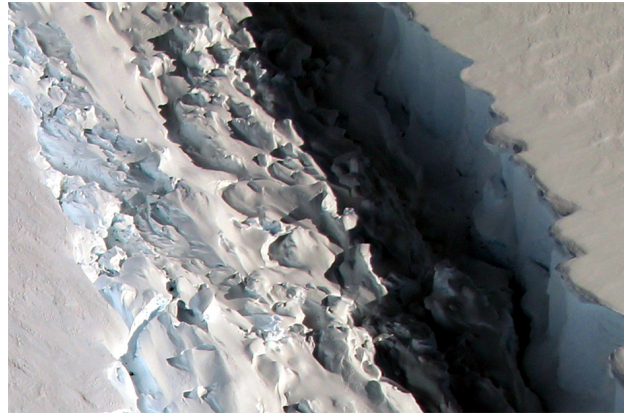


National Aeronautics and  
Space Administration



# SCIENCE



**The NASA Disasters Mapping Portal**  
[maps.disasters.nasa.gov](https://maps.disasters.nasa.gov)

**Jeremy Kirkendall**  
Disasters GIS Lead  
NASA Disasters Program

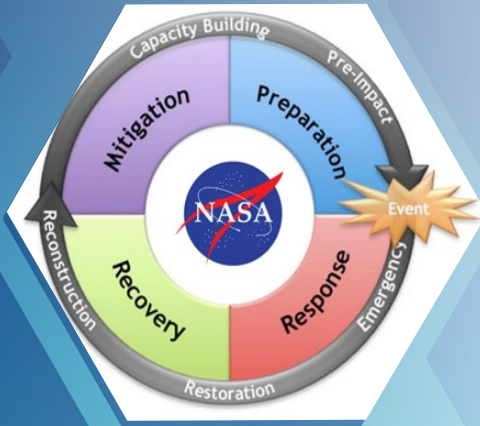


# NASA Operating Missions

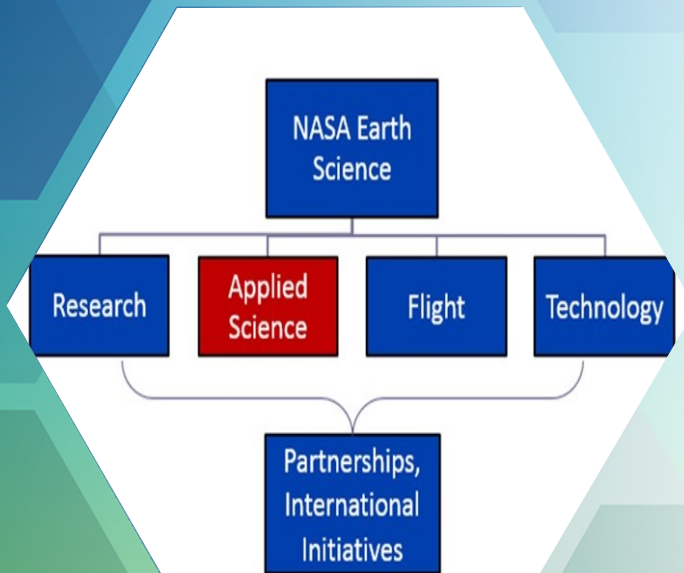




# Approach and Principles of the Disasters Program



- Utilizing the various NASA centers and their resources, a robust response program has been assembled to respond to various disasters worldwide
  - Meteorological (hurricanes, tornadoes)
  - Hydrological (heavy rain/flood)
  - Geophysical (earthquakes, volcanoes)



	Tier 1	Tier 2	Tier 3
<b>Assessment</b> <b>Rapid Hazard Assessment Expected</b> <ul style="list-style-type: none"> <li>- Centers and program experts to contribute within scope of daily activity</li> <li>- Guidance to elevate to Tier response, direct to research or no action</li> <li>- Days</li> <li>E.g.: media report</li> </ul>	<b>Response and Recovery Short Term and Best Effort</b> <ul style="list-style-type: none"> <li>- Centers and programs respond as available with only minor impact to existing/on-going activities</li> <li>- Detailed assessment and products scaled to modest response</li> <li>- Weeks to Month(s)</li> <li>E.g.: Napa Earthquake (2014), Chile Earthquake (2015), Oklahoma tornadoes, yearly floods</li> </ul>	<b>Significant Contributions Over Extended Period</b> <ul style="list-style-type: none"> <li>- Contributions are considerable given continual assessment of size and scale of impact</li> <li>- Personnel relevant to disaster type (s) expected, tasked, and assigned to support</li> <li>- Data and products adapted into recovery</li> <li>- Weeks to Month(s)</li> <li>E.g.: Nepal Earthquake (2015), Deep Horizon (2010), Eyjafjallajökull Eruption (2015)</li> </ul>	<b>Disaster is of major national importance</b> <ul style="list-style-type: none"> <li>- All relevant personnel expected to review activities for level of support to the disaster and/or be on-call</li> <li>- Assets and personnel may specifically assigned and tasked for lengthy time period (Months into recovery).</li> <li>E.g.: Super Storm Sandy (2012), Hurricane Katrina (2005), September 11, 2001 attacks</li> </ul>

# What is the NASA Disasters Mapping Portal?

- Converts NASA scientist's data into a geospatial format for public use
- All data is free and openly available
- No login required
- Every service has a REST endpoint allowing you to add to your own GIS
- Two types of products:
  - Event-based Products
  - Near Real Time Products

The screenshot shows the NASA Disasters Mapping Portal interface. At the top, there's a navigation bar with links: Home, Gallery, Map, Scene, Groups, and a Sign In button. Below this is the NASA Earth Science logo and the 'DISASTERS PROGRAM' title. The main header area includes 'NASA Disasters Mapping Portal' and a secondary navigation bar with 'TOOLS', 'TRAINING', 'NEWS', and 'PREVIOUS EVENTS'. The 'Featured Maps & Apps' section displays four map thumbnails: 'Disasters Program Response: Fall 2018 California Wildfires', 'NASA Products: California Wildfires Fall 2018', 'Recent NASA Products: Hurricane Florence', and 'NASA Products: Hurricane Michael'. Below this is a 'Disasters Program 2018 Highlights' section featuring a large map of the Pacific Ocean and surrounding landmasses (Asia, North America, South America, Australia). To the left of the map, there's a list of highlights: 1. NASA Disasters Program 2018 Responses (with an 'Organization' sub-section), 2. Power Outages - Hurricane Michael, and 3. Flooding - Hurricane Florence. At the bottom, there's a grid of 12 disaster types with corresponding images: Tropical Cyclones, Earthquakes, Floods, Wildfires, Volcanoes, Industrial Accidents, Landslides, Severe Weather, Winter Weather, Risk Reduction, External Resources, and NRT Products. On the right side of the bottom grid, there's a 'Recent Responses' list including: Alaska Earthquake 2018, November 2018 California Wildfires, Typhoon Yutu 2018, Hurricane Willa 2018, Hurricane Michael 2018, Sulawesi Island, Indonesia Earthquake and Tsunami 2018, Hurricane Florence 2018, Hokkaido Japan Earthquake 2018, Hurricane Lane 2018, Kerala India Flood 2018, and Lombok Indonesia Earthquake 2018.



