

National Aeronautics and
Space Administration



Using NASA LANCE Near Real-Time Earth Observations for Disaster Risk Reduction

EXPLORE EARTH

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<i>Other partners: USGS/Hazards Data Distribution System, Int'l Charter on Space and Major Disasters, end user collaborators within FEMA, IFRC, U.S. National Guard, University of Maryland, Global Flood Partnership, others.</i>	



Outline

NASA's Land,
Atmosphere Near
real-time
Capability for EOS
(LANCE)

NASA's Earth
Applied Science
Disasters Program

Disasters
Application



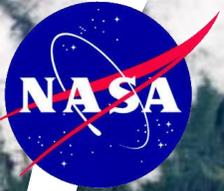


NASA's Land, Atmosphere Near Real-time Capability for Earth Observing Systems (LANCE)

The screenshot shows the LANCE website interface. At the top is the NASA EarthData logo with the tagline 'OPEN ACCESS FOR OPEN SCIENCE'. Navigation links for 'ABOUT', 'DATA', 'COLLABORATE', and 'LEARN' are visible. The main banner features the text 'LANCE: NASA NEAR REAL-TIME DATA AND IMAGERY' over a satellite image of Earth. Below the banner is a search bar and social media icons. The main content area has the heading 'Land, Atmosphere Near real-time Capability for EOS (LANCE)' and a 'Discover NRT Data and Imagery' section with a 'Download Data' list.

- The goal of LANCE (<https://earthdata.nasa.gov/lance>) is to provide **Near Real-time (NRT) data products within 3 hours** from satellite observations to meet the timely needs of applications users including disasters.
- LANCE NRT imagery is generally available within 3-5 hours after observation from **NASA's Global Imagery Browse Services (GIBS) and Worldview.**
- LANCE provides NRT data and imagery from **10 instruments** much quicker than routine processing allows including AIRS, AMSR2, LIS, MISR, MLS, MODIS, MOPITT, OMI, OMPS, and VIIRS. NRT data and imagery from **SMAP (Soil Moisture Active Passive) are coming soon.**
- LANCE provides access to **more than 110** NRT products.
- Fire Information for Resource Management System (**FIRMS**) is a part of LANCE.
- Karen Michael is the LANCE manager. Diane Davies is the LANCE Operations Manager.





LANCE User Working Group (UWG)

- LANCE is managed by NASA's Earth Science Data and Information System (ESDIS) but steered by a User Working Group (UWG) responsible for providing guidance and recommendations concerning a broad range of topics related to the LANCE system, capabilities, and services.
- **The UWG meets twice a year to ensure that LANCE capabilities are aligned with the NRT community needs.**
- UWG recommendations are made to ESDIS, which in turn engages NASA Headquarters concerning the feasibility and cost of implementation.
- **The UWG is chaired by Dr. Miguel Roman (Earth from Space Institute, USRA).**

LANCE UWG members

Name	Affiliation
Miguel Roman	Universities Space Research Association Earth from Space Institute (EfSI)
Robert Brakenridge	Colorado/Dartmouth Flood Observatory
Arlindo da Silva	NASA/Goddard
Vanessa Escobar	NOAA/NESDIS
Mike Fromm	NRL/Washington DC
Sean Helfrich	NOAA/NESDIS/OSPO
Steve Miller	Colorado State University
Maggi Glasscoe	MSFC
Brad Quayle	USFS
Josh Cossuth	NRL/Monterey/Washington DC
Mark Trice	MD DNR
Mike Budde	USGS
Patrick Duran	NASA/MSFC/SPoRT



LANCER Users



(Picture is adapted from Diane Davies's presentation.)



NASA Disasters Program

Program Manager: Dr. David Green.

