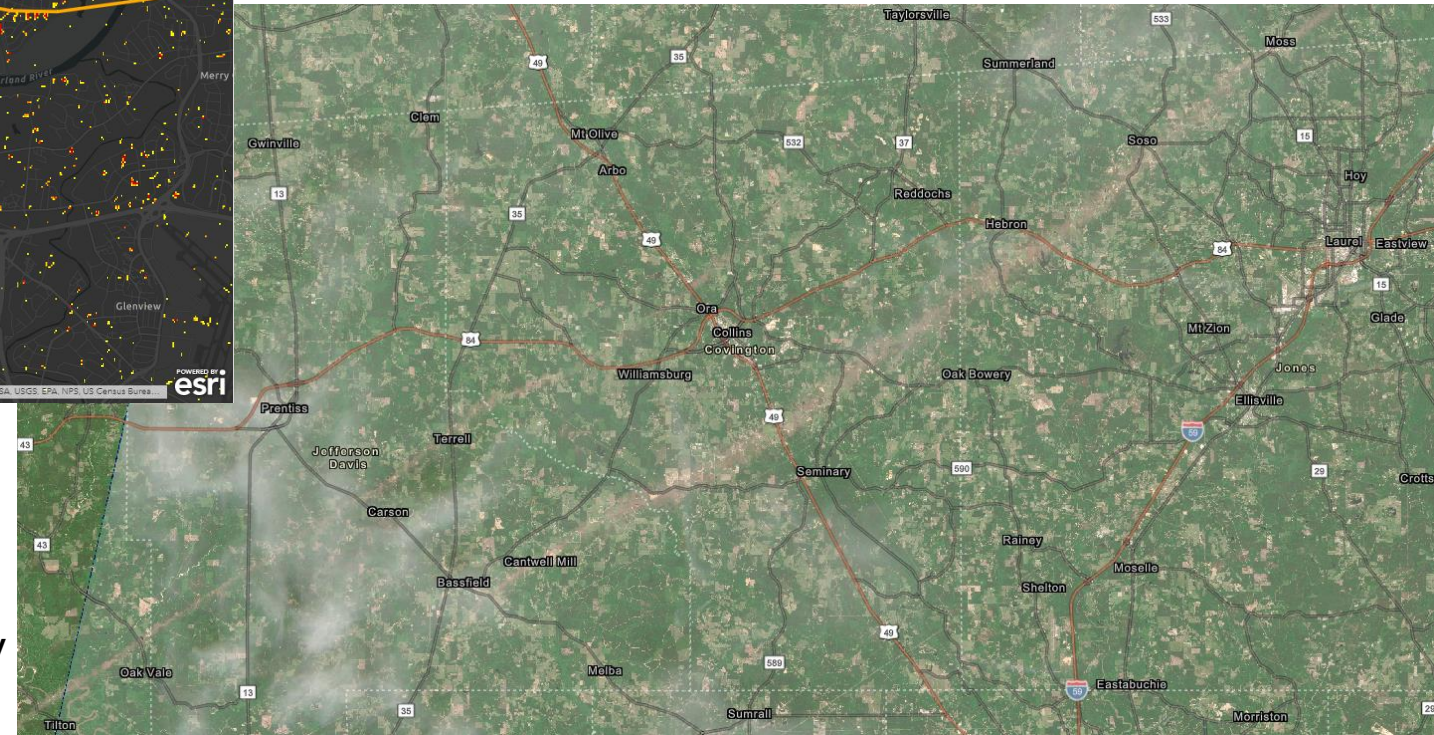
Vegetation covered by volcanic ash on St. Vincent

