



Translating NASA's LANCE Products into Knowledge for Water-related Disaster Applications

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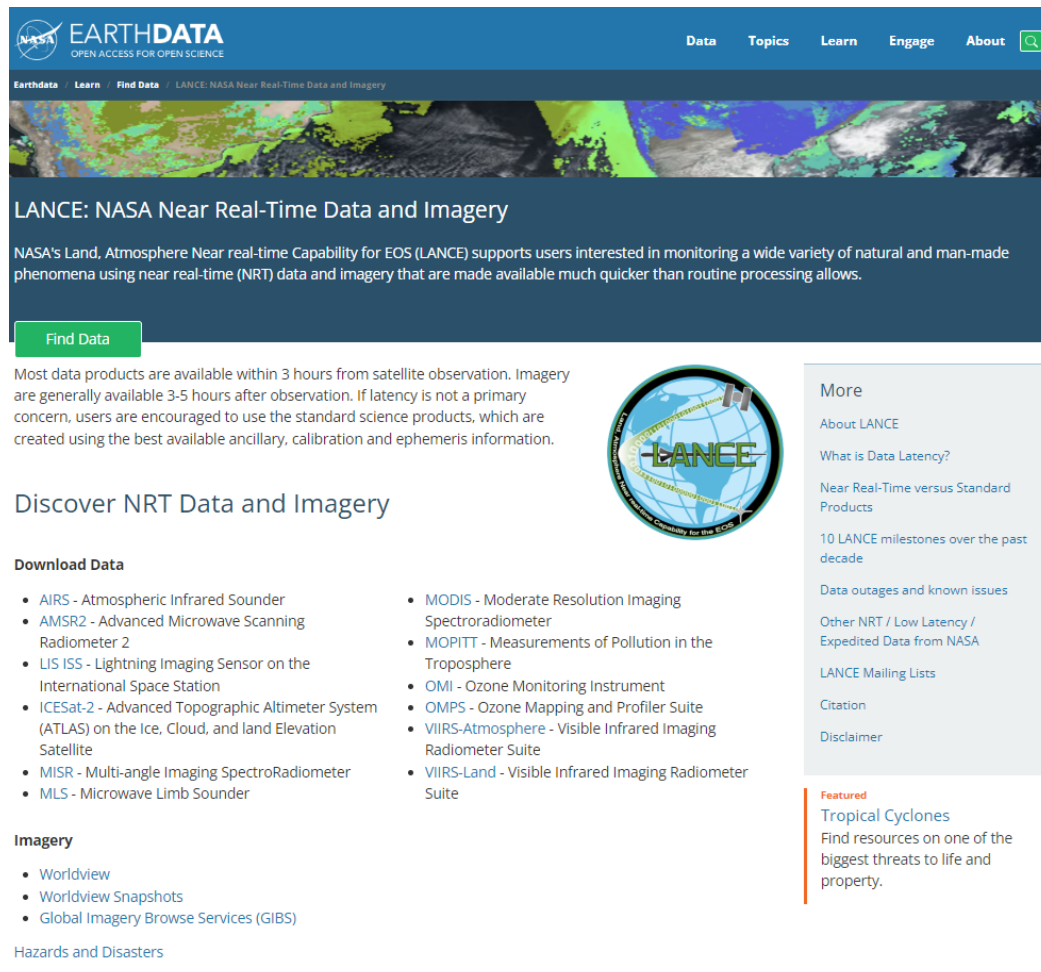
Outline

- NASA's Land, Atmosphere Near Real-time Capability for Earth Observing Systems (LANCE)
- **NASA Earth Science Applied Sciences Program**
- Use Cases of NASA's LANCE Data Products for Water-related Disaster Applications
- **Future NASA Missions**



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

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



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Data Topics Learn Engage About

Earthdata Learn Find Data LANCE: NASA Near Real-Time Data and Imagery

LANCE: NASA Near Real-Time Data and Imagery

NASA's Land, Atmosphere Near real-time Capability for EOS (LANCE) supports users interested in monitoring a wide variety of natural and man-made phenomena using near real-time (NRT) data and imagery that are made available much quicker than routine processing allows.

