
National Aeronautics and
Space Administration
NASA
EXPLORE EARTH
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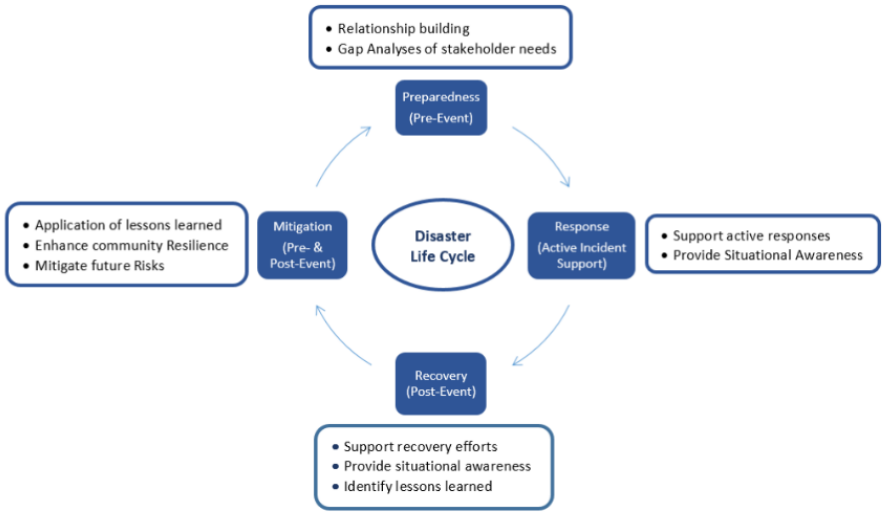
NASA Disasters Mapping Portal
Garrett Layne
Wednesday July 13, 2022
https://disasters-nasa.hub.arcgis.com/

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

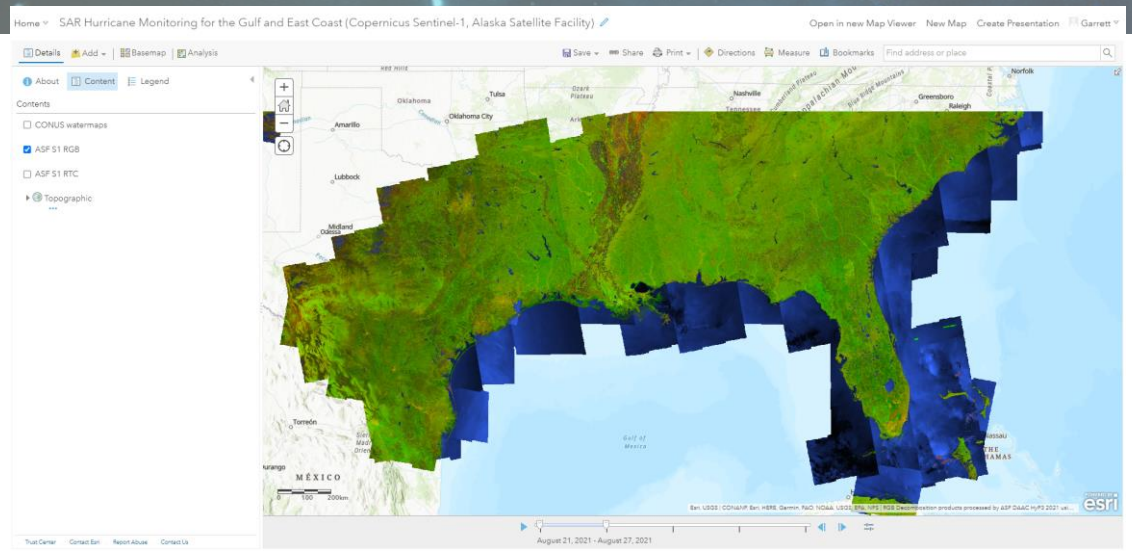
- **2022**
  - Tonga Volcano Eruption
- **2021**
  - December 10-11, 2021 US Tornado Outbreak
  - Hurricane Ida
  - La Palma Volcano Eruption
  - Haiti Earthquake
  - La Soufriere Volcano Eruption
- **2020**
  - Atlantic Hurricane Season
    - Eta, Iota, Laura, Delta
  - Western US Fire Season
  - Puerto Rico Earthquake
  - April 2020 US Tornado Outbreak
  - Australia Fires

What is the NASA Disasters Mapping Portal?

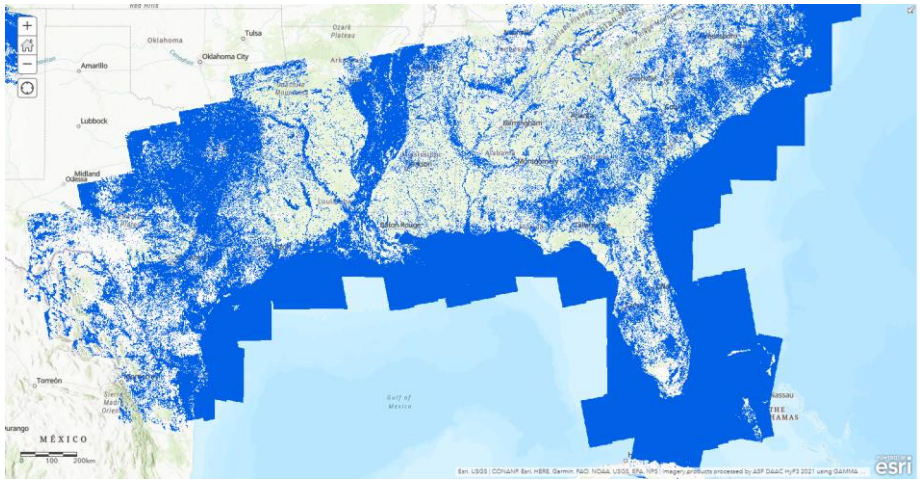
https://disasters-nasa.hub.arcgis.com/

- 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

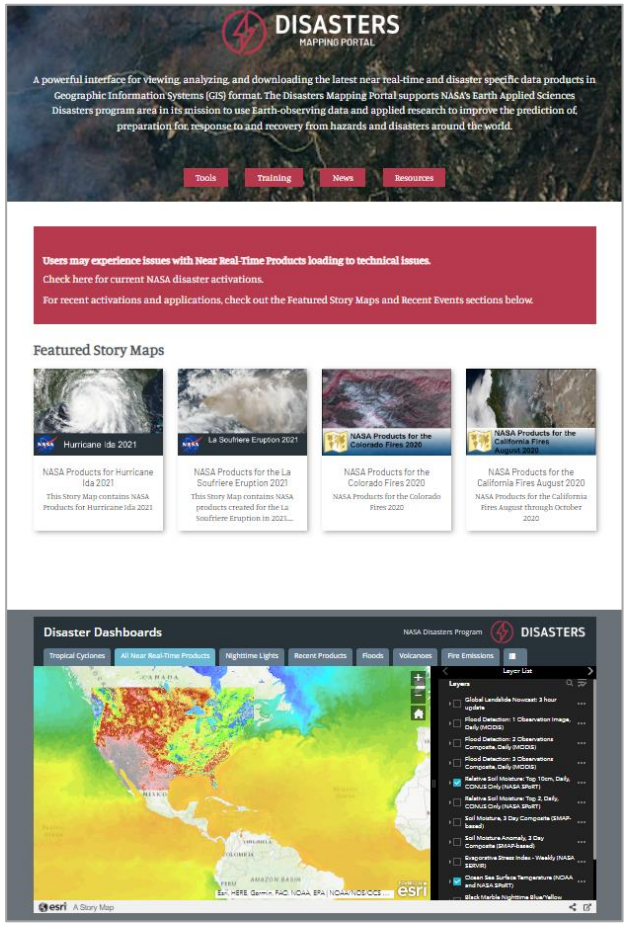


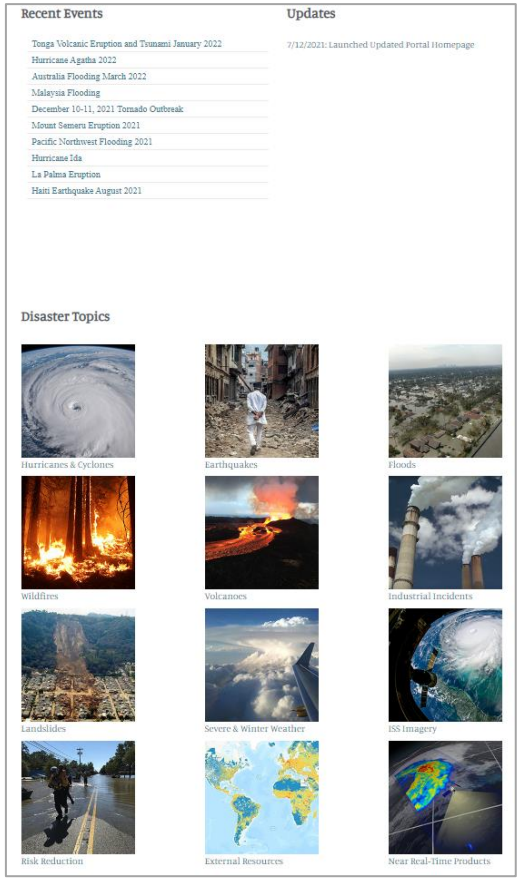
Using Planet Data

- 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

- Featured Story Maps
  - Story Maps for recent or prominent events
- Home Page Story Map
  - Near Real-Time Dashboard
    - Most recent image displayed
  - Recent Products
  - Tropical Cyclone Dashboard
  - Response Locations Dashboard
- Recent Responses
  - Direct link to event's product gallery
- Disaster Category Tiles
  - Event specific products by disaster type
  - Risk Reduction
  - External resources
  - Near Real-Time (NRT) Products