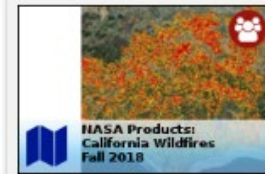
# Featured Maps and Apps

- Story Maps that highlight recent or major responses
- Story Maps help explain how to interpret NASA data

## Featured Maps & Apps



Disasters Program Response ...



NASA Products for the Califor...



NASA Products for Hurricane ...



NASA Products for Hurricane ...



## Disasters Program 2018 Highlights

1

### NASA Disasters Program 2018 Responses

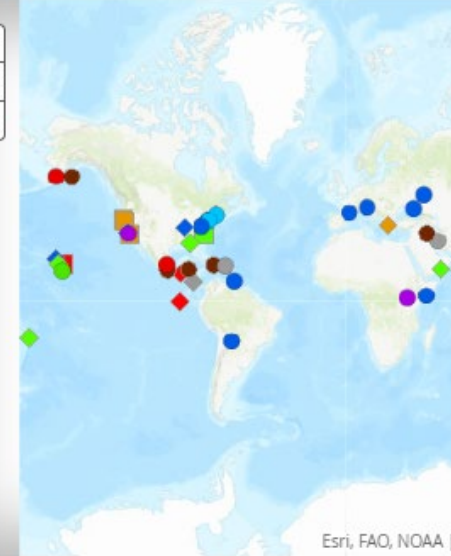
The NASA Disasters Program promotes the use of Earth observations to improve the prediction of, preparation for, response to, and recovery from natural and technological disasters. By sponsoring application science, the Program advances the readiness of results

2

### Power Outages - Hurricane Michael

3

### Flooding - Hurricane Florence



#### LEGEND

##### Tier 0 Responses

- NASA Earth Science
- Disasters Program Responses
- Earthquake
- Flood
- Industrial Accident
- Landslide
- Severe Weather
- Tropical Cyclone
- Volcanic Eruption
- Wildfire
- Winter Weather

##### Tier 1 Responses

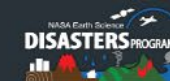
- NASA Earth Science
- Disasters Program Responses
- ▲ Earthquake

Esri, FAO, NOAA | N



# Hurricane Florence Story Map

## NASA Products for Hurricane Florence

[Home](#)[Sentinel-1 RGB](#)[Sentinel-1 Flood Map](#)[UAVSAR Imagery](#)[Black Marble Nighttime Imagery](#)[Black Marble HD Nighttime City Imagery](#)[VIIRS Nighttime Imagery](#)[ARIA Flood Map](#)

## NASA Disasters Program: Hurricane Florence

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

Click on the tabs at the top of the page to learn about impacts from the storm that NASA scientists can observe through satellite data.

For stories related to NASA products produced for Hurricane Florence, click [here](#).

For more information about the NASA Disasters Program, click the following links:  
[NASA Disasters Mapping Portal](#)  
[NASA Disasters Program Website](#)

Image Source: [International Space Station Program](#)