[Find Data](#)

Most data products are available within 3 hours from satellite observation. Imagery are generally available 3-5 hours after observation. If latency is not a primary concern, users are encouraged to use the standard science products, which are created using the best available ancillary, calibration and ephemeris information.

Discover NRT Data and Imagery

Download Data

- AIRS - Atmospheric Infrared Sounder
- AMSR2 - Advanced Microwave Scanning Radiometer 2
- LIS ISS - Lightning Imaging Sensor on the International Space Station
- ICESat-2 - Advanced Topographic Altimeter System (ATLAS) on the Ice, Cloud, and land Elevation Satellite
- MISR - Multi-angle Imaging SpectroRadiometer
- MLS - Microwave Limb Sounder
- MODIS - Moderate Resolution Imaging Spectroradiometer
- MOPITT - Measurements of Pollution in the Troposphere
- OMI - Ozone Monitoring Instrument
- OMPS - Ozone Mapping and Profiler Suite
- VIIRS-Atmosphere - Visible Infrared Imaging Radiometer Suite
- VIIRS-Land - Visible Infrared Imaging Radiometer Suite

Imagery

- Worldview
- Worldview Snapshots
- Global Imagery Browse Services (GIBS)

Hazards and Disasters

More

- About LANCE
- What is Data Latency?
- Near Real-Time versus Standard Products
- 10 LANCE milestones over the past decade
- Data outages and known issues
- Other NRT / Low Latency / Expedited Data from NASA
- LANCE Mailing Lists
- Citation
- Disclaimer

Featured

Tropical Cyclones
Find resources on one of the biggest threats to life and property.

- 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 satellite observation in NASA Worldview.
- LANCE provides more than 170 NRT data products from 11 instruments much quicker than routine processing allows including AIRS, AMSR2, ICESat-2, LIS, MISR, MLS, MODIS, MOPITT, OMI, OMPS and VIIRS.
- 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.**
- 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 GSFC
Vanessa Escobar	NOAA/NESDIS
Mike Fromm	NRL/Washington DC
Sean Helfrich	NOAA/NESDIS/STAR
Steve Miller	Colorado State University
Maggi Glasscoe	NASA MSFC
Brad Quayle	USFS
Josh Cossuth	NRL/Monterey/Washington DC
Mark Trice	MD DNR
Mike Budde	USGS
Patrick Duran	NASA/MSFC/SPoRT



NASA Earth Science Applied Sciences Program

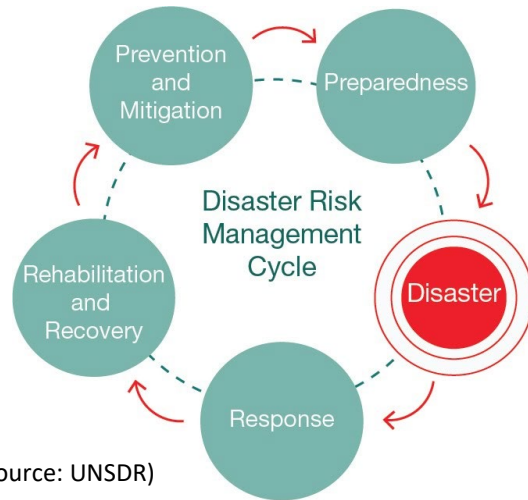
NASA Earth Science Applied Sciences Program

						
CAPACITY BUILDING	DISASTERS	HEALTH & AIR QUALITY	WATER RESOURCES	AGRICULTURE	ECOLOGICAL FORECASTING	WILDLAND FIRE
Our skill-building initiatives empower people around the world to solve local challenges using Earth observations and remote sensing technologies.	Resilience. Response. Recovery. When disaster strikes, our team provides decision-makers, communities and governments with life-saving Earth observations.	We use Earth-observing data to inform air quality standards and support solutions for public health initiatives — all to strengthen our communities' well-being.	Water is one of our most invaluable resources. We help monitor the demand, supply and quality of water around the world and the development of tools to promote conservation.	From individual farmers to global food chains, we help optimize decision-making about food availability and access through Earth-observing data.	To protect our natural land, marine and freshwater resources, we promote the use of Earth observations in conservation, sustainability and resource management.	Fire is an essential process for many ecosystems, but uncontrolled fire can be disastrous to anything in their path. We leverage Earth-observing data, applied research, and partnerships to reduce risk before, during, and after a fire.