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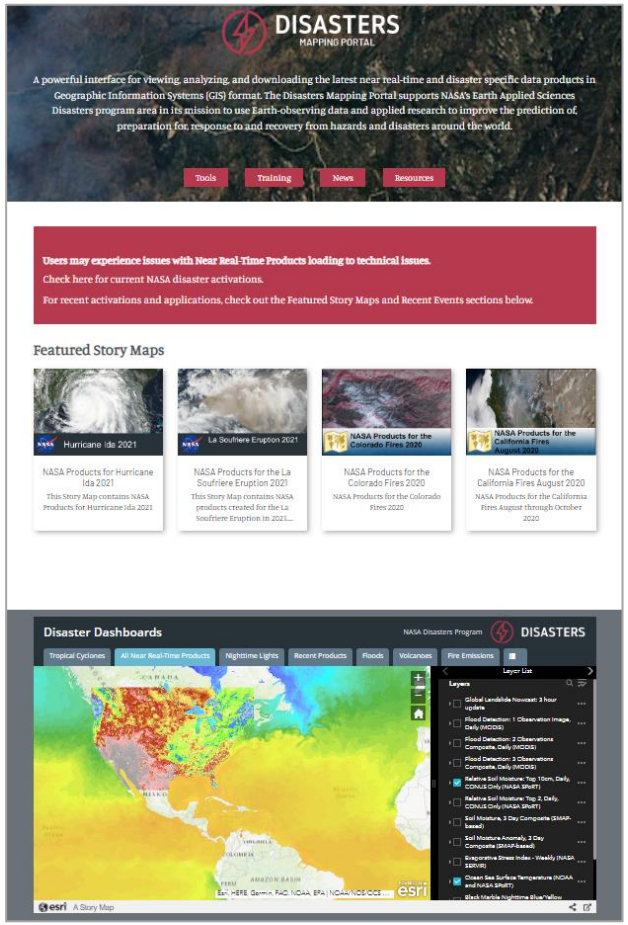
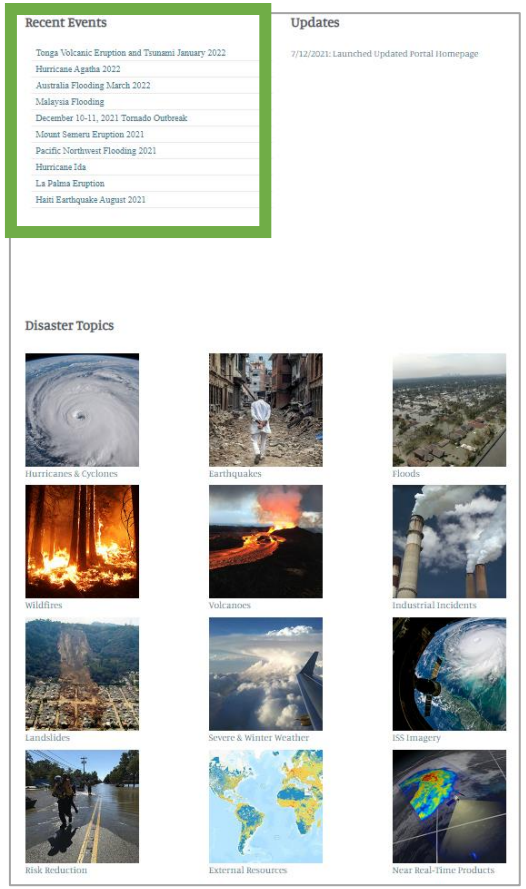
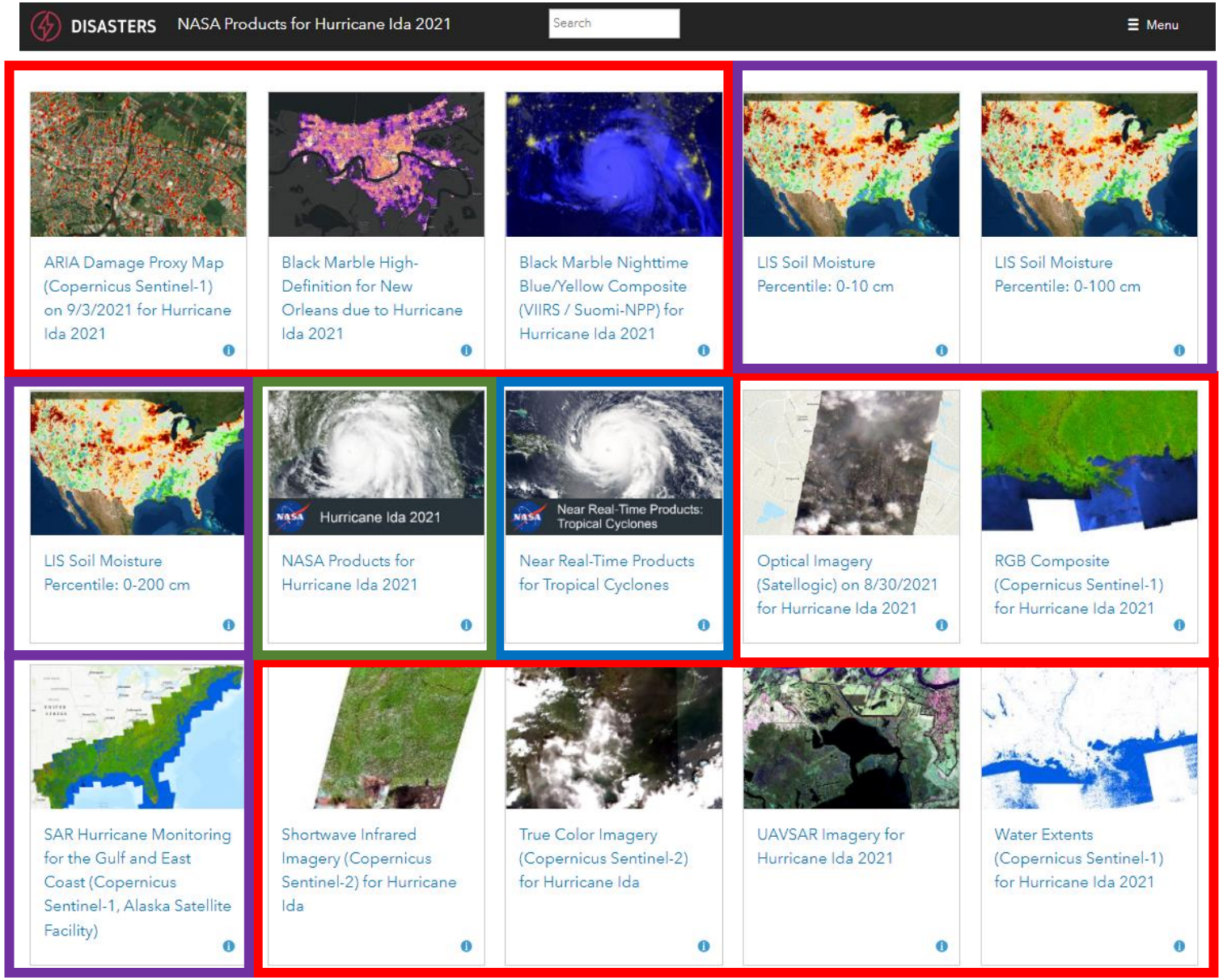




Product Gallery

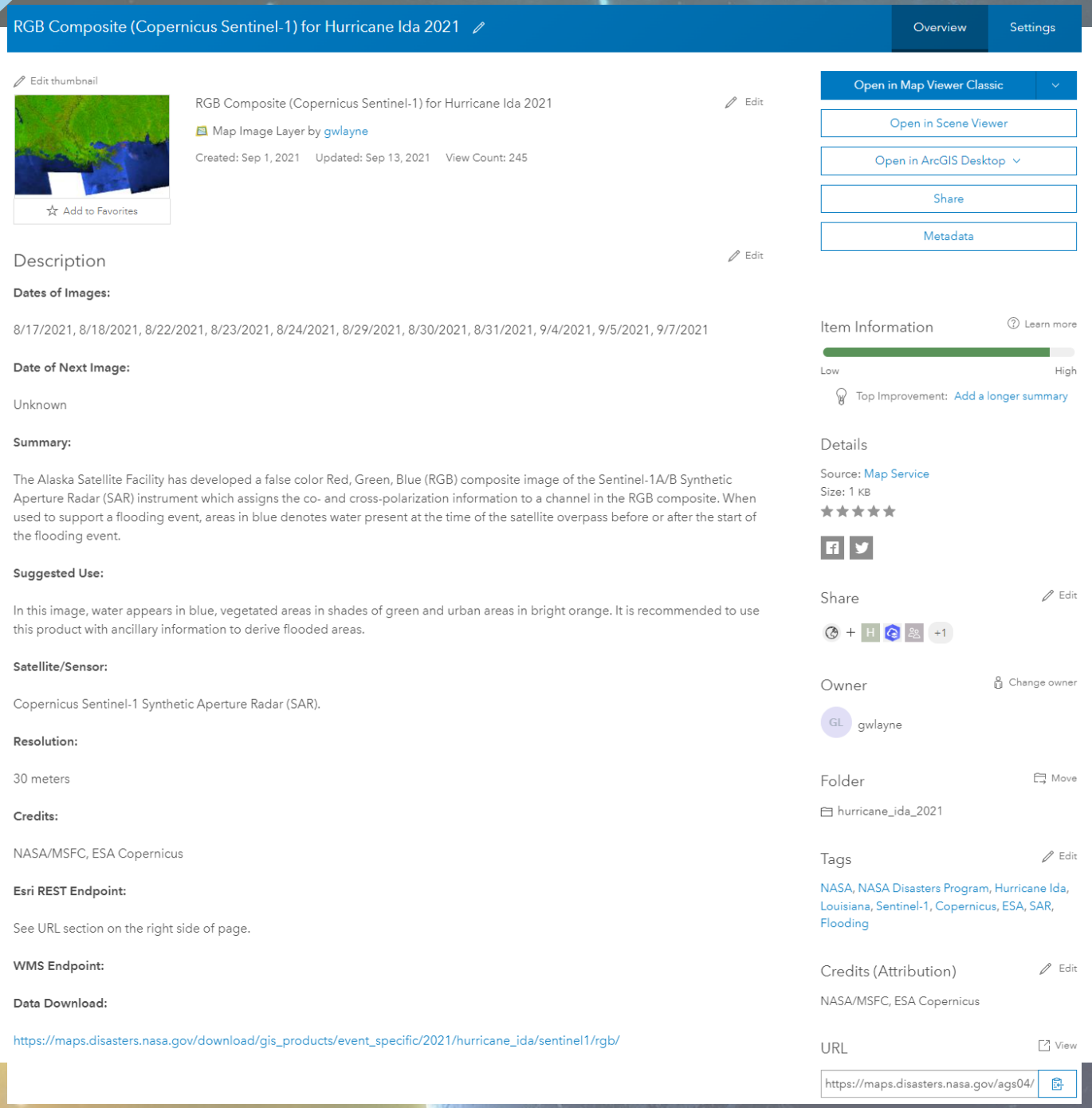
Hurricane Ida, August 2021

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



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



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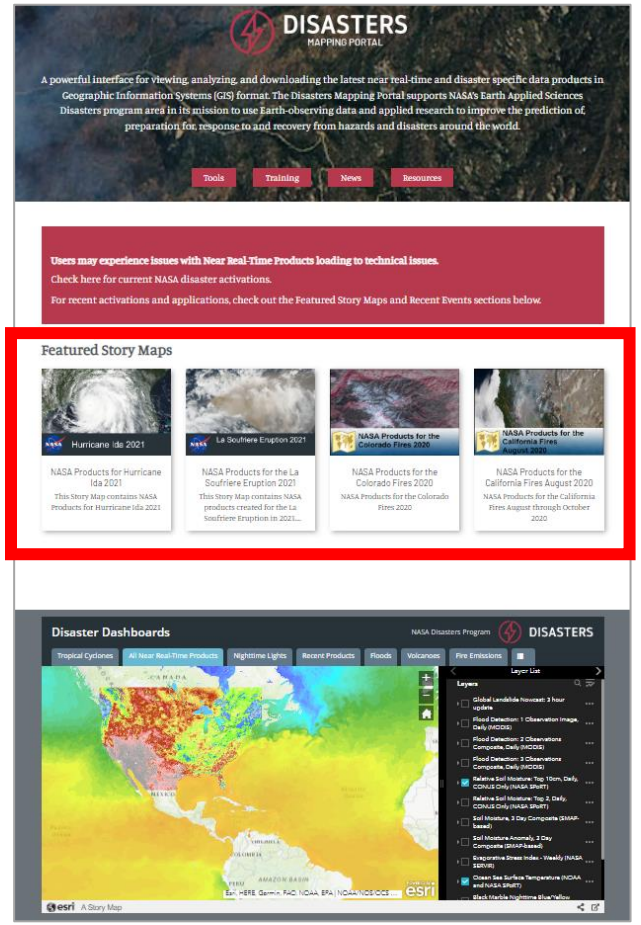
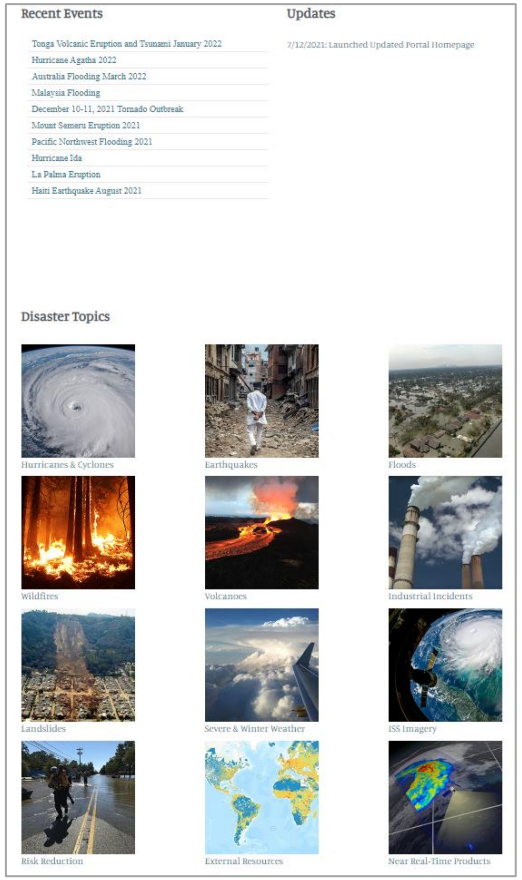
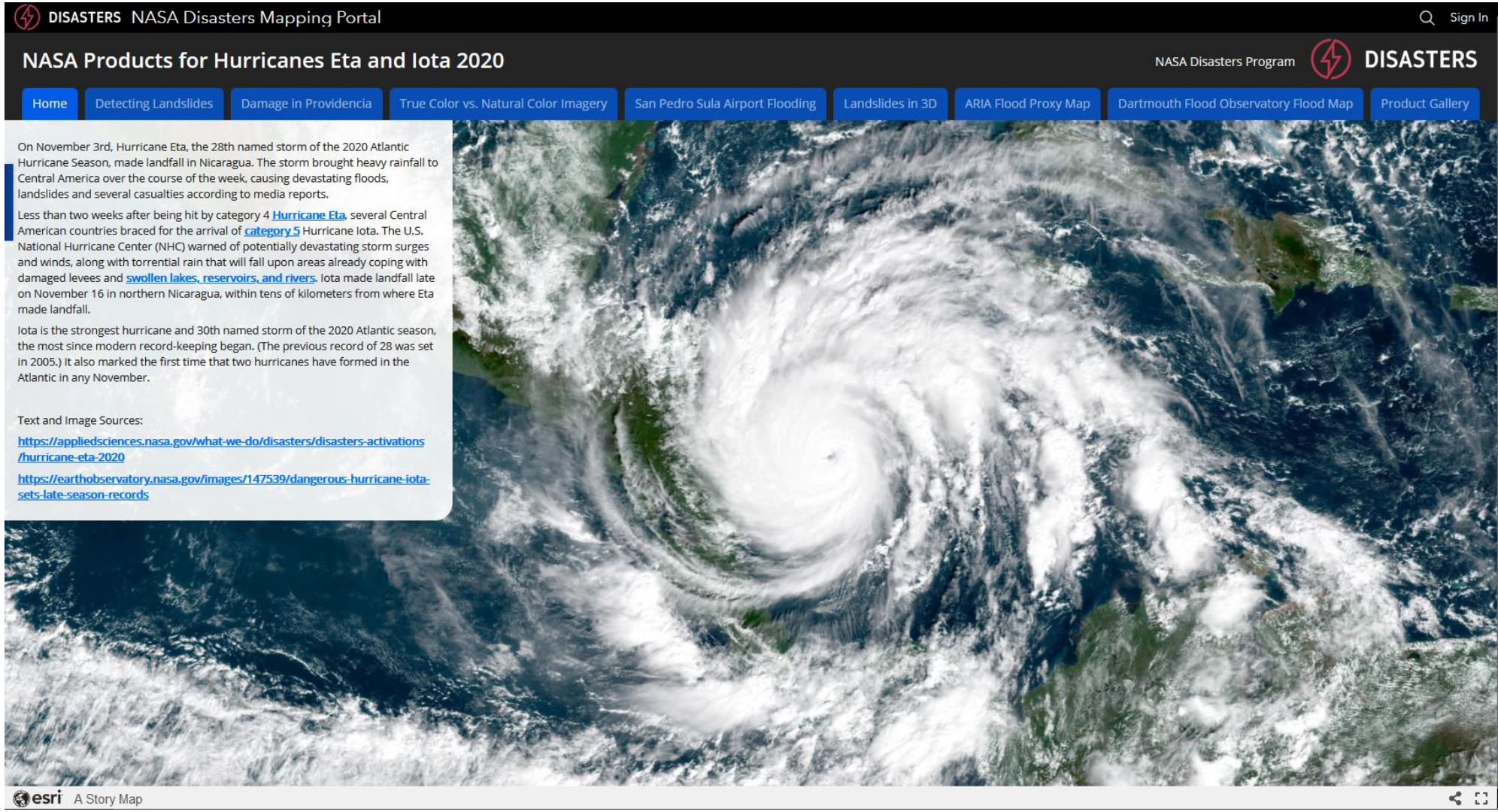