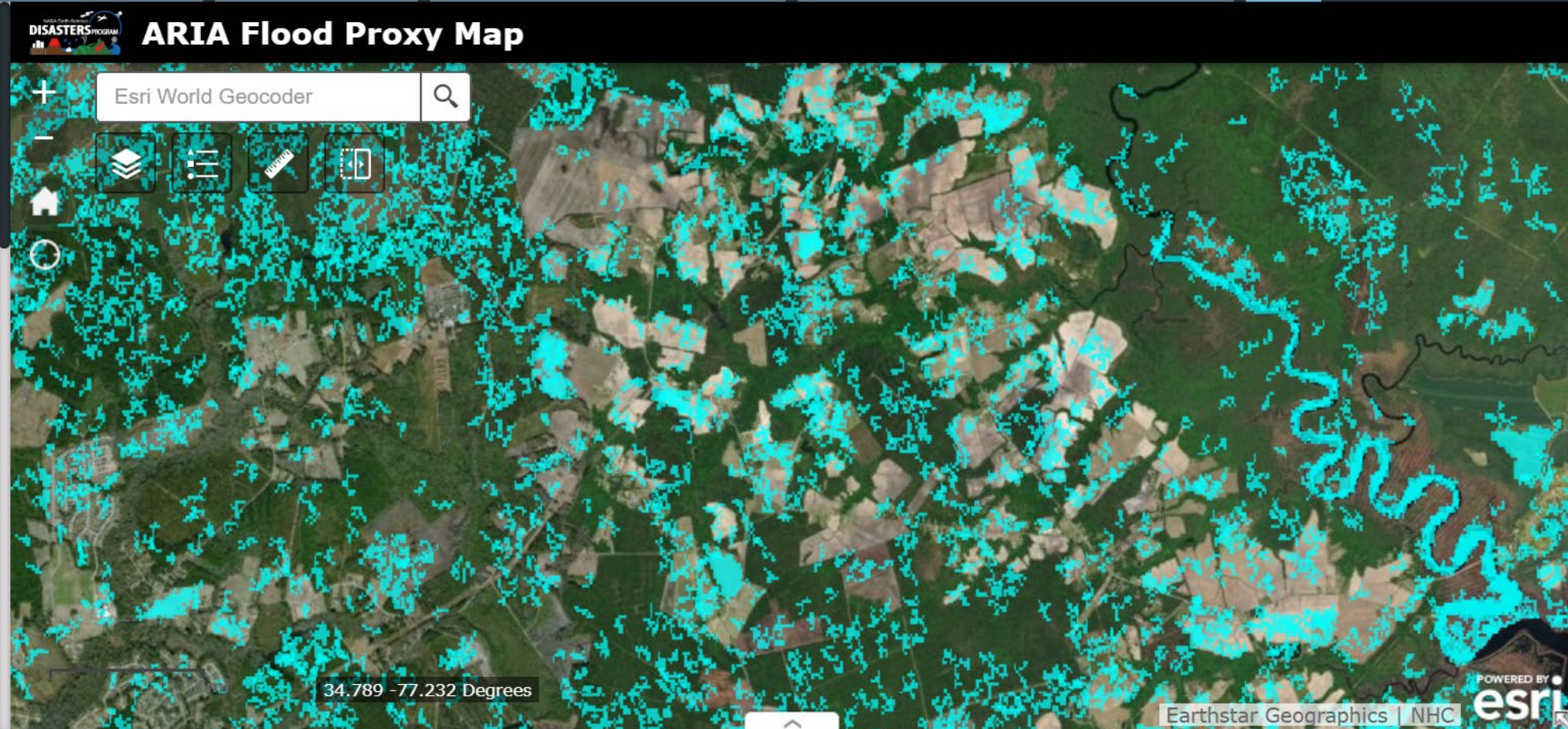
# Hurricane Florence Flooded Fields

## NASA Products for Hurricane Florence

[Home](#)[Sentinel-1 RGB](#)[Sentinel-1 Flood Map](#)[UAVSAR Imagery](#)[Black Marble Nighttime Imagery](#)[Black Marble HD Nighttime City Imagery](#)

### Information About These Products:

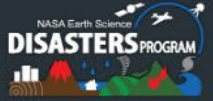
The Advanced Rapid Imaging and Analysis (ARIA) team at NASA's Jet Propulsion Laboratory in Pasadena, California, created this Flood Proxy Map depicting areas of Carolinas that are likely flooded as a result of Hurricane Florence. The images were taken before (October 12, 2016) and at the time (September 14, 2018 7:15 AM local time) when Hurricane Florence made landfall near Wilmington, NC. The map covers an area of 155 miles x 233 miles (250 km x 375 km). Each pixel measures about 33 yards x 33 yards (30 m x 30 m). Media reports provided anecdotal preliminary validation. Sentinel-1 data were accessed through the Copernicus Open Access Hub.





# Hurricane Florence Flooded Fields

## NASA Products for Hurricane Florence

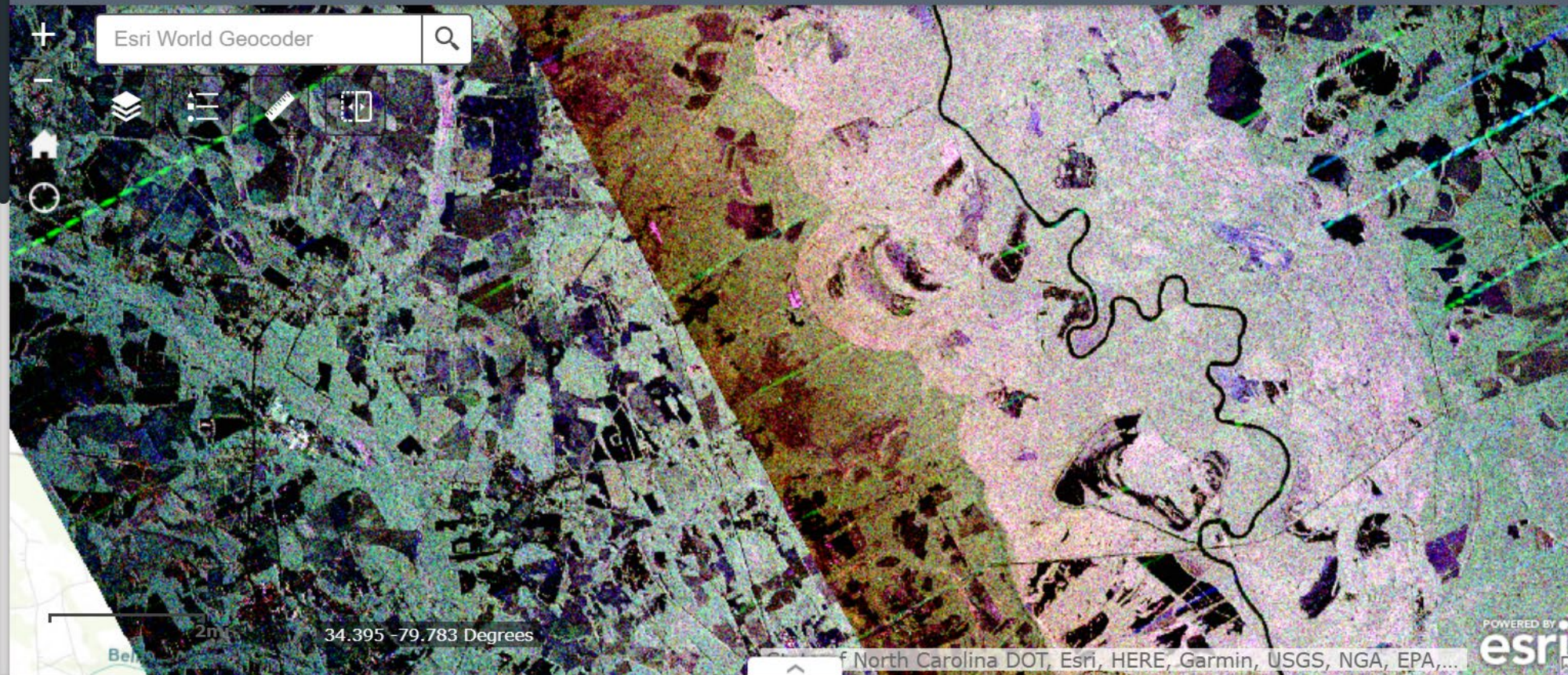
[Home](#)[Sentinel-1 RGB](#)[Sentinel-1 Flood Map](#)[UAVSAR Imagery](#)[Black Marble Nighttime Imagery](#)[Black Marble HD Nighttime City Imagery](#)

### Purpose/Summary:

The overlay of the intensities of these three polarization channels allows user to visually classify a scene by its backscattering mechanism, such as surface scattering (strong HH and VV return), volume scattering (strong HV return) and double-bounce scattering (strong HH return). Areas dominated by green (HV) intensity are typically vegetated areas. Areas dominated by shades of pink (HH+HV) intensity are typically inundated forests or vegetated fields. Black and dark grey areas are usually smooth surface (roads, open water, smooth bare ground) where there is very little radar backscatter.