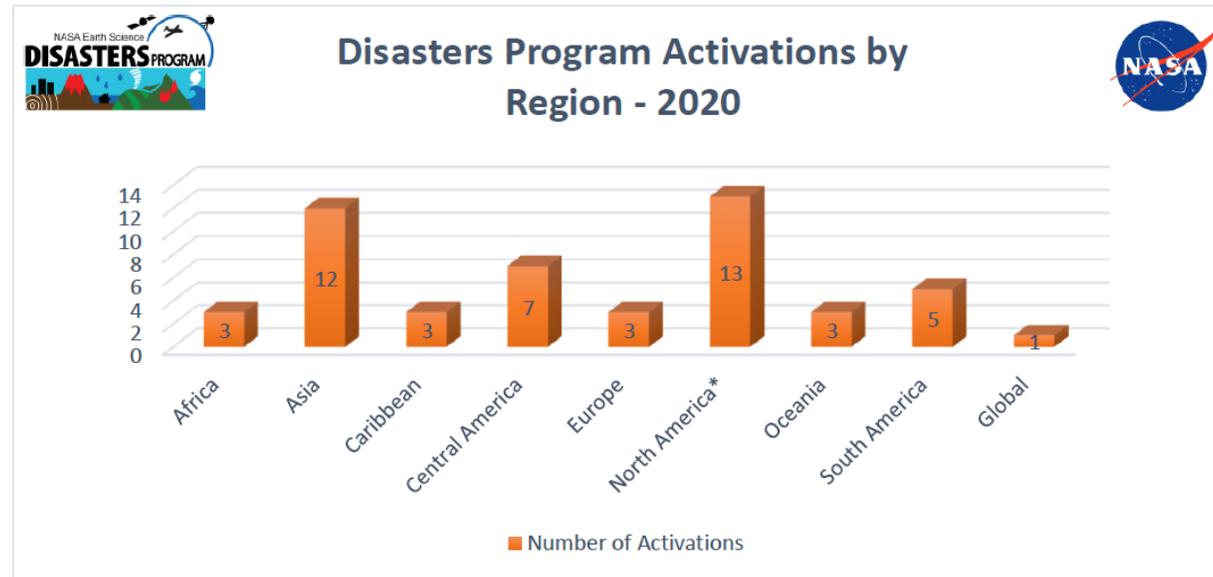
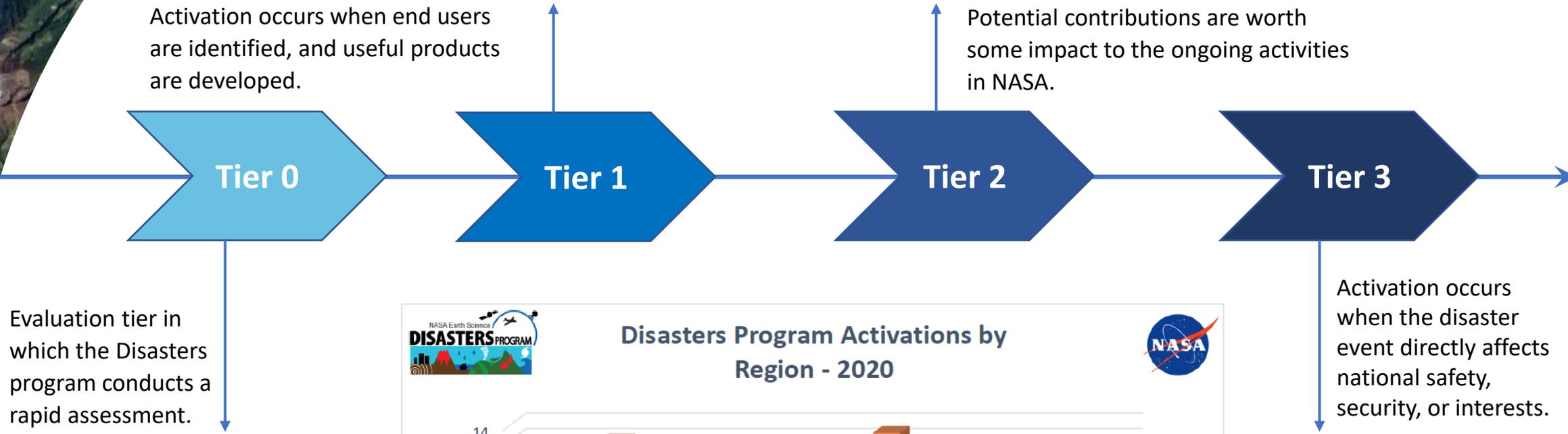


Figure 23. Disaster Activations by Region. *Note: North America includes Canada, Mexico, and the United States.