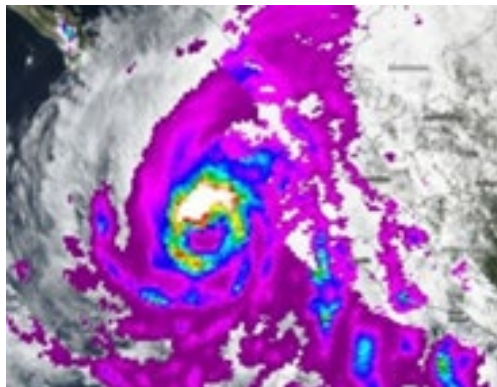


Use Cases of NASA's LANCE Data Products for Water-related Disaster Applications

Water-related Disaster Applications of NASA's LANCE Data Products



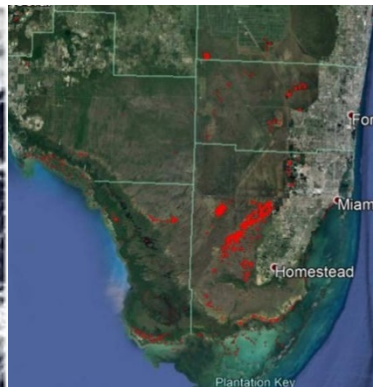
NASA's LANCE provides **Near Real-time (NRT) products** within 3 hours of observation to meet the timely needs of disaster risk reduction activities before, during and after a water-related disaster including flood, hurricane and earthquake.



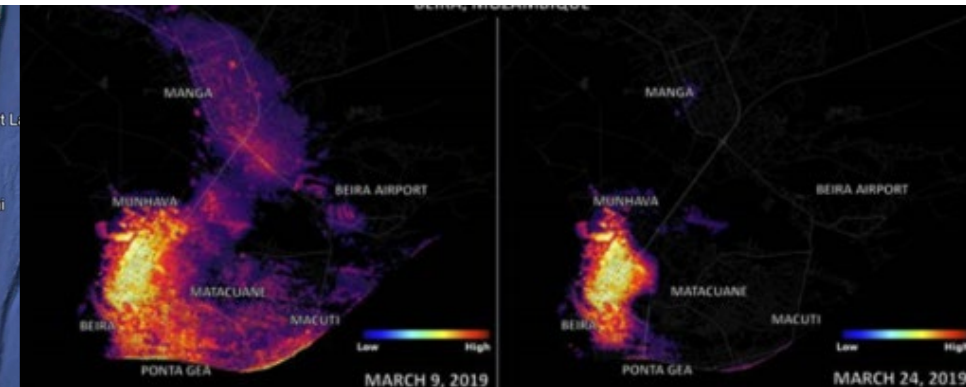
AMSR2 Surface Precipitation Rates product