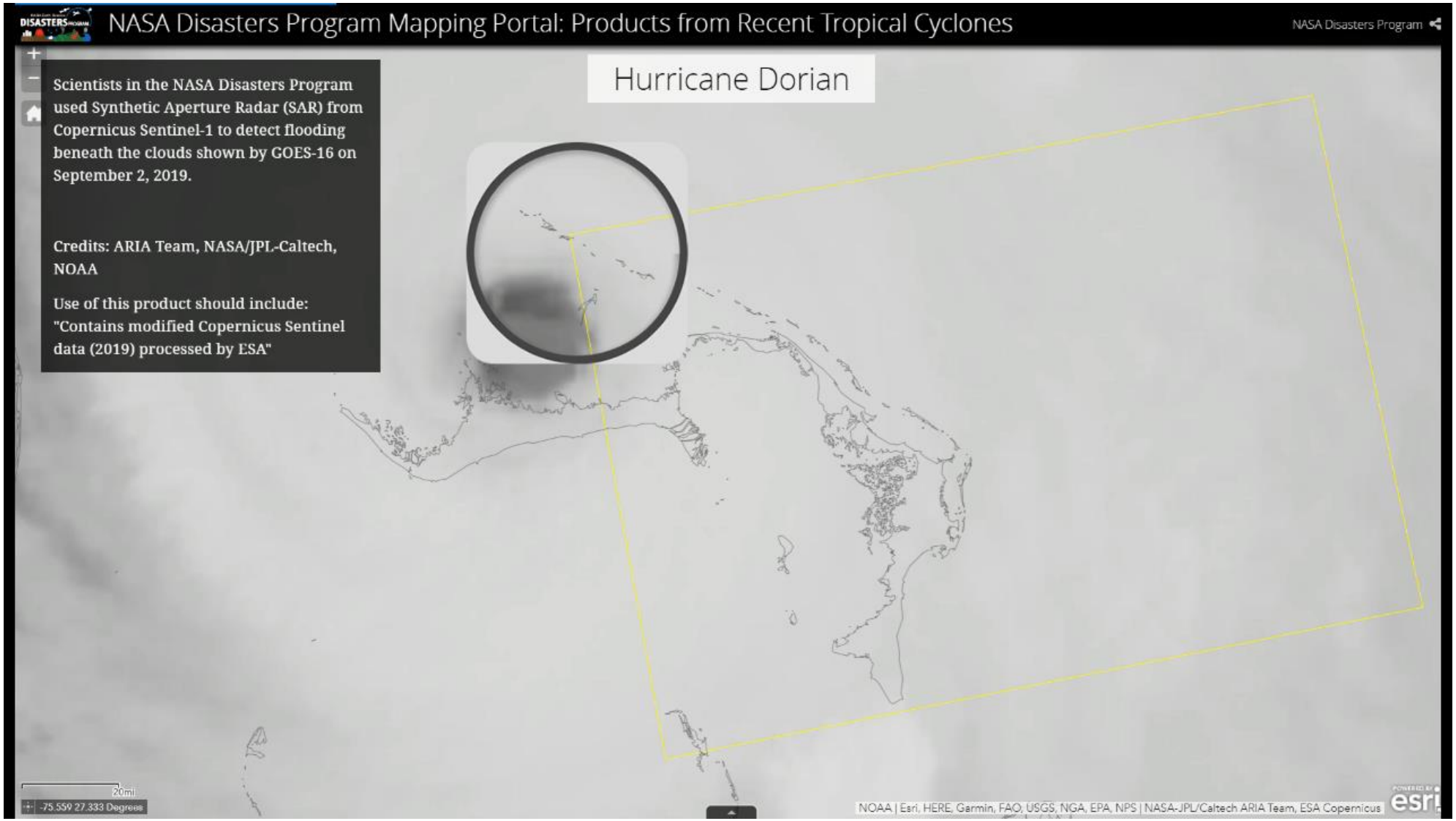
Featured Story Maps

- 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



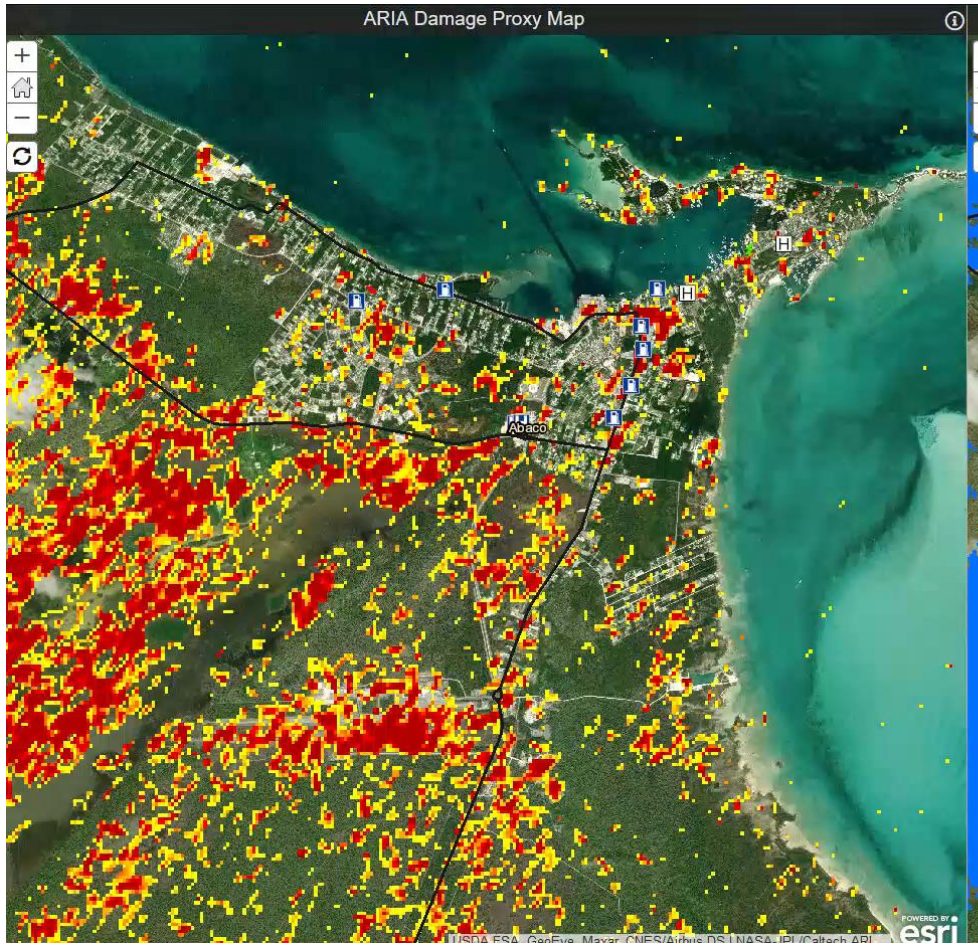
Interactive widgets and web apps

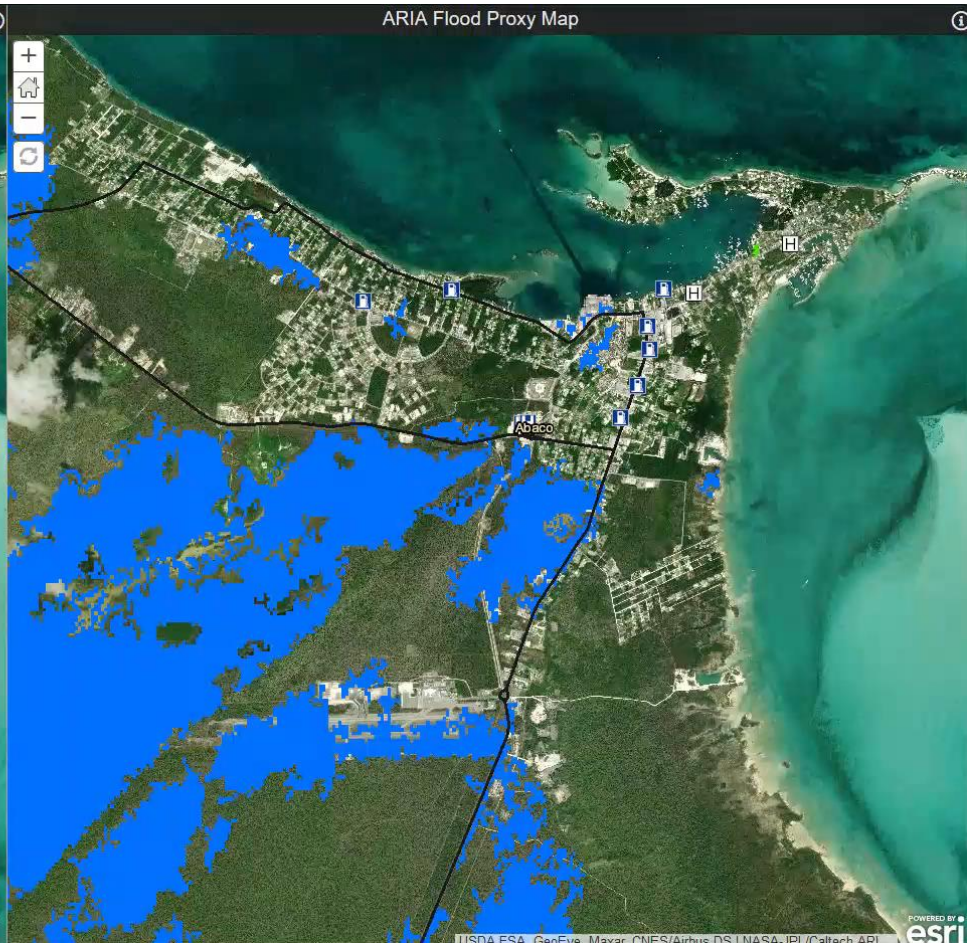
- Help explain products
- Explain the differences between different types of sensors
- Show ways to use data
- Sentinel-1 Flood Proxy Map overlaid with GOES 16 image at the same time