(Source of the figure: NASA Earth Science Applied Science 2020 Annual Summary of Disasters Program)

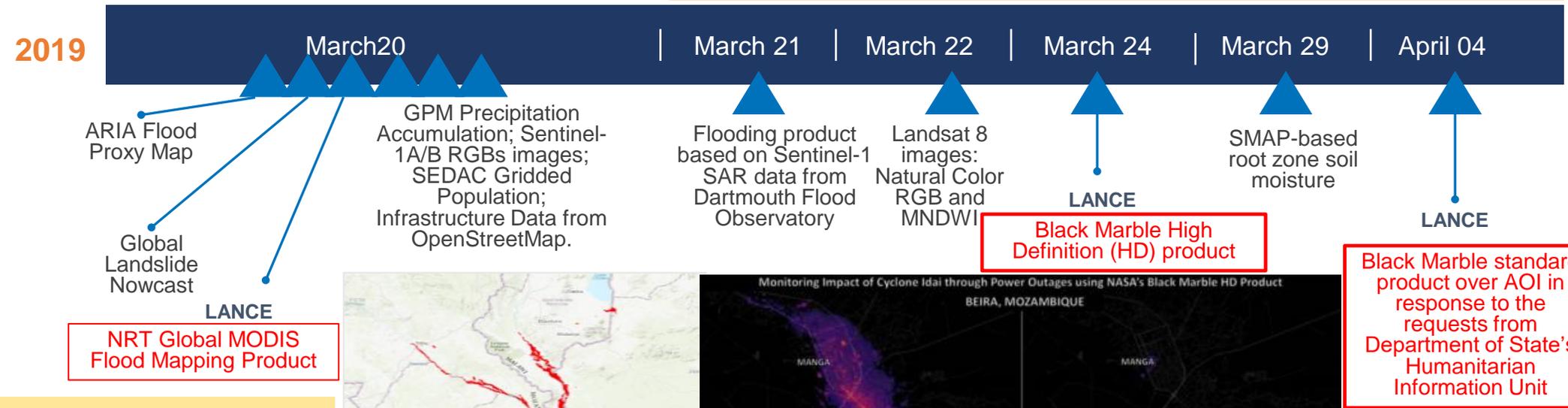




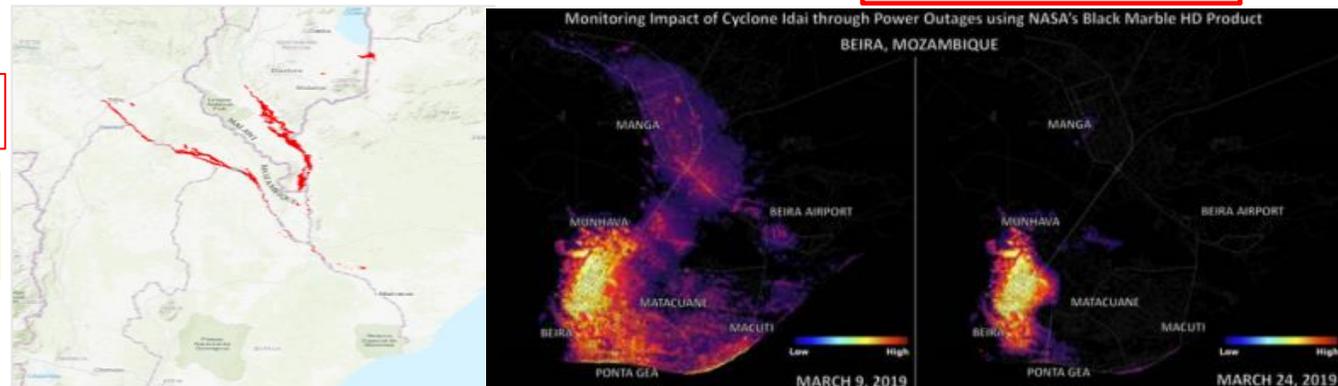
Using LANCE NRT Data Products in NASA Response for Tropical Cyclone Idai