VIIRS Surface Reflectance product



MODIS Flood Mapping product



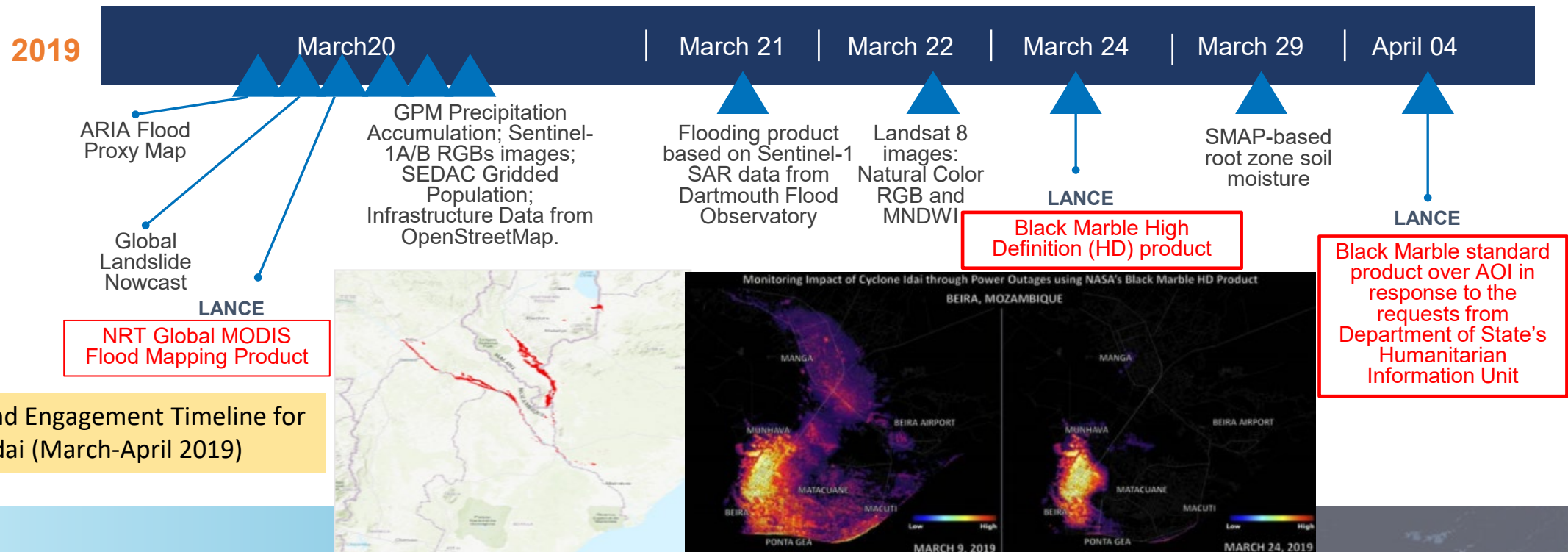
NASA's Black Marble Nighttime Light product

Using LANCE 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.... **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**

Feedback from stakeholders and end users is helpful for identifying gaps and improving the process of transitioning NASA's LANCE data products to users.

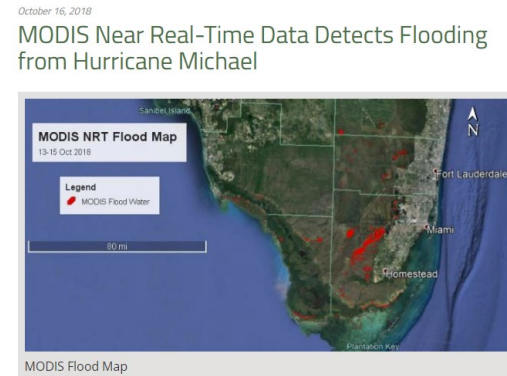


Using NASA's LANCE Data Products for Detecting Floods due to Hurricanes and Earthquakes

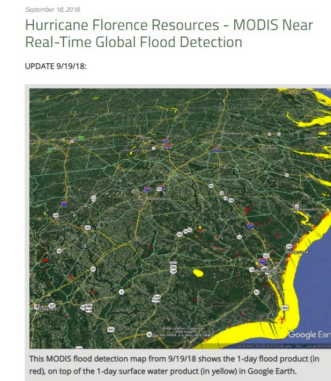
- **NASA GSFC MODIS Near Real-time (NRT) Flood Mapping Products** (<https://floodmap.modaps.eosdis.nasa.gov/>) have been widely used to support Floods disaster responses for a few years, which are available in LANCE (<https://earthdata.nasa.gov/earth-observation-data/near-real-time/mcdwd-nrt>) since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