Show What's Possible

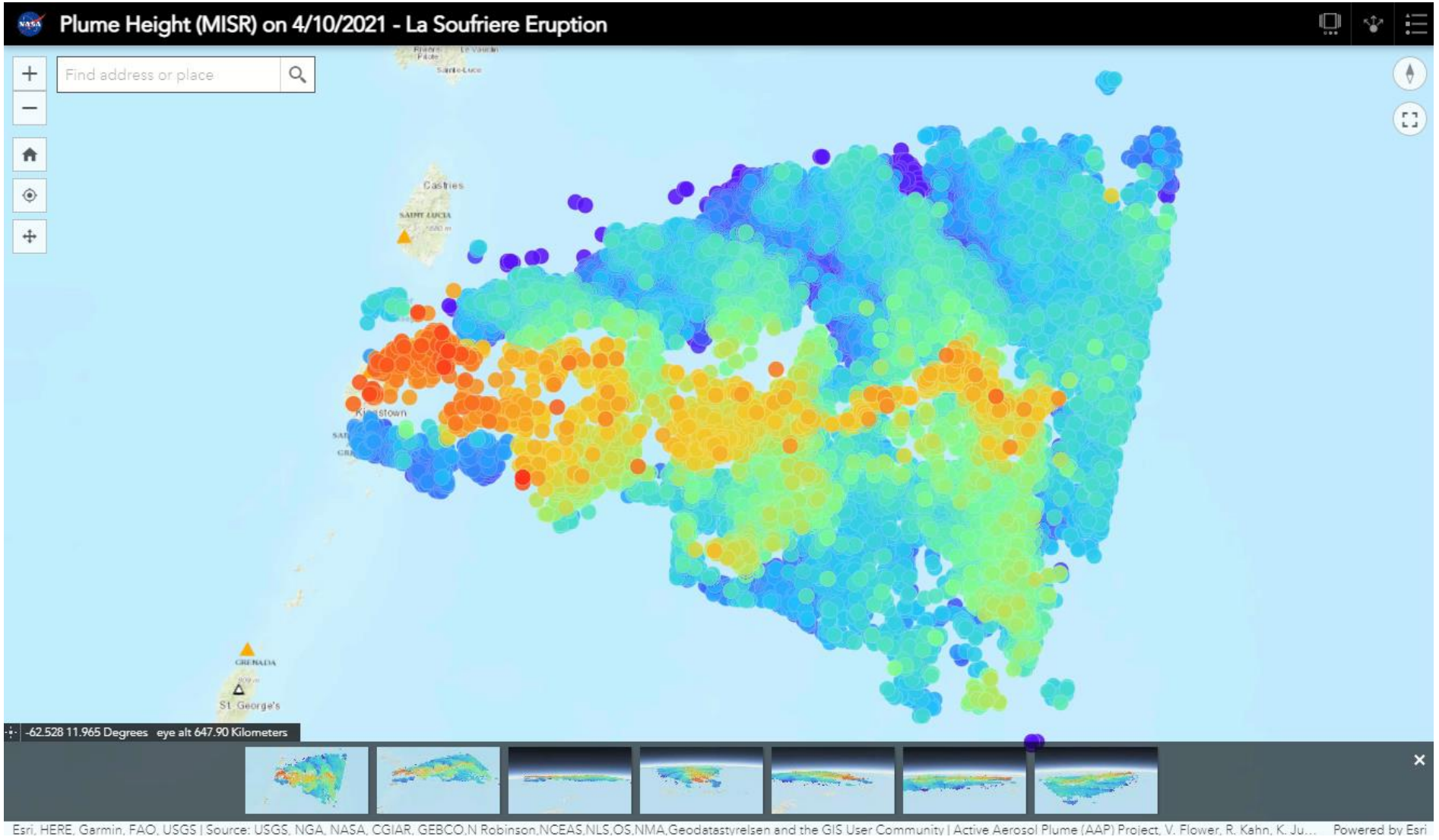
- Damage and Flood Proxy Maps
- Resolution: 30m
- SAR-based change detection
- Combine with infrastructure data to show potentially damaged or flooded assets





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



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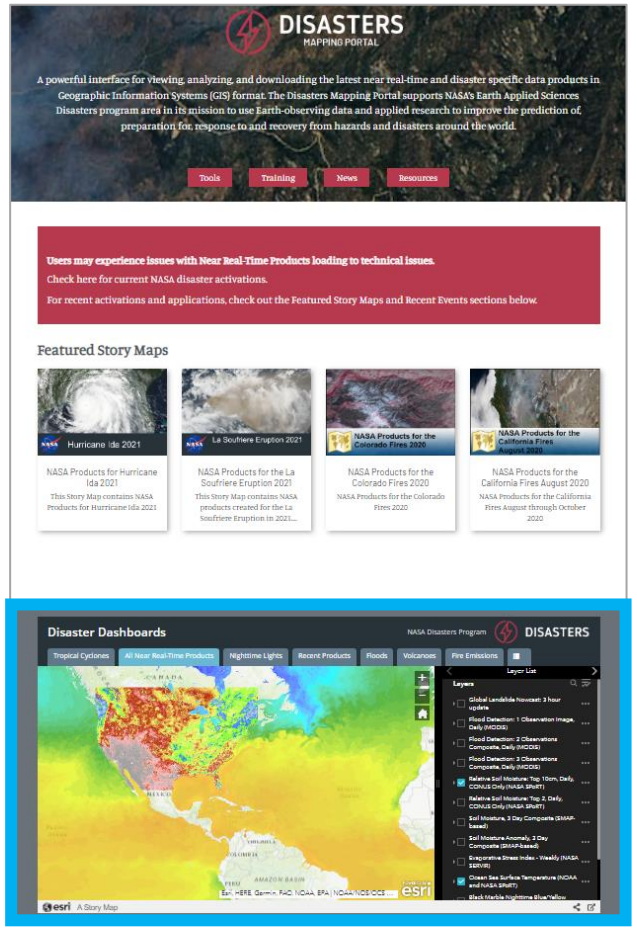
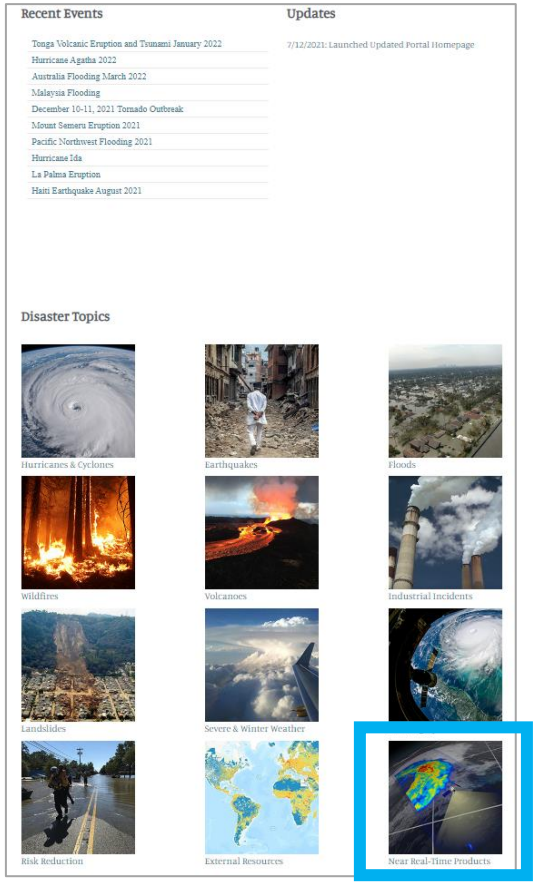
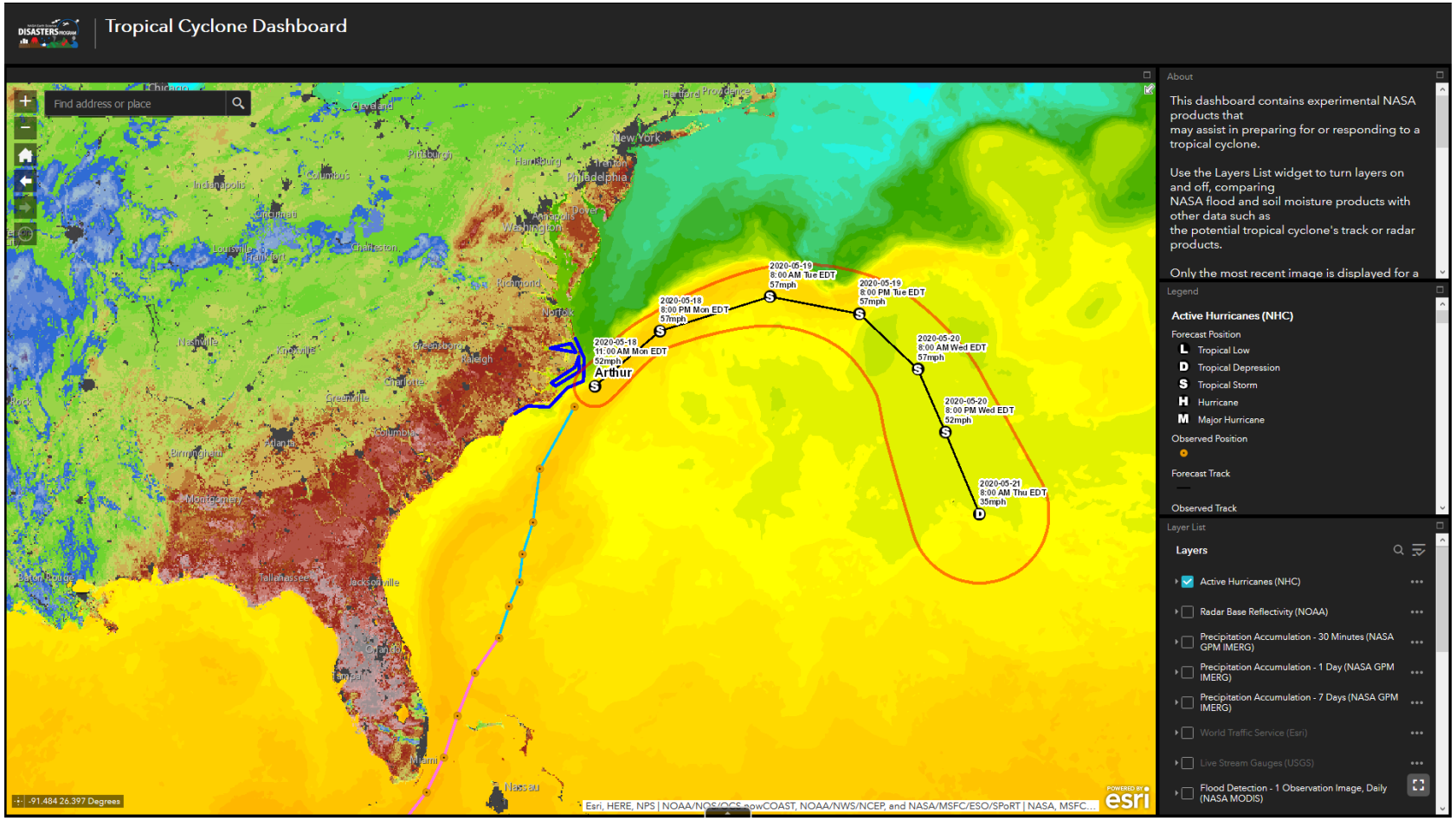