Severe Weather



Nashville Tornado 3/2/2020

- ARIA Damage Proxy Map (3/8)
- NWS Official Path

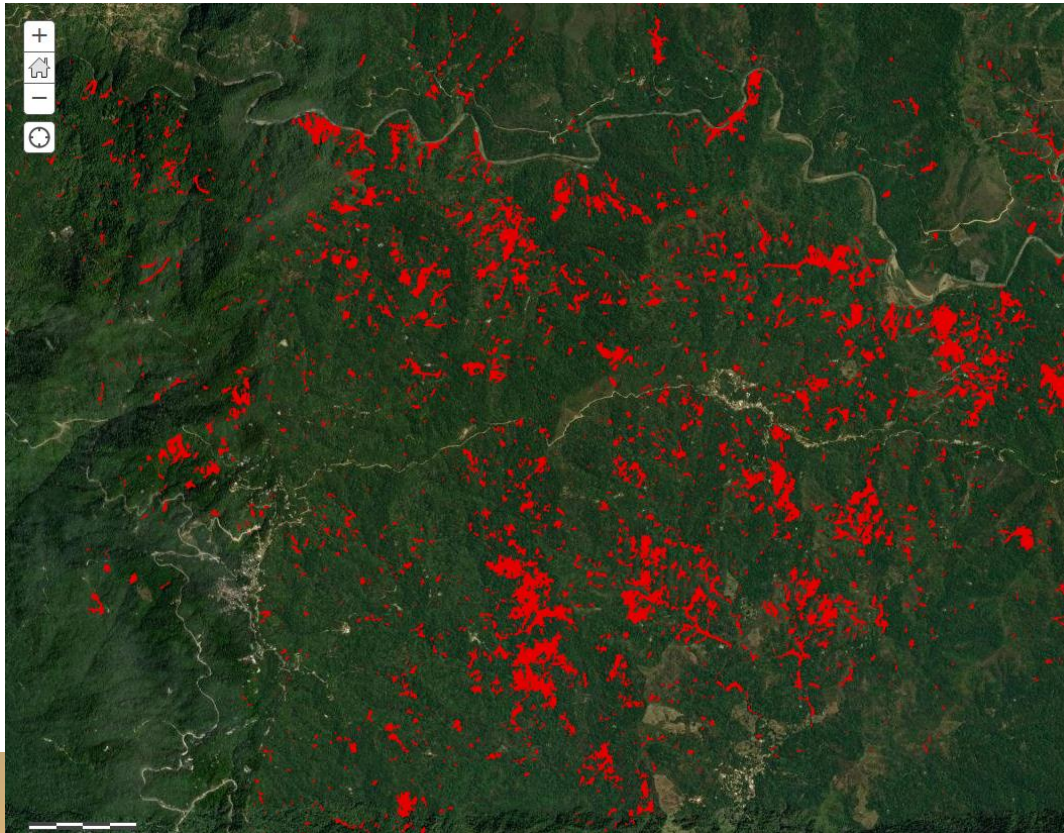


Southern MS Tornadoes 4/12/2020

- Copernicus Sentinel-2 True Color Imagery (4/27/2020)