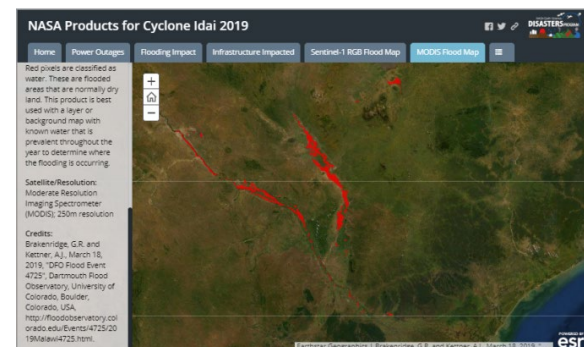
Floods in Indonesia



Hurricane Michael



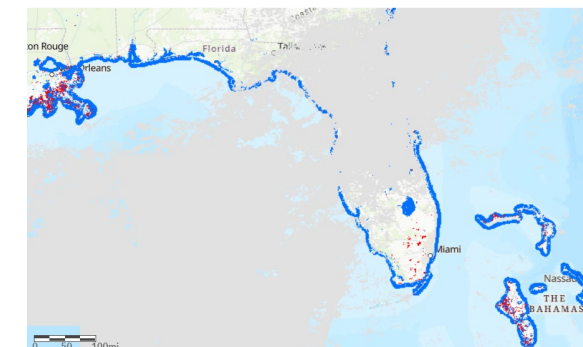
Hurricane Florence



Cyclone Idai

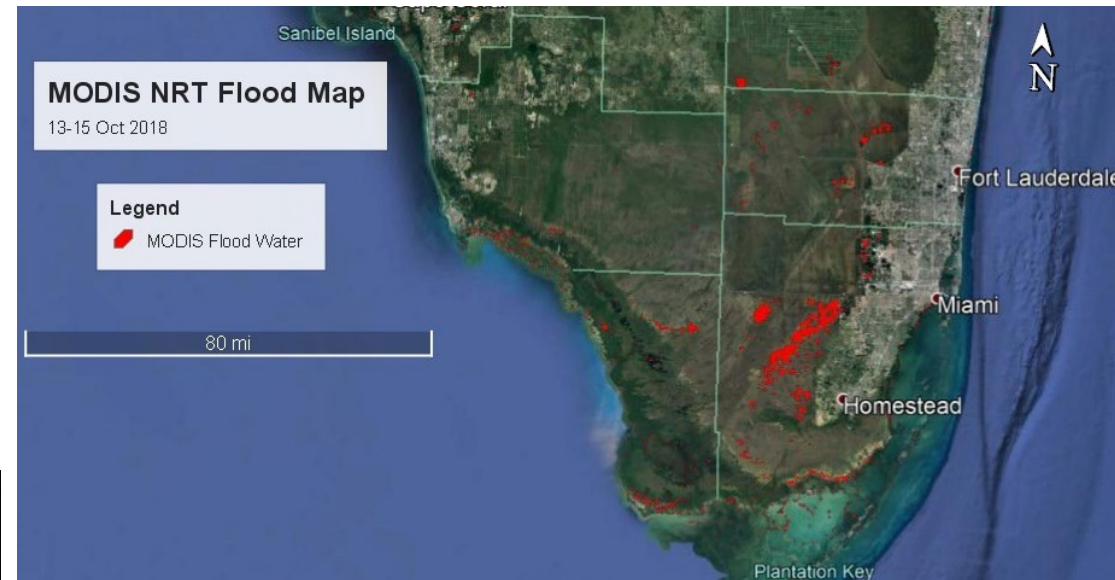


Australia Floods 2021



Hurricane Elsa

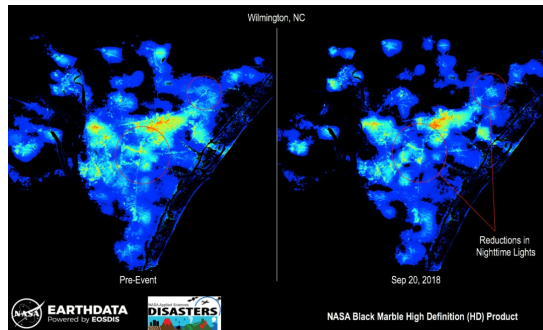
NASA's LANCE MODIS Near Real-Time Data Detected Floods from Hurricane Michael