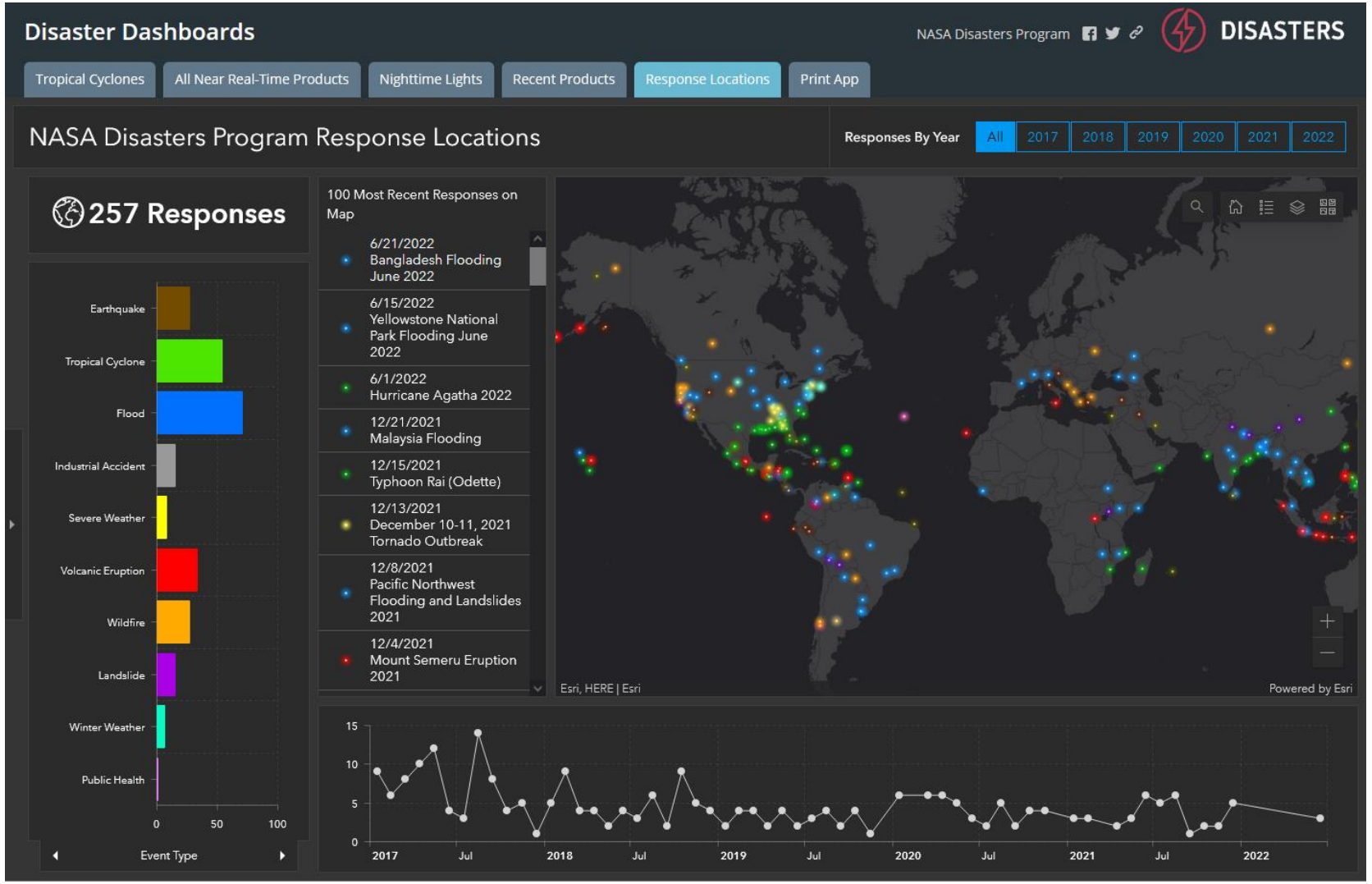
Tropical Cyclone Dashboard

- 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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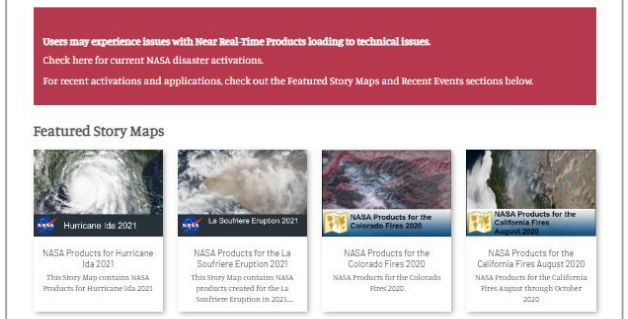
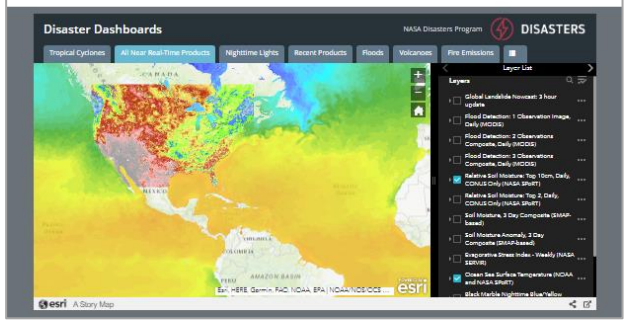
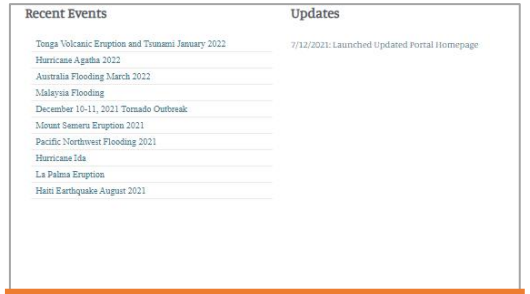
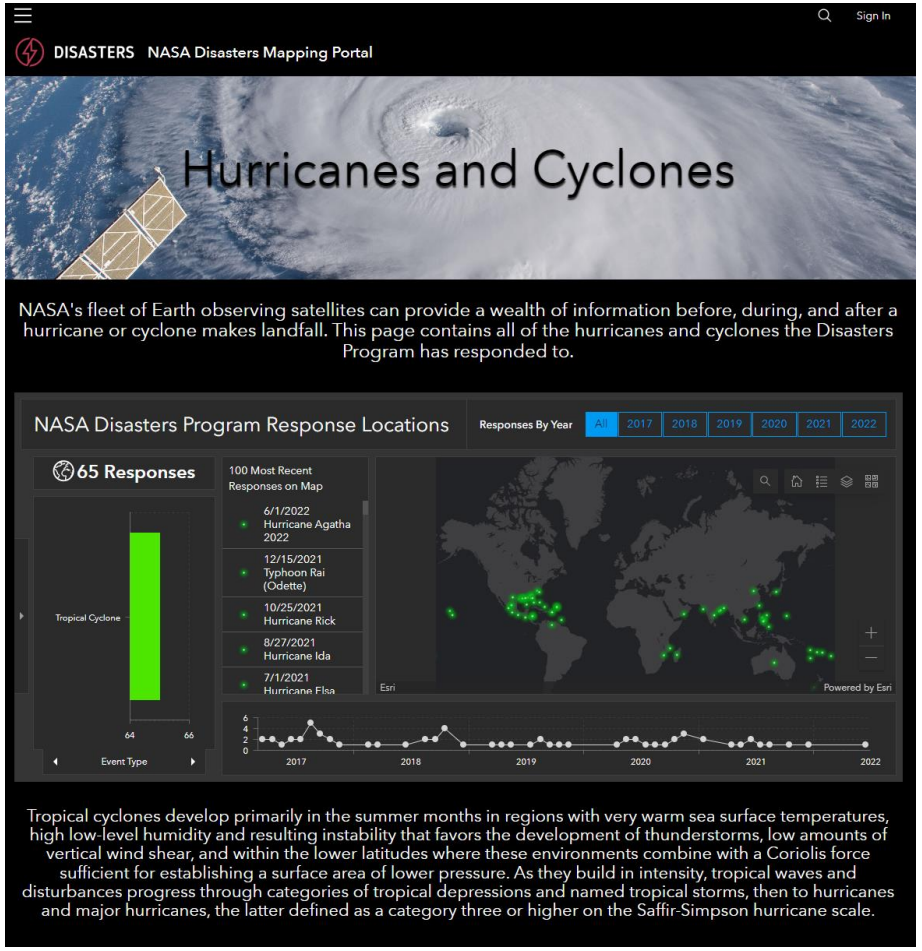






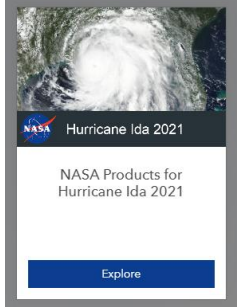
Hurricanes and Cyclones Page

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



Event Response Story Maps

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



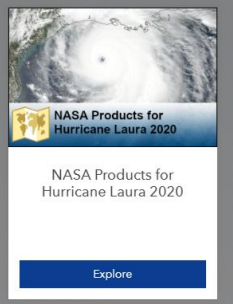
NASA Products for Hurricane Ida 2021

Explore

NASA Products for Hurricanes Eta and Iota...

NASA Products for Hurricanes Eta and Iota 2020

Explore



NASA Products for Hurricane Laura 2020

Explore

NASA Products for Cyclone Kenneth 2019

NASA Products for Cyclone Kenneth

Explore

Hurricane Dorian 2019

NASA Storymap and products for Hurricane Dorian 2019.

Explore

NASA Products for Cyclone Idai 2019

NASA Products for Cyclone Idai 2019

Explore

NASA Products for Hurricane Michael 2018

NASA Products for Hurricane Michael 2018

Explore

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

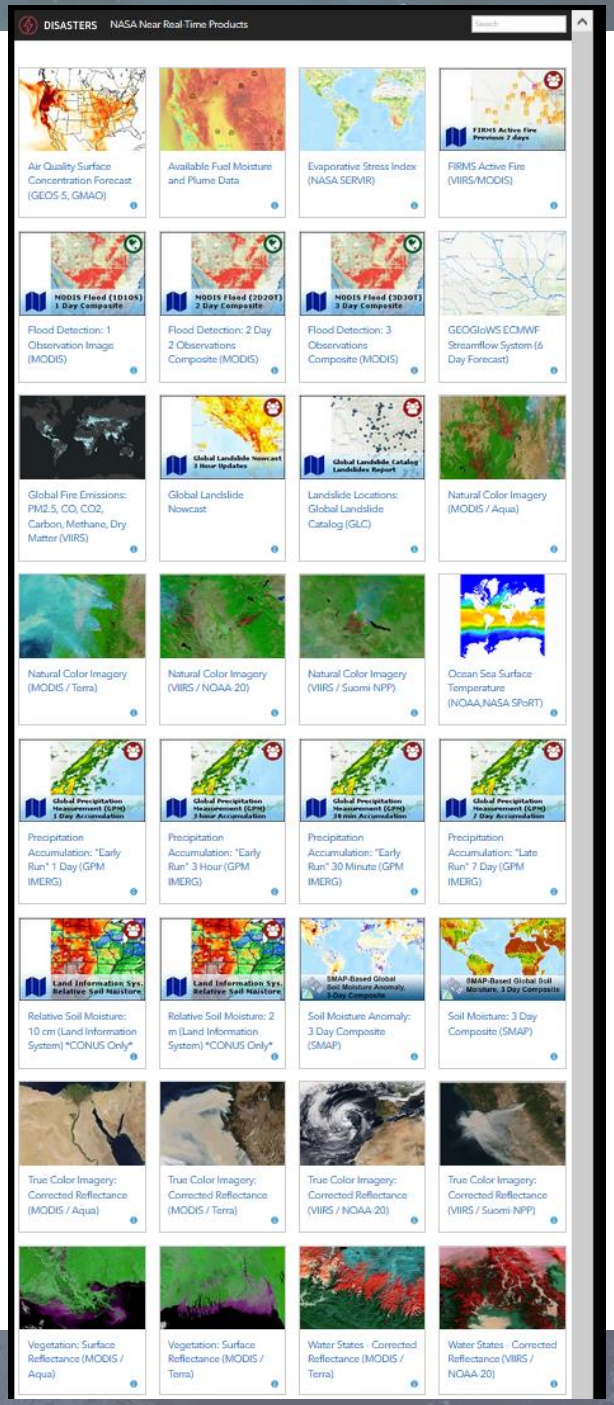
- Hurricane Agatha 2022
- Hurricane Ida 2021
- Hurricane Elsa 2021
- Hurricane Zeta 2020
- Hurricanes Eta and Iota 2020
- Hurricane Delta 2020
- Hurricane Sally 2020
- Hurricane Laura 2020
- Hurricane Isaias 2020
- Tropical Storms Amanda/Cristobal 2020
- Hurricane Karen 2019
- Hurricane Dorian 2019
-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

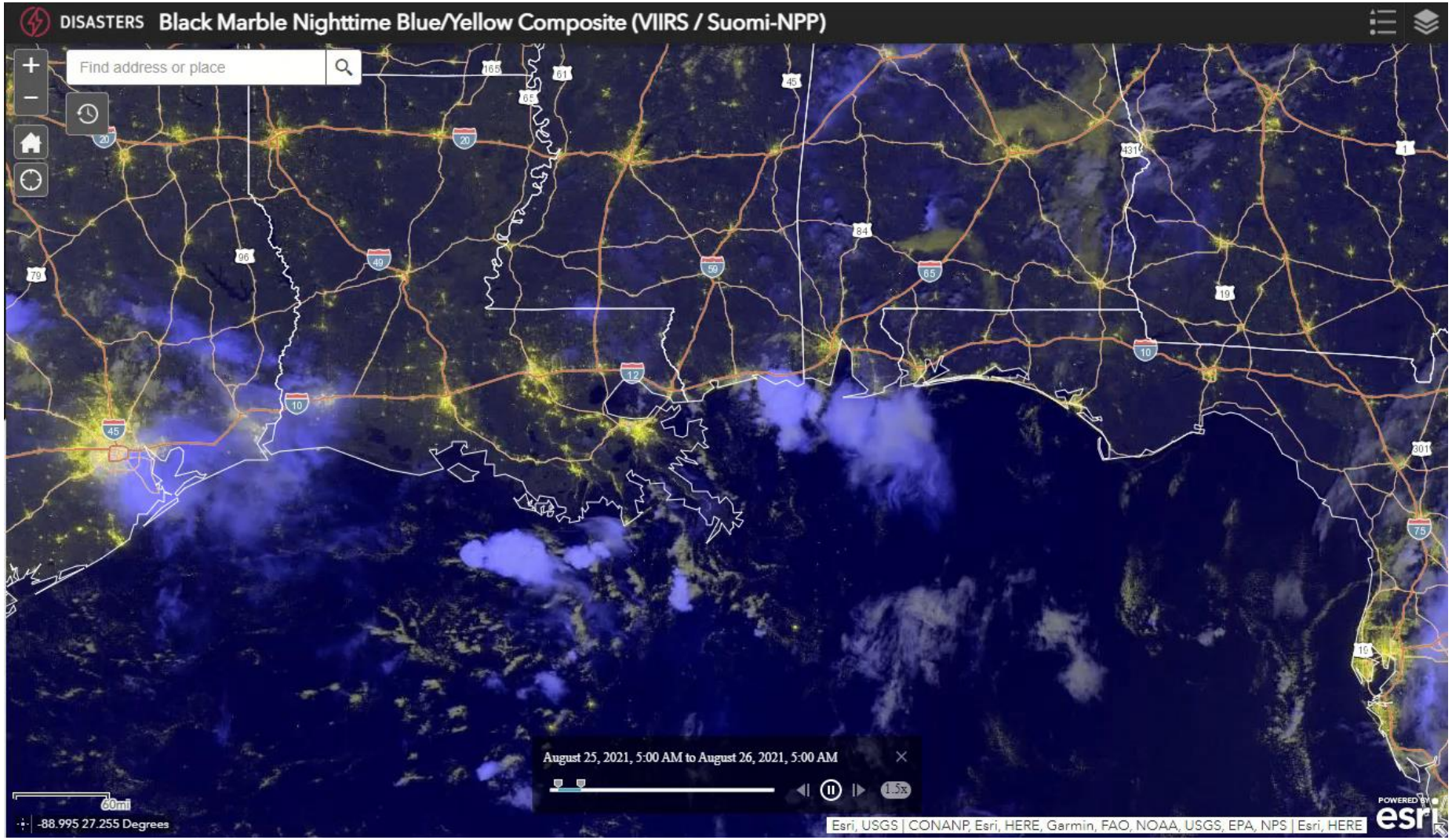
Near Real-Time Products

- 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)