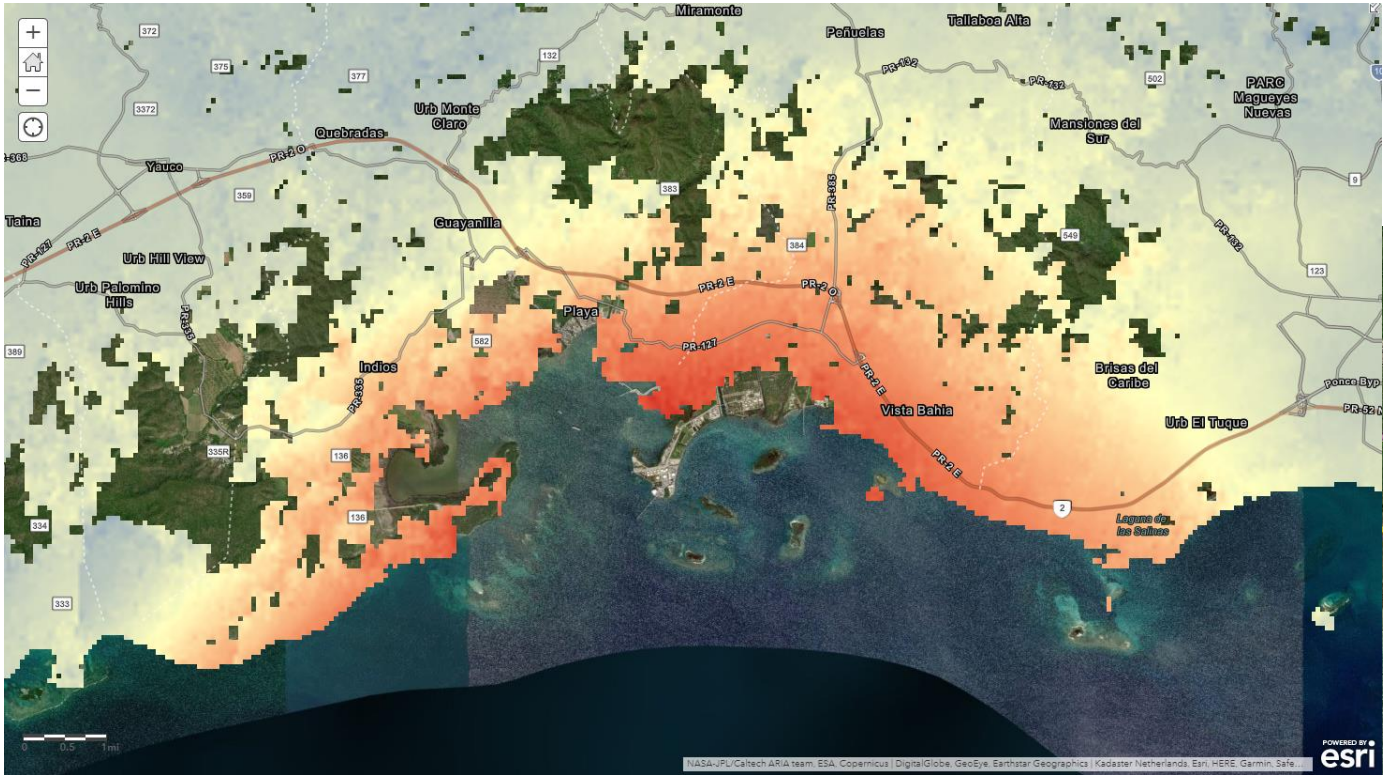
Landslides

- Semi-automatic landslide detection with manual quality control
- Utilizes Planet 3-meter data to identify and map landslide polygons

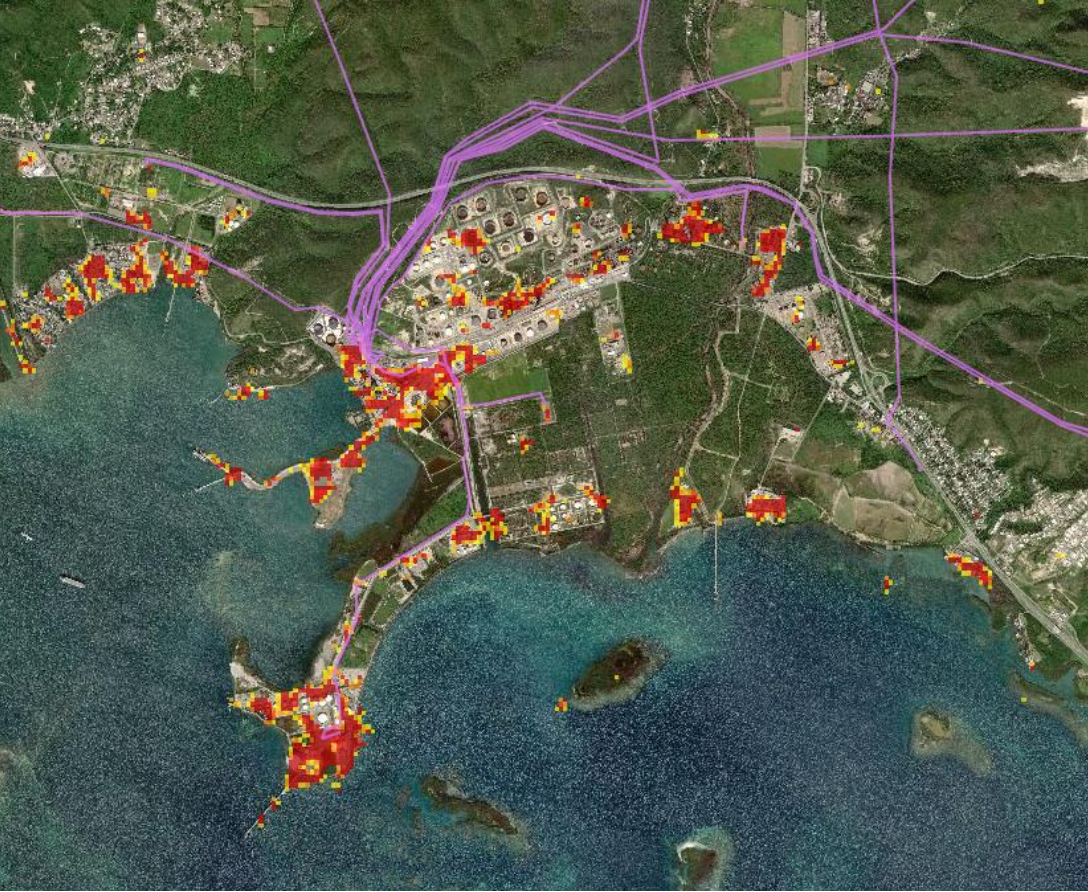


- Top: Landslides mapped in British Columbia on October 30, 2021, with Planet data
- Left: Landslides mapped after the landfall of Hurricane Agatha in Mexico