"I've heard from our field teams that the maps that we are making with NASA data are also being used **by the Mozambique government for initial assessments and decision-making**, so that's great news. The data you're providing is very useful for us as we work with partners to respond to the flooding." **Lauren Bateman, IFRC**

"In terms of any direct asks we have relating to data needs for our current production on Tropical Cyclone Idai, there is one item of interest that stands out. 1. **Black Marble Power Outages** – We see this is available for the city of Beira. Is it possible to get this on the scale of the entire province of Sofala in Mozambique? Access to electric is key for proper hygiene, especially this long after the onset of the disaster and, combined with flood extent and displacement, can be really helpful in showing the scale of potential Cholera/disease outbreaks." **Ryan Latgis, Humanitarian Information Unit, U.S. Department of State**



NASA Response and Engagement Timeline for Tropical Cyclone Idai (March-April 2019)





Disaster Response Support: Visualizing LANCE NRT Data Products in NASA Disasters Mapping Portal



DISASTERS NASA Disasters Mapping Portal Sign In

Near Real-Time Products

These products are updated on a near real-time basis and most have a global coverage. They are based on data collected by satellites and NASA models.

DISASTERS NASA Near Real-Time Products Search

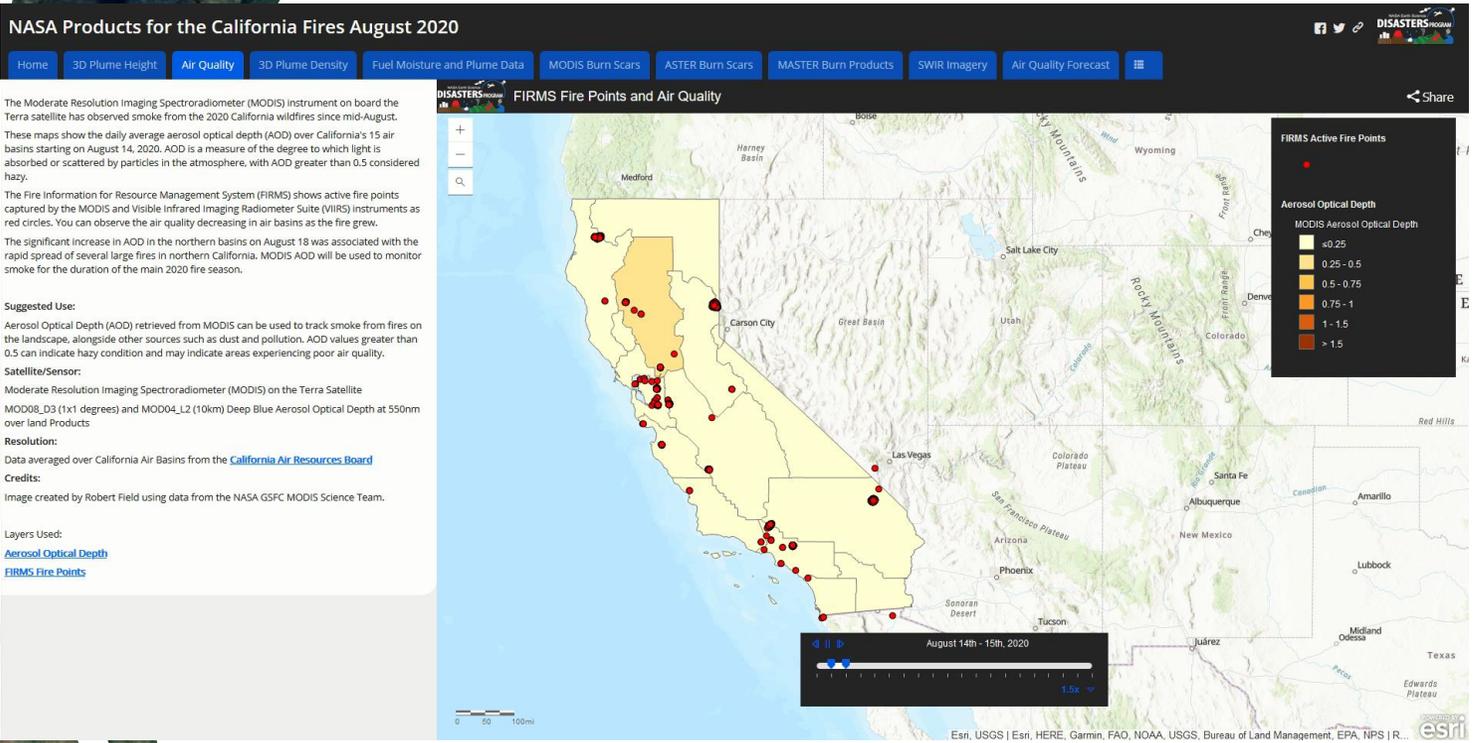
- Air Quality Surface Concentration Forecast (GEOS-5, GMAO)
- Available Fuel Moisture and Plume Data
- Black Marble Nighttime Blue/Yellow Composite (VIIRS / Suomi-NPP)
- Burn Scar - Corrected Reflectance (MODIS / Aqua)