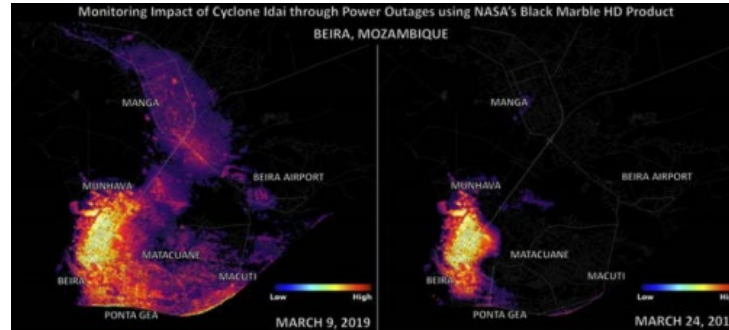
These maps were created from the Moderate Resolution Imaging Spectroradiometer (MODIS) Near Real-Time (NRT) Global Flood Mapping product. The red color on the map represents new flood waters from October 13 -15, 2018 in Florida. NASA's LANCE provides data to the NRT Global MODIS Flood Mapping initiative, which produces global daily flood water maps at approximately 250 m spatial resolution.

Using NASA's LANCE Data Products 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

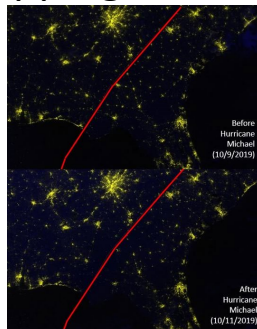


Cyclone Idai

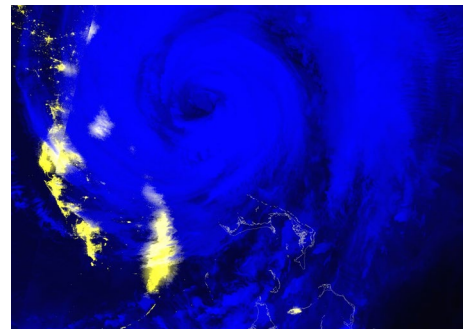


Hurricane Ida

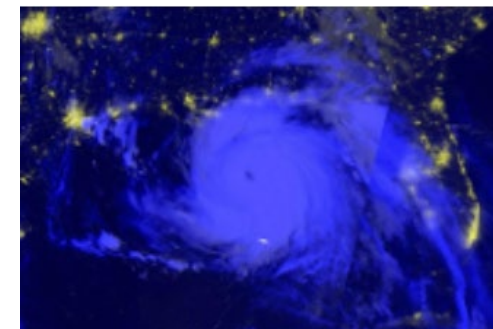
- **The Black Marble Nighttime Blue/Yellow Composite Product** is available in NASA Disasters Mapping Portal and NASA Worldview website since June 2021.



Hurricane Michael



Hurricane Dorian



Hurricane Ida

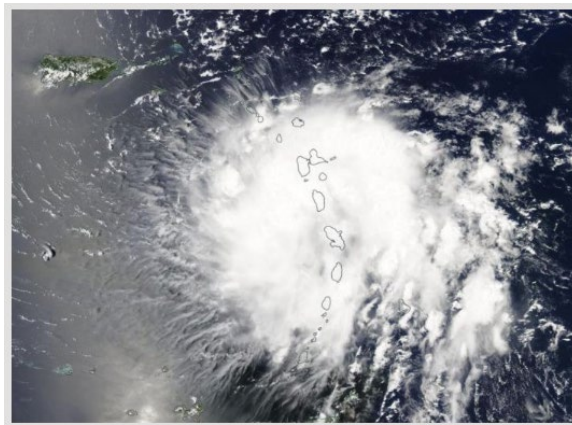
NASA's Black Marble Blue/Yellow Composite Data Products for Hurricane Ida 2021