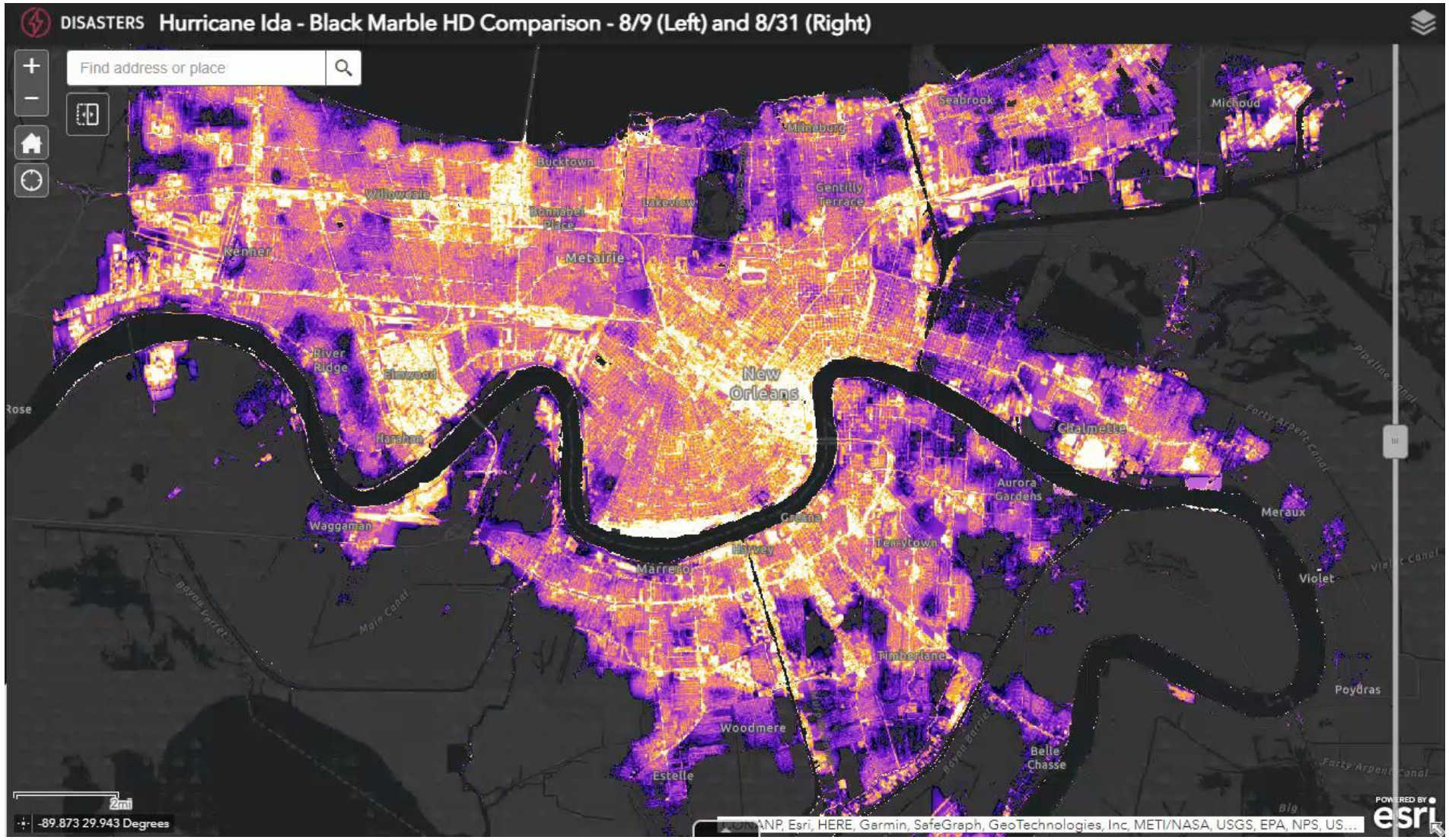
Hurricane Ida 2021

- 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



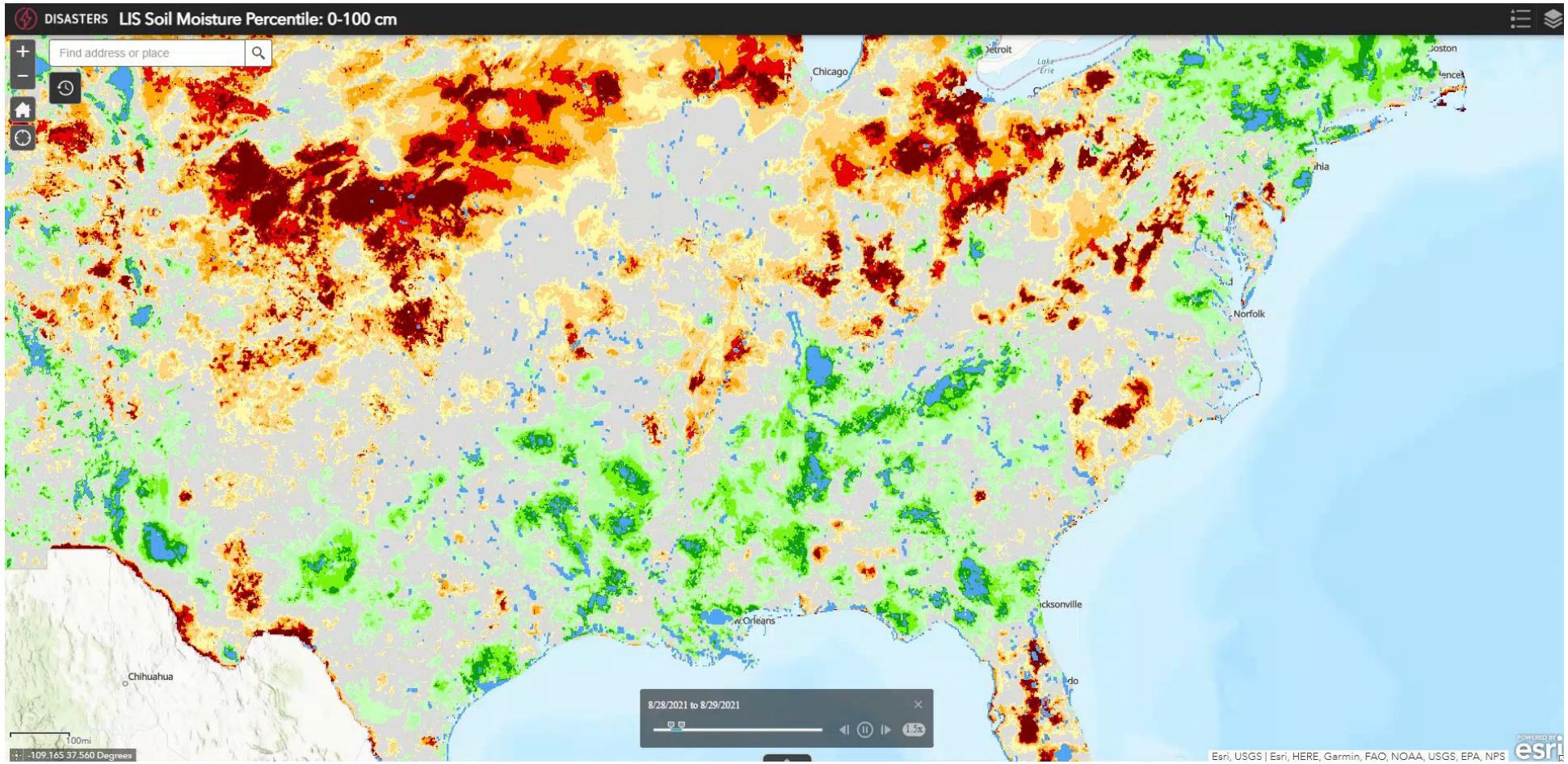
Hurricane Ida 2021

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



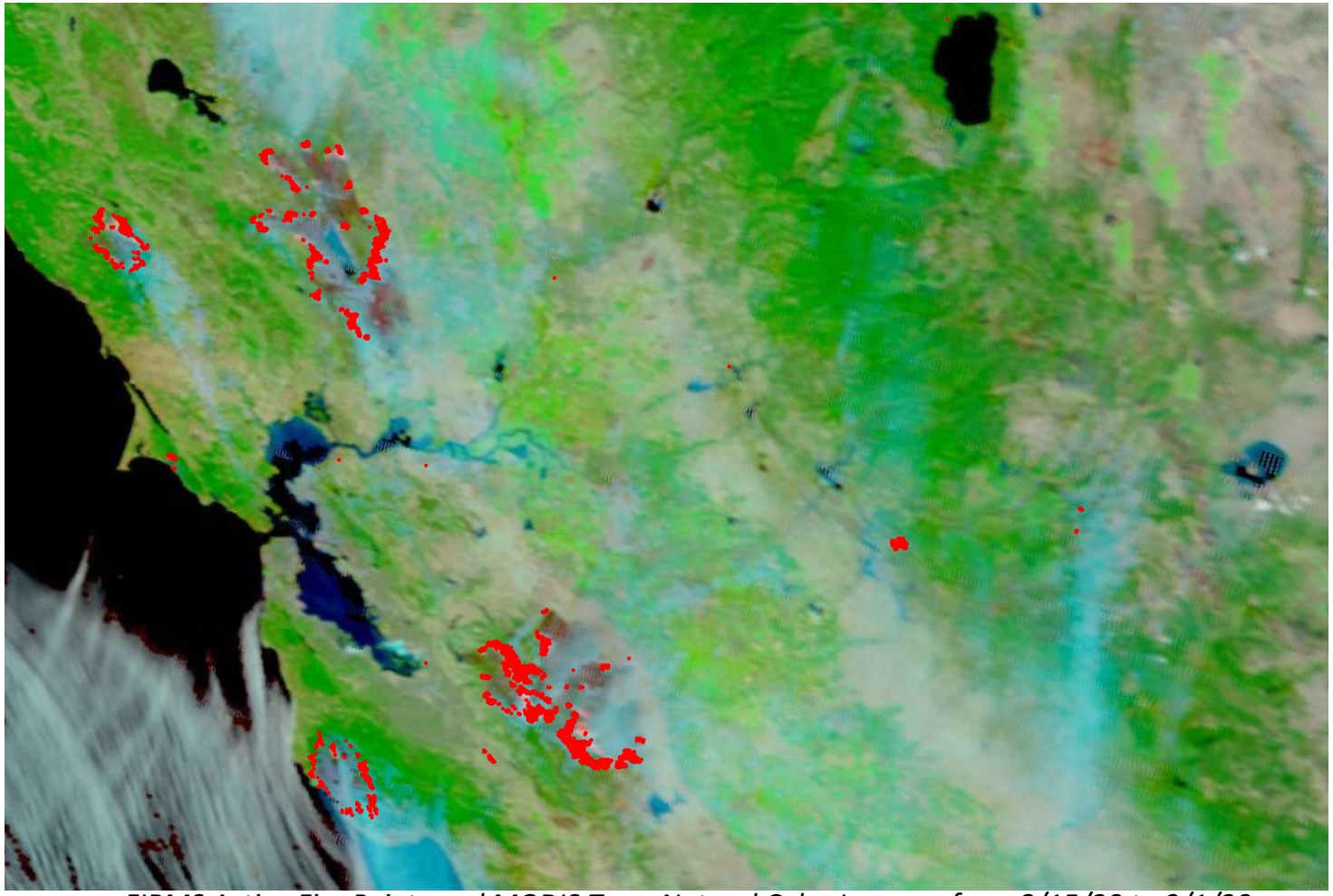
Hurricane Ida 2021

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



California Wildfires 2020

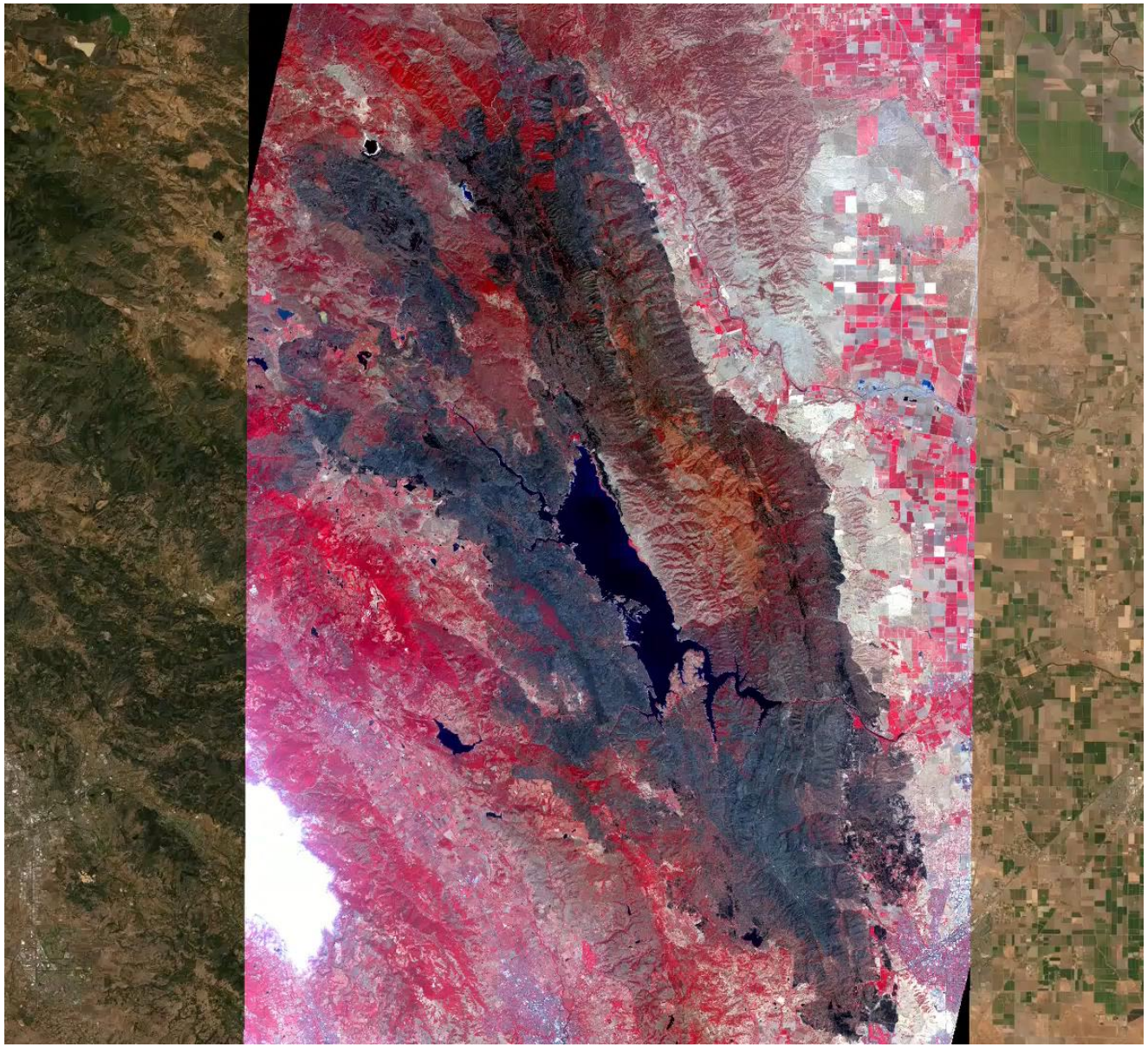
- Using Near Real-Time data to monitor and track the evolution of wildfires
  - MODIS and VIIRS Natural Color Imagery
  - FIRMS Active Fires Points
- Updates multiple times per day
- Moderate resolution at 500-750 meters