### Technical Data Information:

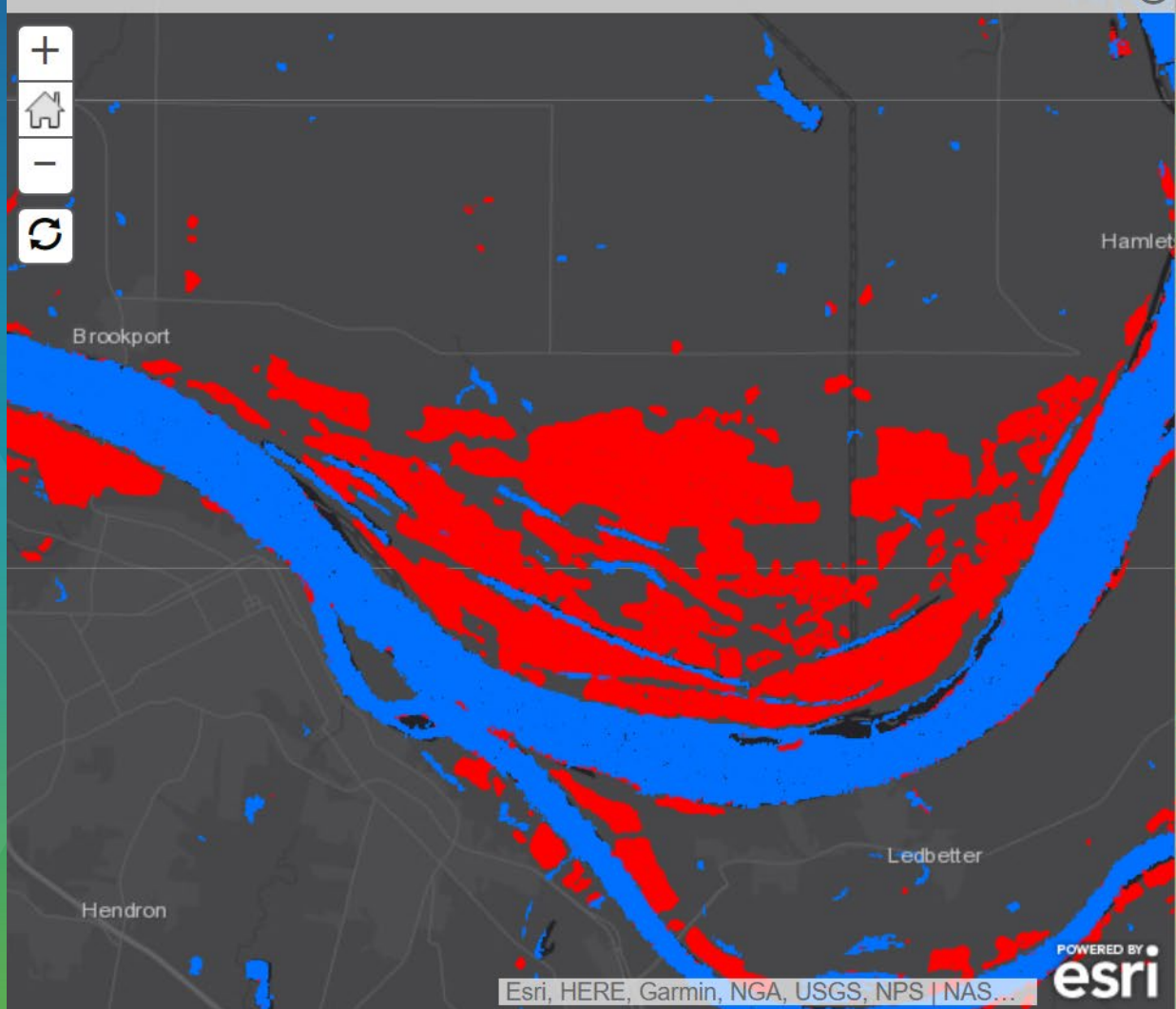
## Hurricane Florence UAVSAR Products





# Feb 2018 Midwest Flooding

ESA Sentinel-1 Water Extents



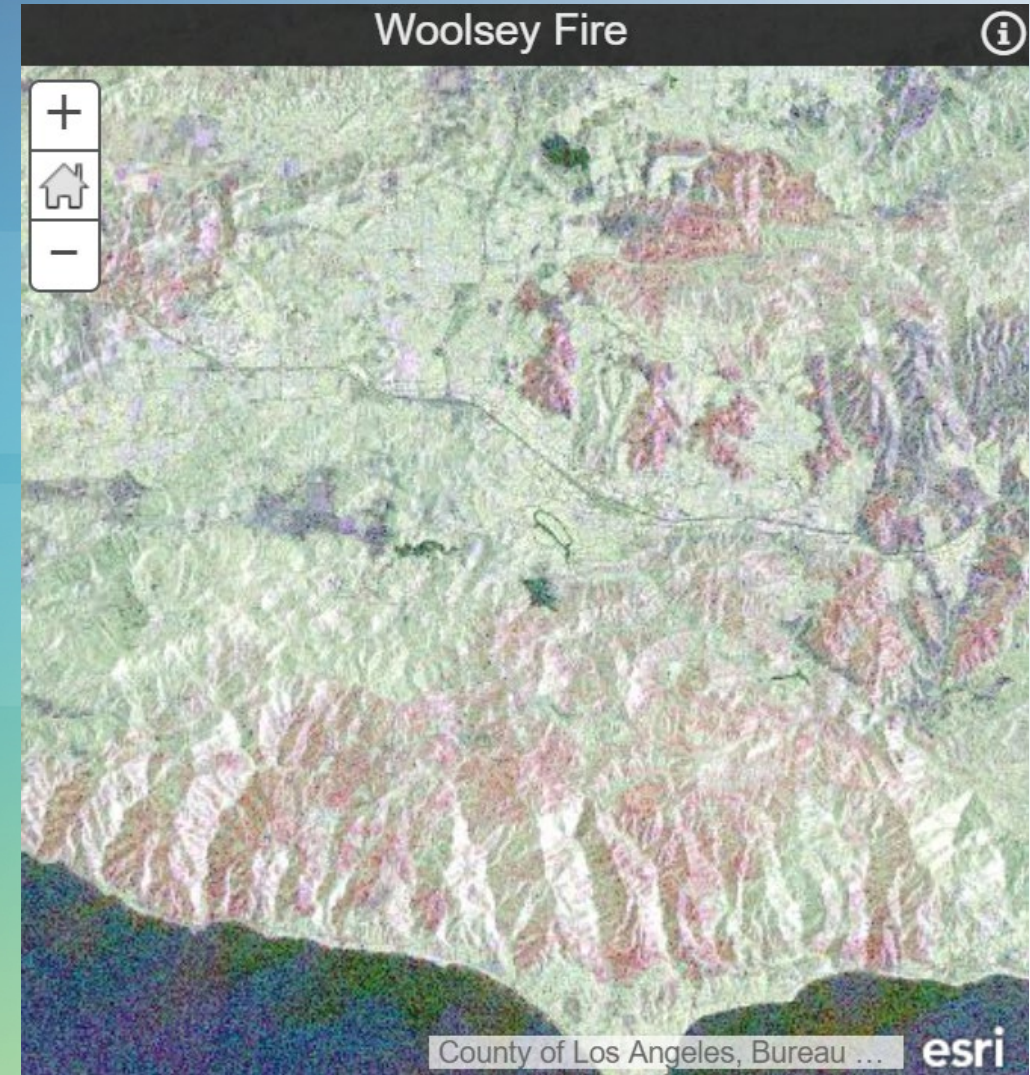
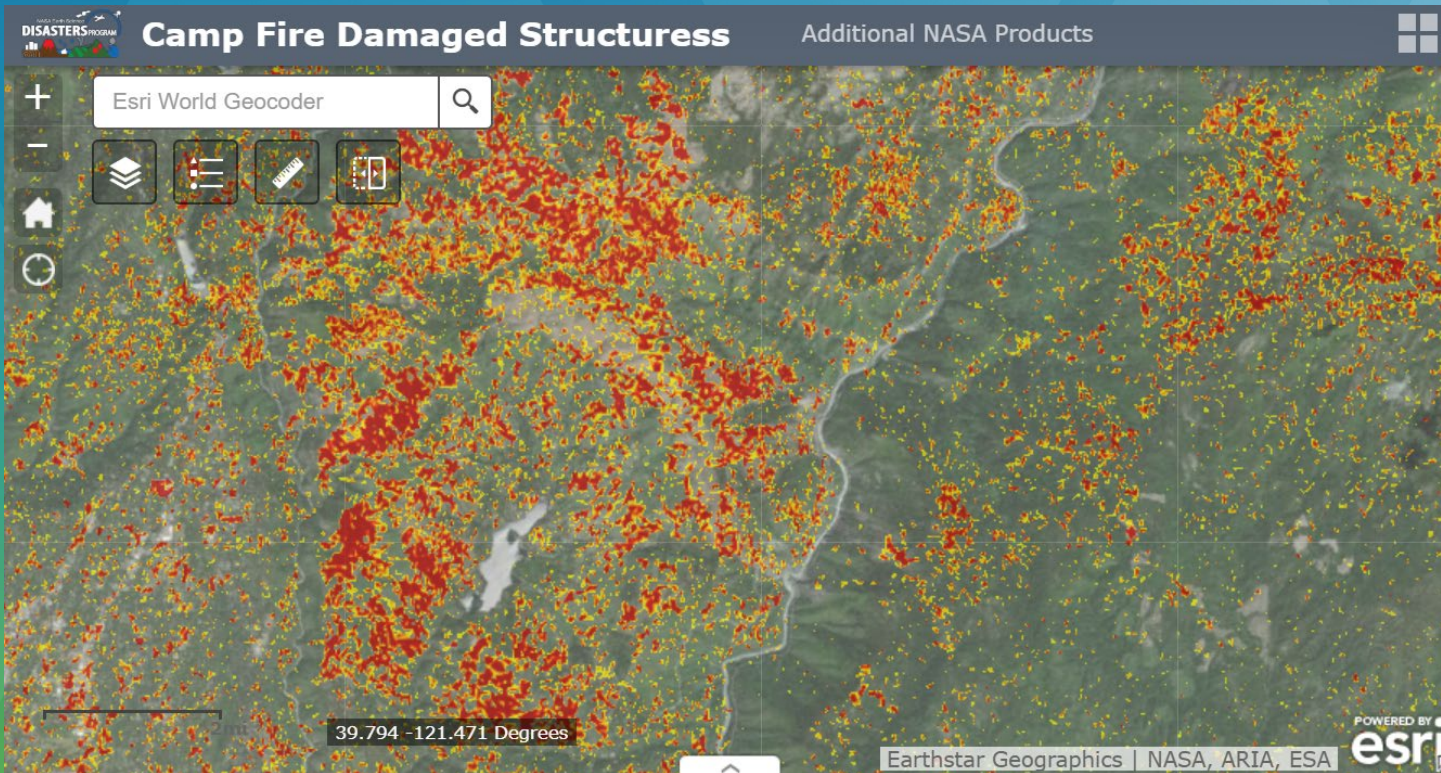
ESA Sentinel-1 RGB Composites





# Change Detection Products

- Detect burn scars, crop damage, flooding, and more

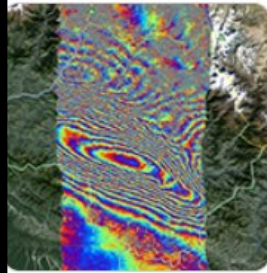




# Disaster Type



Tropical Cyclones



Earthquakes



Floods



Wildfires



Volcanoes



Industrial  
Accidents



Landslides



Severe Weather



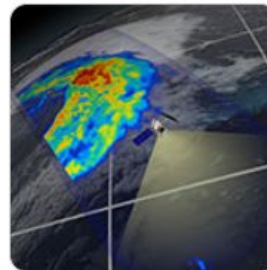
Winter Weather



Risk Reduction



External  
Resources



NRT Products

## Recent Responses

Alaska Earthquake 2018

November 2018 California  
Wildfires

Typhoon Yutu 2018

Hurricane Willa 2018

Hurricane Michael 2018

Sulawesi Island, Indonesia  
Earthquake and Tsunami 2018

Hurricane Florence 2018

Hokkaido Japan Earthquake  
2018

Hurricane Lane 2018

Kerala India Flood 2018


Lombok Indonesia Earthquake  
2018



# Tropical Cyclones

[Home](#) [Gallery](#) [Map](#) [Scene](#) [Groups](#) [My Content](#) [My Organization](#)

 [Jeremy](#) ▼

 "tropical cyclone"



## Search Results

### Related Searches

Find items related to ""tropical cyclone""

Find items published by Esri related to ""tropical cyclone""

### 9 results



[Details](#)

#### Hurricane Florence

NASA Data Products available for Hurricane Florence including satellite and UAVSAR imagery to help determine the extent of flooding, nighttime imagery depicting power outages, and potential storm damage.

owned by gwayne on September 11, 2018



[Details](#)

#### Tropical Cyclone Gita, February 2018

NASA Derived Data Products available for Tropical Cyclone Gita. February 12, 2018. (click here for more information)

owned by gwayne on February 14, 2018



[Details](#)

#### Hurricane Matthew Data Products

To help assess the event and provide situational awareness due to Hurricane Matthew, NASA has compiled a series of web maps and data products.

owned by gwayne on November 1, 2017



#### Hurricane Michael 2018

NASA Data Products available for Hurricane Michael including satellite imagery to help determine the extent of flooding, nighttime imagery depicting power outages, and potential storm damage.