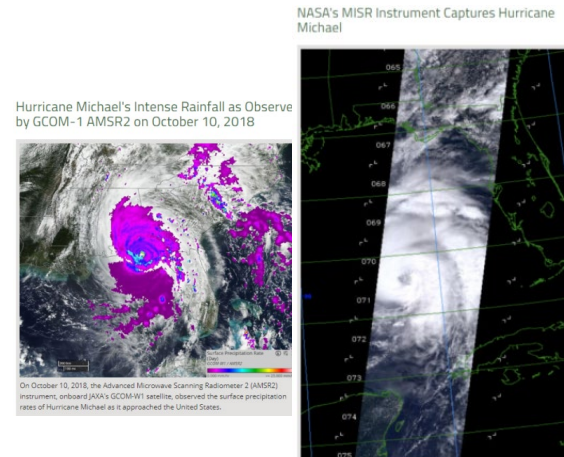
Using NASA's LANCE Data Products for Monitoring Hurricanes

- **AMSR2 Near Real-time (NRT) Surface Precipitation Rates product**
- **MISR/MODIS/VIIRS Near Real-time (NRT) Corrected Reflectance product**

NASA's LANCE data products have been used to monitor the hurricane from the space. Extracted knowledge from data products is helpful for strengthening early warning and preparedness in order to assess the disaster-affected areas and the needs of disaster victims.

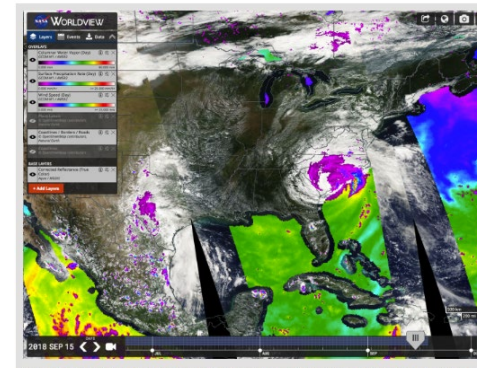


Hurricane Dorian



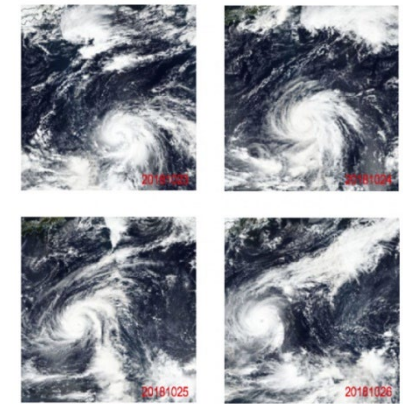
Hurricane Michael

Hurricane Florence Resources - LANCE Near-realtime Data and Imagery



Hurricane Florence

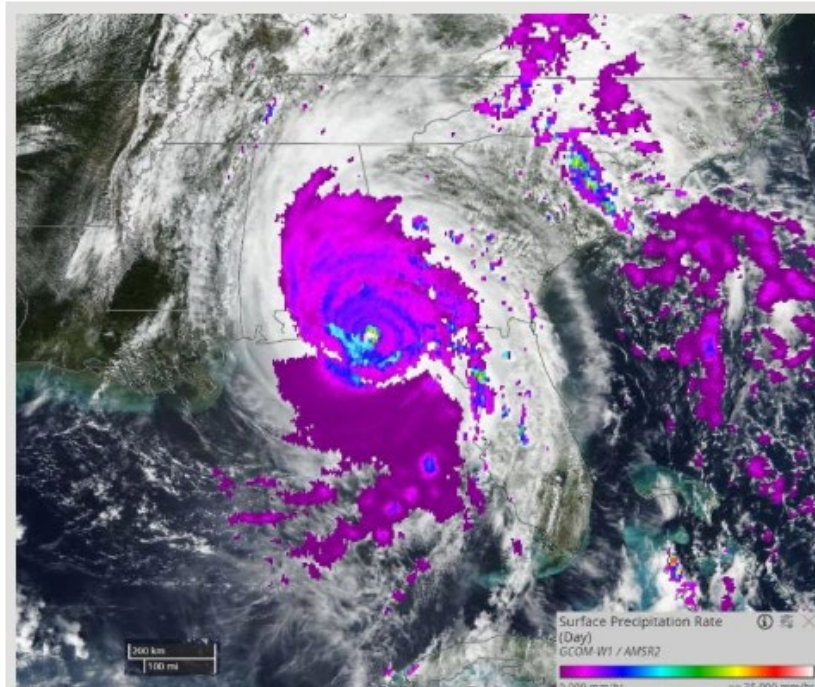
October 26, 2018
Remote Sensing Observations of Typhoon Yutu from VIIRS