- Can see active hot spots, burn scars and smoke transport



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

California Wildfires 2020

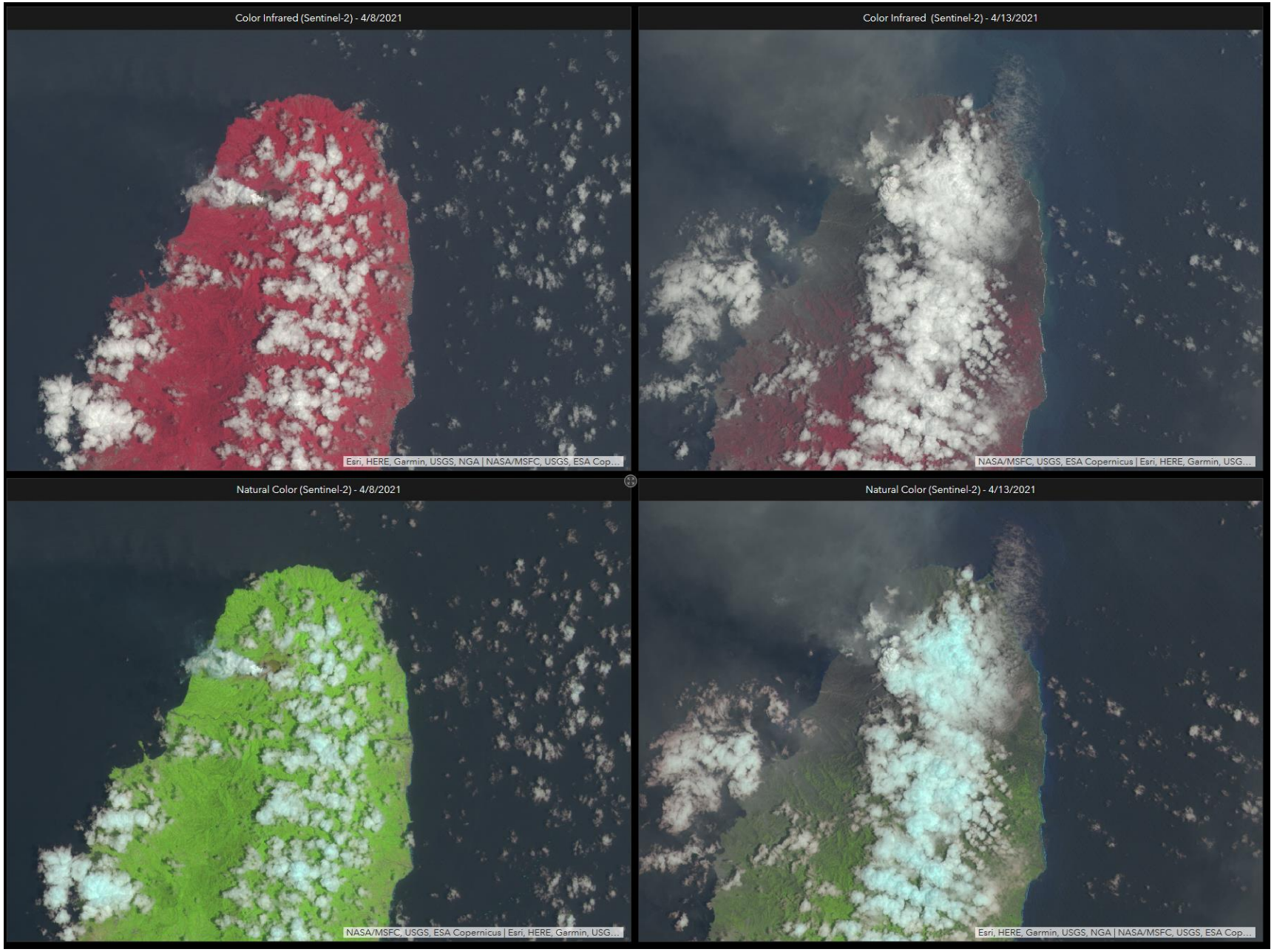
- FIRMS Active Fire Points
  - Daily global near real-time product
  - MODIS and VIIRS based
- ASTER Burn Scar
  - 15m resolution
  - Burned areas show as black/dark gray



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

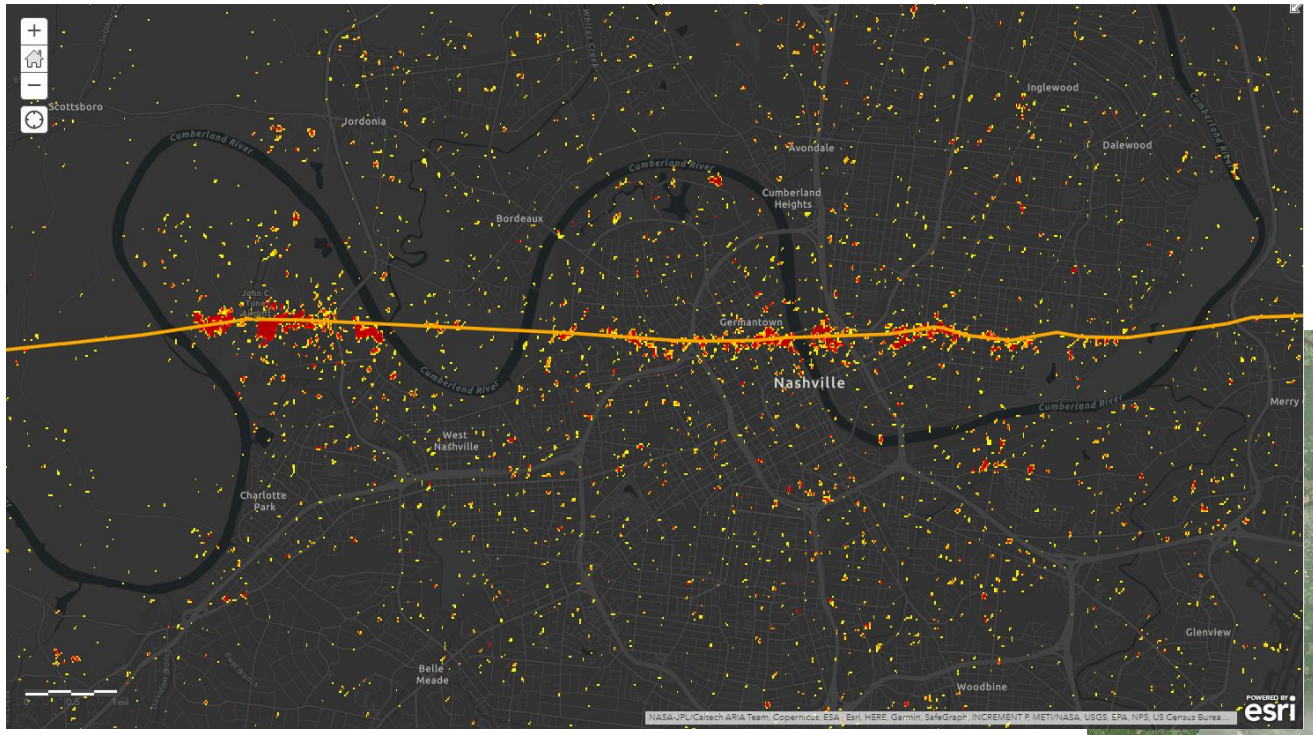
La Soufriere Volcano Eruption

- 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



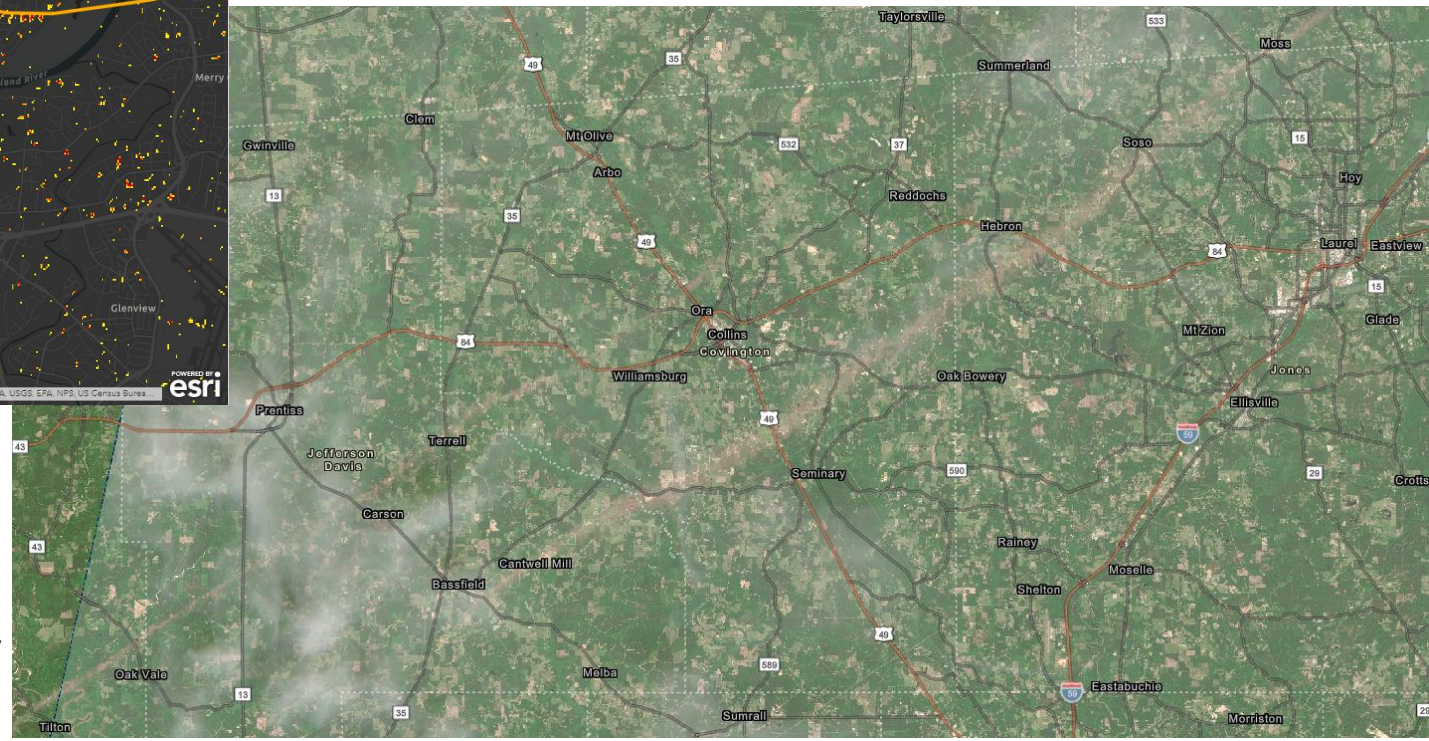
Vegetation covered by volcanic ash on St. Vincent