[Relevance](#) [Title](#) [Owner](#) [Date](#)

### More Information

[What types of items can I find here?](#)

[Advanced search options](#)

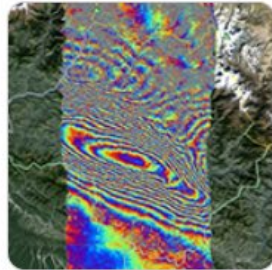
[Finding layer packages and other ArcGIS desktop content.](#)



# Recent Responses



Tropical Cyclones



Earthquakes



Floods



Wildfires



Volcanoes



Industrial  
Accidents



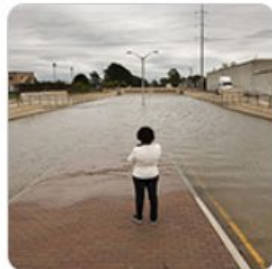
Landslides



Severe Weather



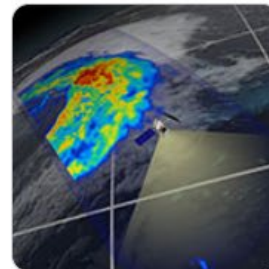
Winter Weather



Risk Reduction



External  
Resources



NRT Products

## Recent Responses

Alaska Earthquake 2018

November 2018 California  
Wildfires

Typhoon Yutu 2018

Hurricane Willa 2018

Hurricane Michael 2018

Sulawesi Island, Indonesia  
Earthquake and Tsunami 2018

Hurricane Florence 2018

Hokkaido Japan Earthquake  
2018

Hurricane Lane 2018


Kerala India Flood 2018

Lombok Indonesia Earthquake  
2018




# Hurricane Florence Product Gallery

- Contains all NASA products for the event
- Click on a product to go to the Item Details page to learn more or to add it to your GIS



## NASA Products for Hurricane Florence

NASA Data Products available for Hurricane Florence including satellite and UAVSAR imagery to help determine the extent of flooding, nighttime imagery depicting power outages, and potential storm damage.



Sort by

Date

Title



Type


Ratings


Avg. Rating


Comments

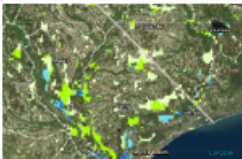
Views





**NASA Products for Hurricane Florence**  
Web Mapping Application by jkirkend. Last Modified Jan 4, 2019.  
A collection of NASA's products used in response to Hurricane Florence  
(1,887 views) 





**Power Outages at Fort Bragg due to Hurricane Florence**  
Web Mapping Application by jkirkend. Last Modified Dec 5, 2018.  
Black Marble HD nighttime imagery showing power outages at Fort Bragg due to Hurricane Florence  
(13 views) 





**GFMS Maximum Inundation Estimate**  
Image Service by gwayne. Last Modified Oct 11, 2018.  
GFMS Max Inundation Estimate for Hurricane Florence  
(113 views) 



**ARIA Damage Proxy Map 9/14/2018 at 23:05:48 UTC produced using Sentinel-1**  
Image Service by jkirkend. Last Modified Oct 4, 2018.  
ARIA Damage Proxy Map 9/14/2018 at 23:05:48 UTC produced using Sentinel-1  




**Landsat 8 532 RGB 7/14/2017 [Pre-Event]**  
Image Service by jkirkend. Last Modified Oct 2, 2018.  
Pre-Event Hurricane Florence 7/14/2017 Imagery. This Band 532 RGB provides a false composite look at the surface. This product contains imagery from USGS' Landsat 8.  
(17 views) 



**Landsat 8 532 RGB 9/19/2018**  
Image Service by jkirkend. Last Modified Oct 1, 2018.

Show

All Results

Maps

Layers

Applications

Tools

Files

There are 2 ways to view the NASA products on this page:

1. Open the [NASA Story Map](#) for this event
2. Click on an individual product and it will take you to the item details page. Clicking the Open button allows you to view it in the free browser based map viewer or in ArcGIS for Desktop if you have the software installed. From here you can read about how to interpret the product, how it was captured, and when the next update may be available.

**NASA's Data Use Policy**

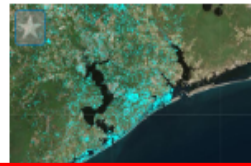
**UPDATE 9/17/18:**  
Remnants of Hurricane Florence are now a post-tropical cyclone moving over the Mid-Atlantic states. To date the storm has caused approximately 25 deaths. Tens of thousands of homes in the Southeast, including the Carolinas have been damaged as floodwaters continue to rise, and numerous communities, including the City of Wilmington, NC are cut off by the floodwaters. Search and rescue operations are continuing, and thousands of people remain in shelters. NASA Scientists have begun to map the floodwaters by



# Add Our Data To Your Map

- Click Open and add to a new web map
- Or copy the REST endpoint and add to your ArcGIS Online account, a Portal, or other application
- This Item Details page explains how to use the product

## ARIA Flood Proxy Map 9/15/2018 at 23:57 UTC produced using ESA Sentinel-1



ARIA Flood Proxy Map on September 15, 2018 22:57UTC. Image produced using ESA Sentinel-1

Imagery Layer by gwayne

Source: Image Service

Last Modified: September 18, 2018

☆☆☆☆☆ (0 ratings, 27 views)

OPEN ▾

SHARE

Add layer to map  
Add layer to new map  
Open in ArcGIS for Desktop

EDIT

DELETE

MOVE ▾

CHANGE OWNER

METADATA

### Purpose/Summary:

The Advanced Rapid Imaging and Analysis (ARIA) team at NASA's Jet Propulsion Laboratory in Pasadena, California, created this Flood Proxy Map (FPM) depicting areas of Carolinas that are likely flooded as a result of Hurricane Florence. The map is derived from synthetic aperture radar (SAR) images from the Copernicus Sentinel-1 satellites, operated by the European Space Agency (ESA). The images were taken before (September 09, 2018) and 36 hours after the hurricane's landfall (September 15, 2018 18:57 PM local time). The map covers an area of 53 miles x 152 miles (85 km x 245 km), indicated with the big red polygon. Each pixel measures about 33 yards x 33 yards (30 m x 30 m). Media reports provided anecdotal preliminary validation. Sentinel-1 data were accessed through the Copernicus Open Access Hub.