Puerto Rico Earthquakes 2020



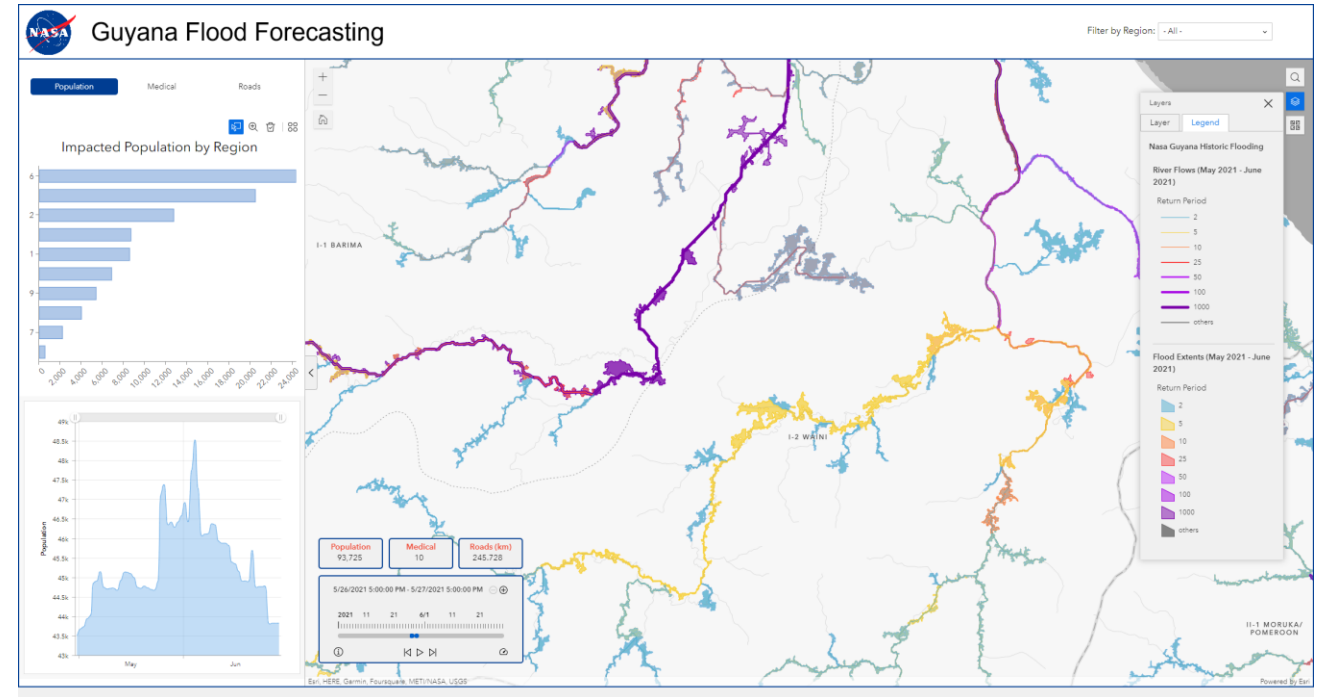
Left: Surface Deformation map showing ~5.5 inches of subsidence near the Costa Sur power Plant west of Ponce, PR



Right: Damage Proxy Map showing potential damage to the Costa Sur Power Plant overlaid with power lines layer

What's on the Horizon

- Expand catalog of Near Real Time products hosted on the Portal
- NASA is adding more GIS services from NASA Worldview to Living Atlas
 - Developing GIS solutions for NASA Data Centers
- Developing applications and tools to expand the Portal's capabilities
 - GeoRSS (Esri)
 - Flood Risk Dashboards (Esri)
 - Voice Atlas NLP Chat Bot (Navteca)



The screenshot displays the NASA Disasters Mapping Portal. The header includes the NASA logo and 'EARTH SCIENCE APPLIED SCIENCES'. The main content area features a satellite image of a disaster zone with the text: 'A powerful interface for viewing, analyzing, and downloading the latest near real-time and disaster specific data in Geographic Information Systems (GIS) format. The Disasters Mapping Portal supports NASA's Earth Applied Sciences program area in its mission to use Earth-observing data and applied research to improve the preparedness for, response to and recovery from hazards and disasters around the world.' A 'Chatbot' window is open on the right, with a message: 'Welcome to Voice Atlas. Just type a question in the text area below and press enter. Type help if you need further assistance. What information can I get for you today?' Below the chatbot, there are buttons for 'Tools', 'Training', 'News', and 'Resources'. A red banner at the bottom left says 'Check here for current NASA disaster activations.' Below that, there is a section for 'Featured Story Maps' with several thumbnail images.



**Scan the QR Code to
provide feedback and
receive more
information!**

NASA Disasters Mapping Portal:
<https://disasters-nasa.hub.arcgis.com/>

HQ-Disasters-GIS@mail.nasa.gov

Garrett.W.Layne@nasa.gov

NASA Earth Science User Group

Time: Thursday July 14th at 11:30am - 12:30pm

Location: Room 24 C

The background of the slide is a cosmic scene. The top half features a dark blue and black space filled with numerous small stars and a prominent, bright blue nebula on the right side. The bottom half features a gradient from orange to green, with a bright green nebula on the right and many small, bright stars scattered throughout. A light blue horizontal band is positioned in the center, containing the text.

Portal Demo