Severe Weather



Nashville Tornado 3/2/2020

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

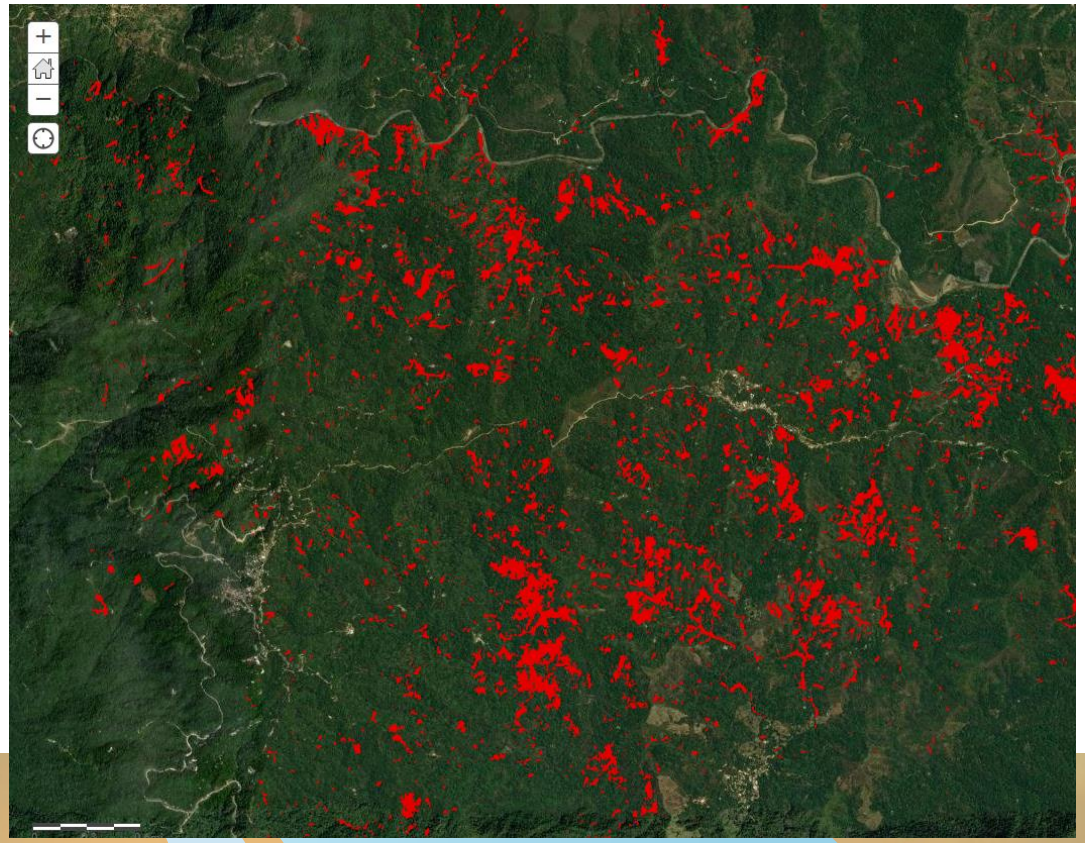


Southern MS Tornadoes 4/12/2020

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

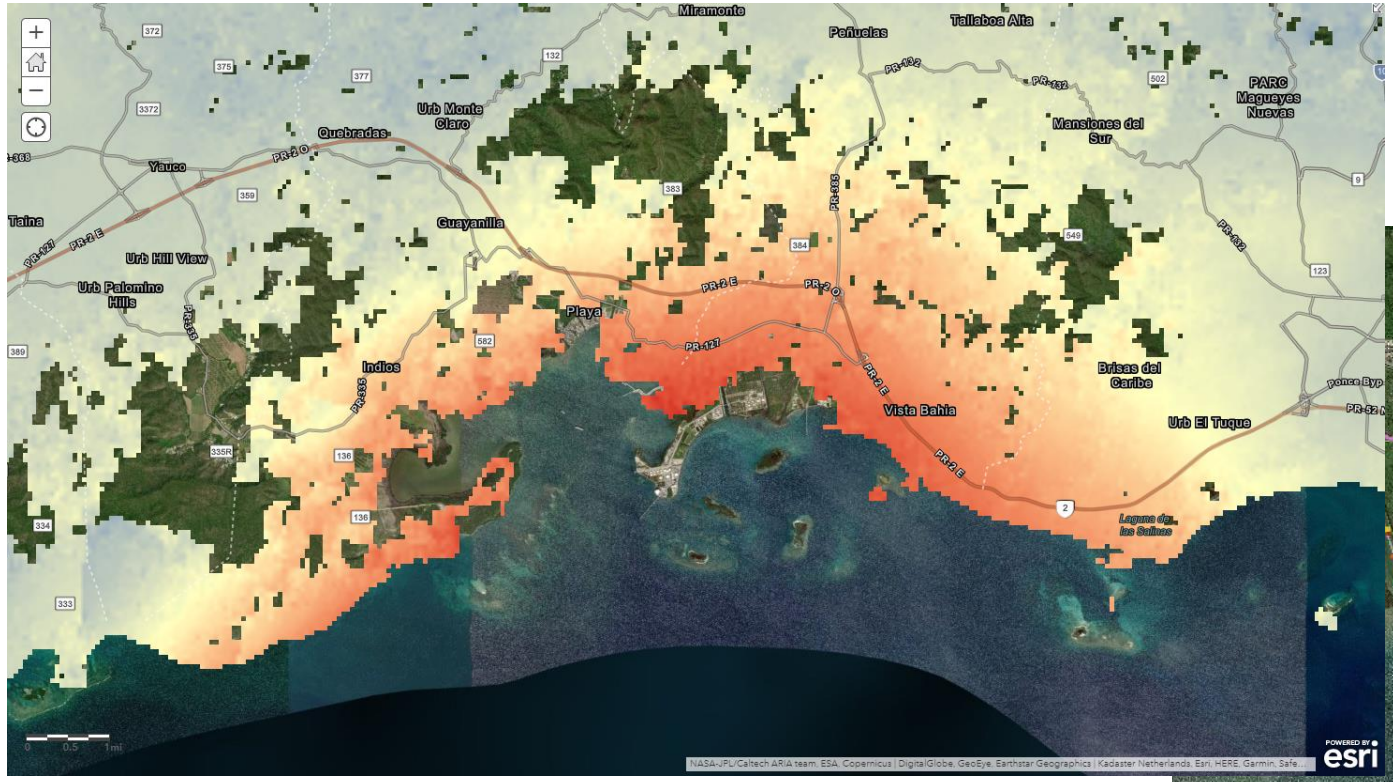
Landslides

- 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

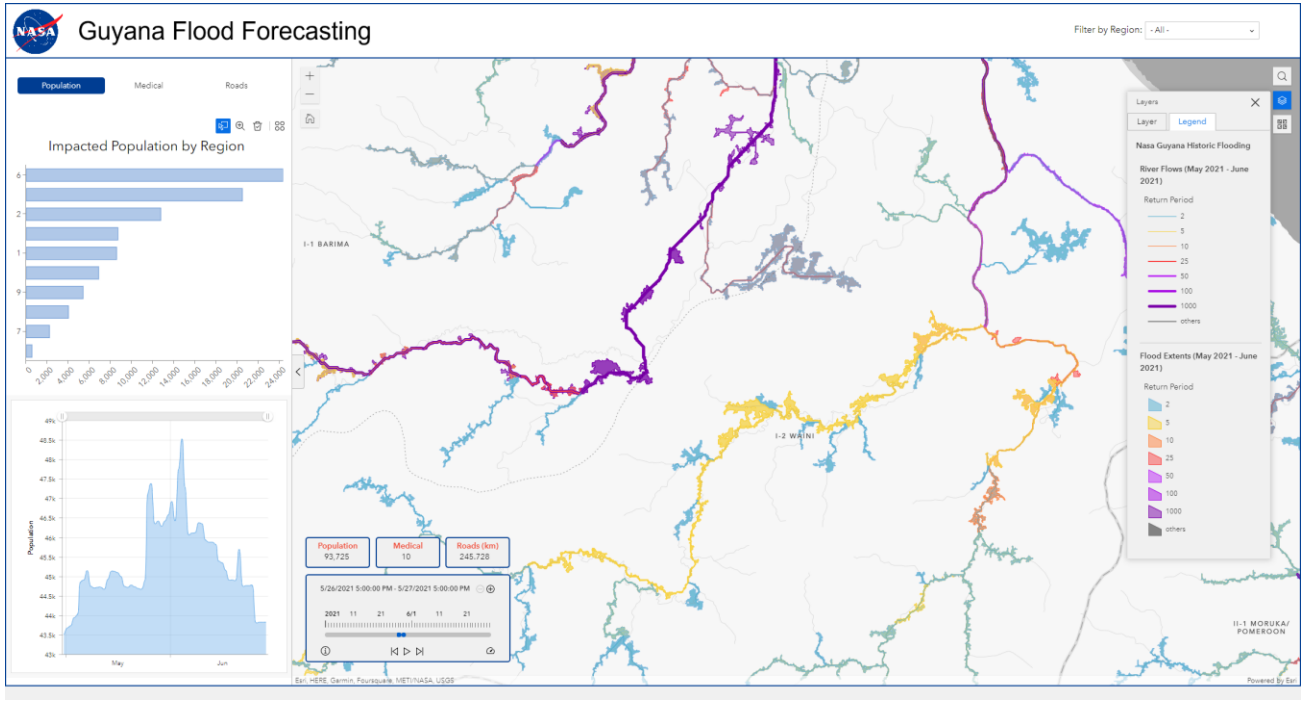


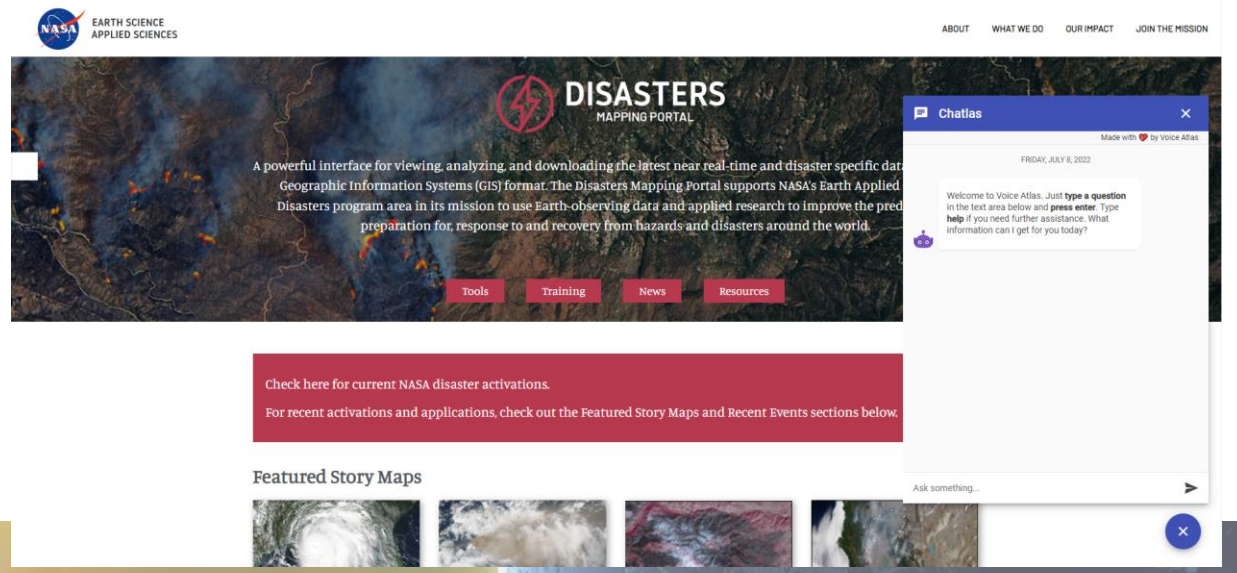
Left: Surface Deformation map showing ~5.5 inches of subsidence near the Costa Sur power Plant west of Ponce, PR

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)





NASA Disasters Mapping Portal:

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

HQ-Disasters-GIS@mail.nasa.gov

Garrett.W.Layne@nasa.gov

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

NASA Earth Science User Group

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

Location: Room 24 C

Portal Demo