Typhoon Yutu

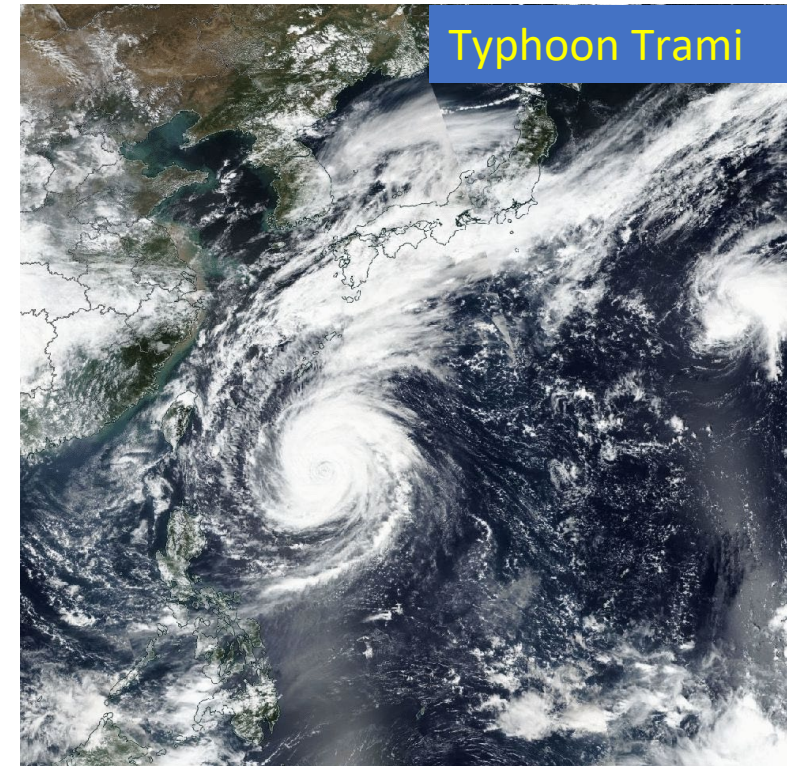
Satellite Observations of Hurricane and Typhoon from LANCE Data Products

Hurricane Michael's Intense Rainfall as Observed by GCOM-1 AMSR2 on October 10, 2018



On October 10, 2018, the Advanced Microwave Scanning Radiometer 2 (AMSR2) instrument, onboard JAXA's GCOM-W1 satellite, observed the surface precipitation rates of Hurricane Michael as it approached the United States.

This LANCE NRT AMSR2 image shows high precipitation rates in red, yellow and light blue, and lower rates in dark blue and purple. LANCE NRT AMSR2 products include surface precipitation rate, wind speed over ocean, water vapor over ocean and cloud liquid water over ocean. NRT AMSR2 products are generated within three hours of observation, using algorithms provided by the NASA-funded US AMSR2 Science Team, with JAXA NRT L1R (resampled brightness temperatures) as input.



The VIIRS (Visible Infrared Imaging Radiometer Suite) instrument aboard Suomi-NPP observed the **Super-Typhoon Trami** around 1:30 pm local time from September 26 to 30, 2018. The VIIRS images revealed a cloud-filled eye.



Future NASA Missions

Future NASA Missions

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 and smoke to support disaster response.



✓ **TROPICS (Constellation launch in 2022)** will provide near real-time high resolution sounding within hurricane eyes. Data from TROPICS will improve the investigation in hurricane intensity and track forecasting. *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 wildland fires, floods and oil spills.





Thank you! Questions?

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Many thanks to my co-authors!