### Suggested Usage:

Likely flooded areas are depicted in light blue. This map was cross-validated with ARIA's earlier flood proxy map derived from Sentinel-1 SAR data ([Previous FPM](#)) acquired at the time of the hurricane's landfall. This flood proxy map should be used as guidance to identify areas that are likely flooded, and may be less reliable over urban and vegetated areas.

### Satellite/Sensor:

Synthetic Aperture Radar (SAR) from Copernicus Sentinel-1 operated by the European Space Agency (ESA); 30 meter resolution

### Credits/Acknowledgments:

The image contains modified Copernicus Sentinel data (2018), processed by ESA and analyzed by the NASA-JPL/Caltech ARIA team. This research was carried out at JPL funded by NASA Disasters Program. For more information about ARIA, visit: <http://aria.jpl.nasa.gov>

### Access and Use Constraints

Free and available to public users; Commercial providers; Data is not research grade and should not be used for scientific research. Please note that research products provided are intended to aid decision making and are not for operational use. Use of this product should include: "Contains modified Copernicus Sentinel data (2018) processed by ESA"

### Map Contents

ARIA Flood Proxy Map 9/15/2018 at 23:57 UTC produced using ESA Sentinel-1

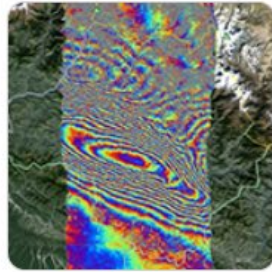
[https://maps.disasters.nasa.gov/ags03/rest/services/Hurricane\\_Florence\\_2018/S1\\_ARIA\\_FPM\\_20180915\\_2257/ImageServer](https://maps.disasters.nasa.gov/ags03/rest/services/Hurricane_Florence_2018/S1_ARIA_FPM_20180915_2257/ImageServer)



# Near Real-Time Products



Tropical Cyclones



Earthquakes



Floods



Wildfires



Volcanoes



Industrial  
Accidents



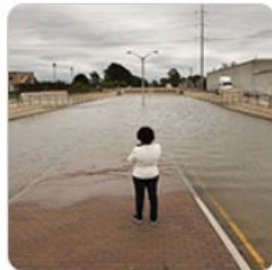
Landslides



Severe Weather



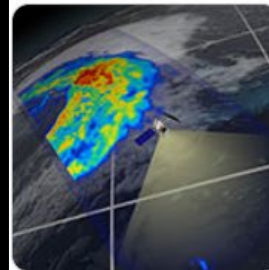
Winter Weather



Risk Reduction



External  
Resources



NRT Products

## Recent Responses

Alaska Earthquake 2018

November 2018 California  
Wildfires

Typhoon Yutu 2018

Hurricane Willa 2018

Hurricane Michael 2018

Sulawesi Island, Indonesia  
Earthquake and Tsunami 2018

Hurricane Florence 2018

Hokkaido Japan Earthquake  
2018

Hurricane Lane 2018

Kerala India Flood 2018

Lombok Indonesia Earthquake  
2018



# Near Real-Time Products

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Near Real Time Products

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Near Real-Time Products from NASA Earth Science

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Maps

Layers

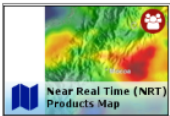
Scenes

Apps

Tools

Files

Show ArcGIS Desktop Content



Open Details


[Homepage Map] NASA Near Real-Time Products (Current Snapshot)

Web map is published to give a current snapshot of all Near Real-Time (NRT) products available as web services thru NASA Disasters Mapping Platform.

Web Mapping Application by gwayne

Last Modified: July 24, 2018

(0 ratings, 0 comments, 6,028 views)



Open Details


[Time-enabled] FIRMS Active Fire: previous 7 days, Update every 3 hours

The Fire Information for Resource Management System (FIRMS) distributes Near Real-Time (NRT) active fire data within 3 hours of satellite overpass fr

Map Image Layer by gwayne

Last Modified: July 19, 2018

(0 ratings, 0 comments, 11,451 views)



Open Details

[Time-enabled] Flood Detection 1 Observation Image, Daily, MODIS

MODIS Flood 1 Day 1 Observation, Cloud & Terrain Shadow Masking Applied

Imagery Layer by gwayne

Last Modified: July 19, 2018

(0 ratings, 0 comments, 16 views)