- **NASA Disasters Mapping Portal** (<https://disasters-nasa.hub.arcgis.com/>), the NASA's Open Data Portal hosted by the NASA Earth Applied Sciences Disasters Program, is an ArcGIS-based online interface for viewing, analyzing and downloading disaster response datasets **including LANCE NRT products on disasters events.**

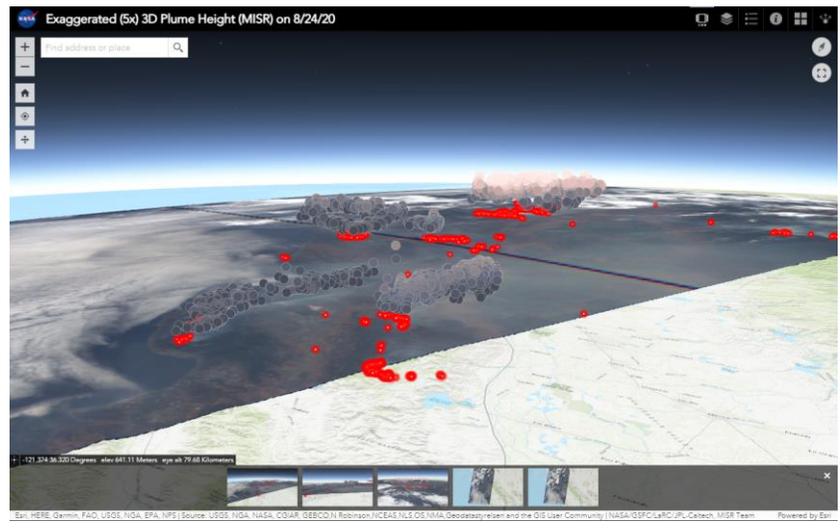




Using LANCE NRT Data Products in NASA Response for Wildfires



LANCE FIRMS NRT Fire Products were used during the Disasters Program's response to the Western US Fires in 2020.



The above map shows the Aerosol Optical Depth averaged of CA Air Basins, where LANCE FIRMS NRT active fire points provides context of location of fires.

The image above shows that *FIRMS active fire points* provides context of origin of the smoke plumes shown 3D from MISR Smoke Plumes Height on 8/24/20.



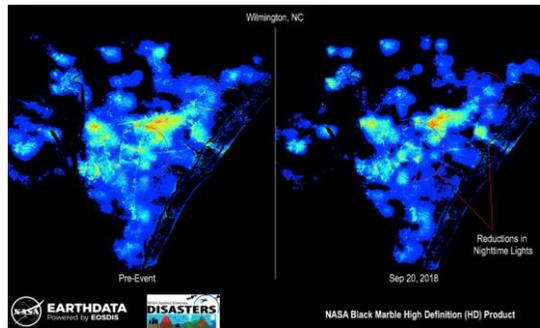
(This slide is provided by Garrett Layne from NASA Disasters Program)



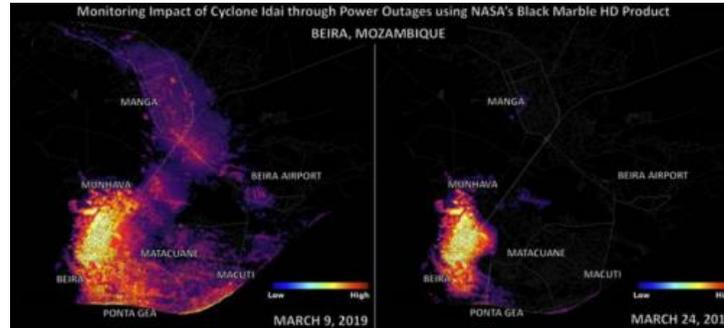


Using LANCE NRT Data Products in NASA Response for Monitoring Power Outages

- **NASA's Black Marble Nighttime Lights product suite** (<https://blackmarble.gsfc.nasa.gov>) allows users to observe changes in nighttime lights that may be due to power outages. The Black Marble dataset is available in **NRT in LANCE** (<https://earthdata.nasa.gov/earth-observation-data/near-real-time/download-nrt-data/viirs-nrt>) and as a standard product from NASA's LAADS DAAC.



Hurricane Florence

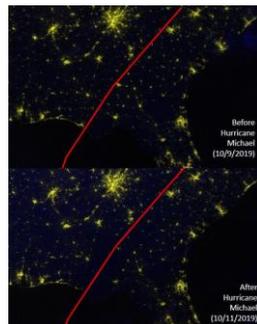


Cyclone Idai



Hurricane Ida

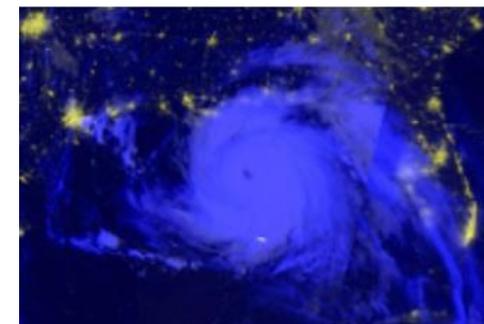
- **The Black Marble Nighttime Blue/Yellow Composite Product** is available in NASA Disasters Mapping Portal and NASA Worldview website since June 2021.



Hurricane Michael



Hurricane Dorian



Hurricane Ida





Using LANCE NRT Data Products in NASA Response for Floods due to Hurricanes, Tropical Cyclones and Earthquakes

- **NASA GSFC MODIS NRT Flood Mapping Products** (<https://floodmap.modaps.eosdis.nasa.gov/>) have been widely used to support Floods disaster responses for a few years, which are available in LANCE (<https://earthdata.nasa.gov/earth-observation-data/near-real-time/mcdwd-nrt>) since April 2021.



Floods in Indonesia



Hurricane Michael



Hurricane Florence



Cyclone Idai



Australia Floods 2021



Hurricane Elsa





Expecting New NRT Data Products from Upcoming NASA Missions

With the free and open data policy, upcoming NASA missions will increase our capabilities to cover the gaps in Disaster Risk Reduction between scientific capability and users' needs:

✓ **NISAR (Launch in 2023 Q1)** will provide low latency high-resolution SAR observations which can penetrate cloud cover to support disaster response.



✓ **TROPICS (Constellation launch in 2022 Q1)** will provide near real-time high resolution sounding within hurricane eyes. **The TROPICS Pathfinder launched in June 2021 and first light images have been released:**



<https://www.nasa.gov/feature/esnt/goddard/2021/nasa-s-tropics-pathfinder-satellite-produces-global-first-light-images-and-captures>

✓ **PACE (Launch in 2024)** will provide low latency data products in the application of detecting and mapping disasters including wildfires, floods and oil spills.