Group Details

Owner: gwayne

Status: Public

Contributors: Members

Tags: NASA, NASA Disasters Program, NRT

7 Members

gwayne

dborges1

jseepers

bosmanog

laschul1

jrbell1

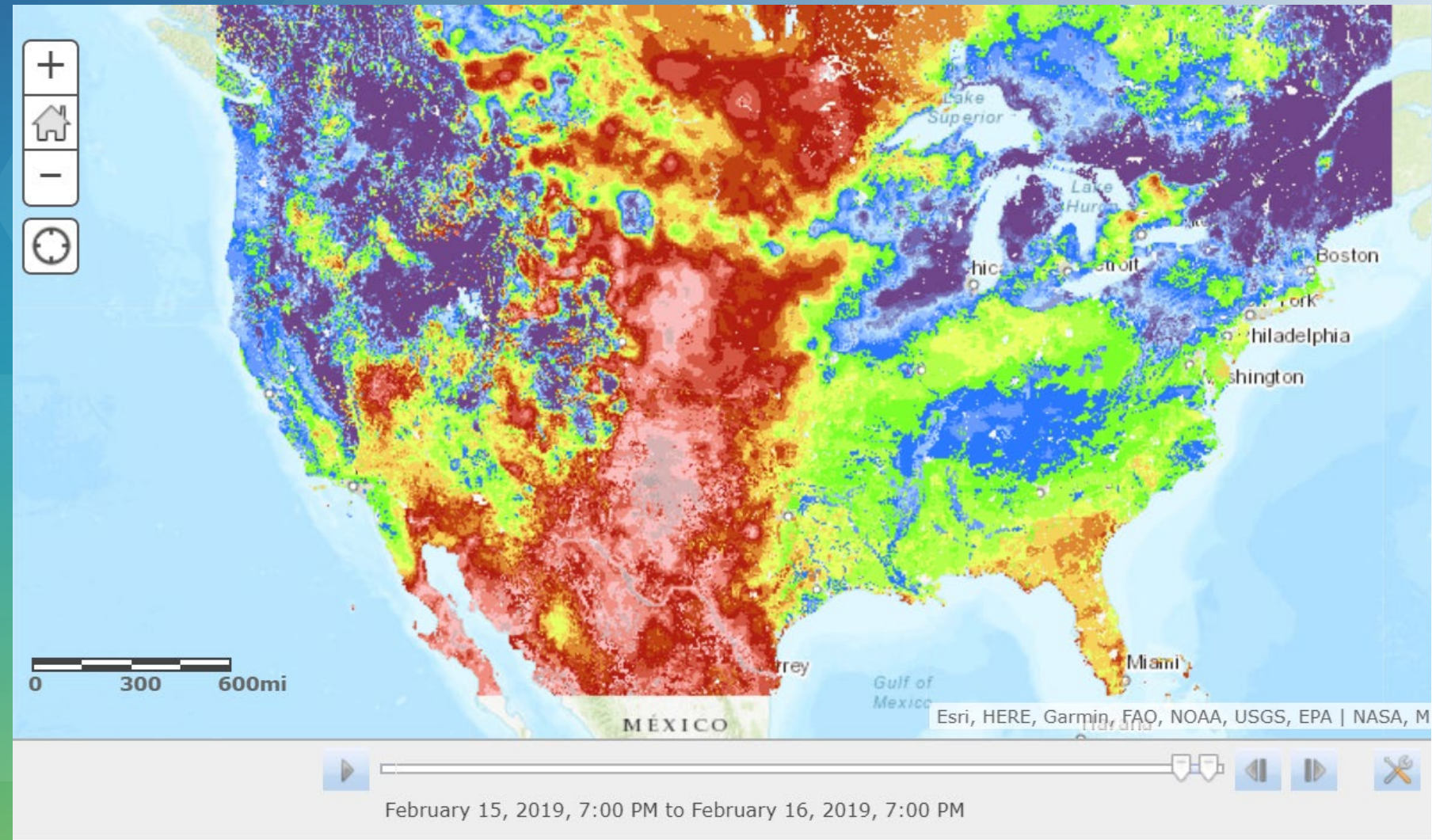
jkirkend

17



# Near Real-Time Products: Relative Soil Moisture

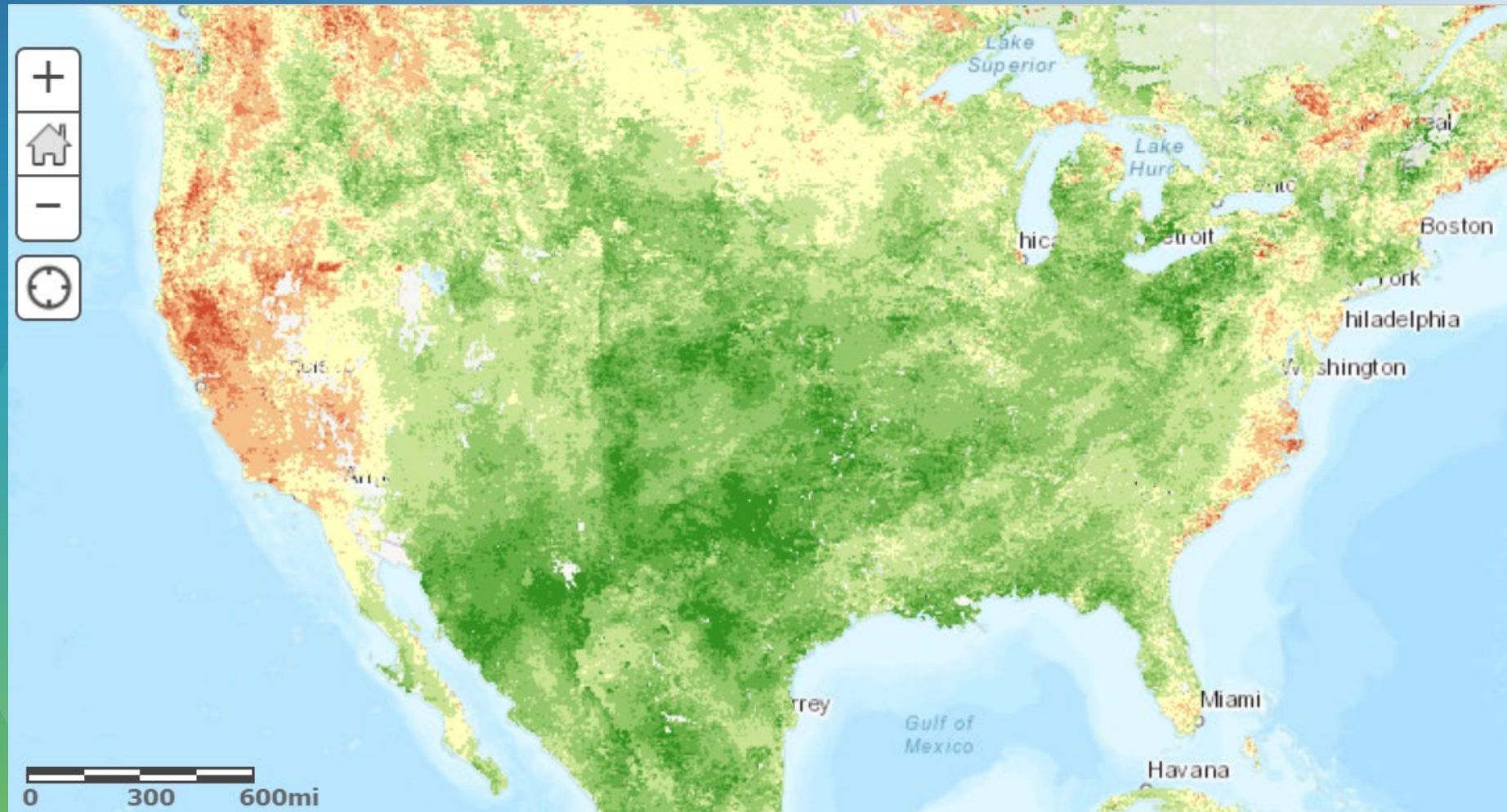
- Top 10cm of soil
- 3km Resolution
- Updated daily
- Time enabled





# Near Real-Time Products: Evaporative Stress Index

- 5km Resolution
- Global coverage
- Updated weekly





## Learn More

NASA Disasters Mapping (GIS) Portal:

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

NASA Disasters Program

<https://disasters.nasa.gov>

Jeremy.J.Kirkendall@nasa.gov