

Using Polar-orbiting Satellite Information to Support the Non-Weather Community

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REPRESENTING ACTIVITIES OF THE NASA EARTH AND APPLIED SCIENCE DISASTERS PROGRAM

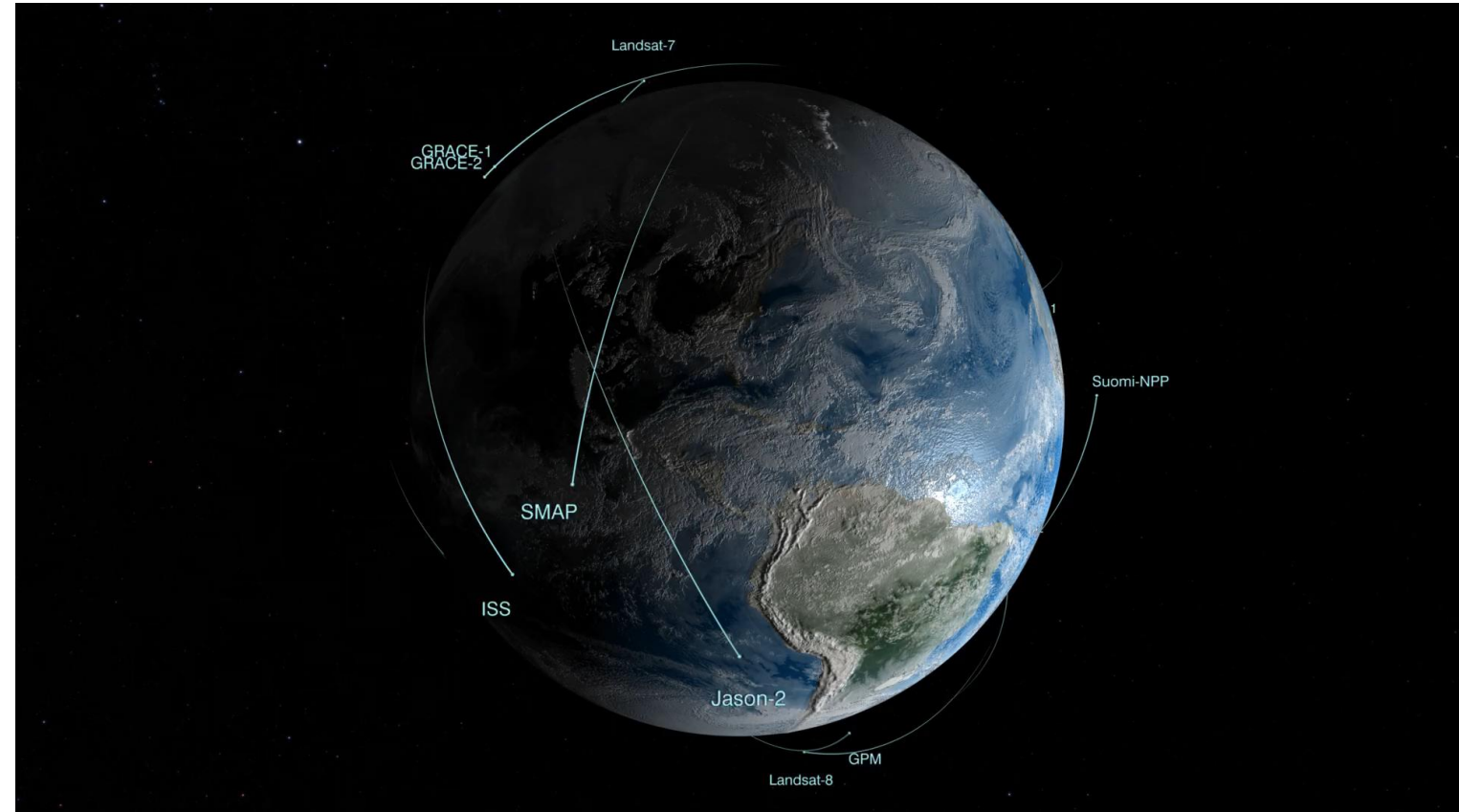


Earth Observing Satellites

NASA's Earth Observing System is made up of a number of satellites which observe the Earth across the electro-magnetic spectrum to monitor:

- ☐ Weather, Water, and Climate
- ☐ Carbon
- ☐ Soil Moisture
- ☐ Lightning
- ☐ Ozone
- ☐ NO_x

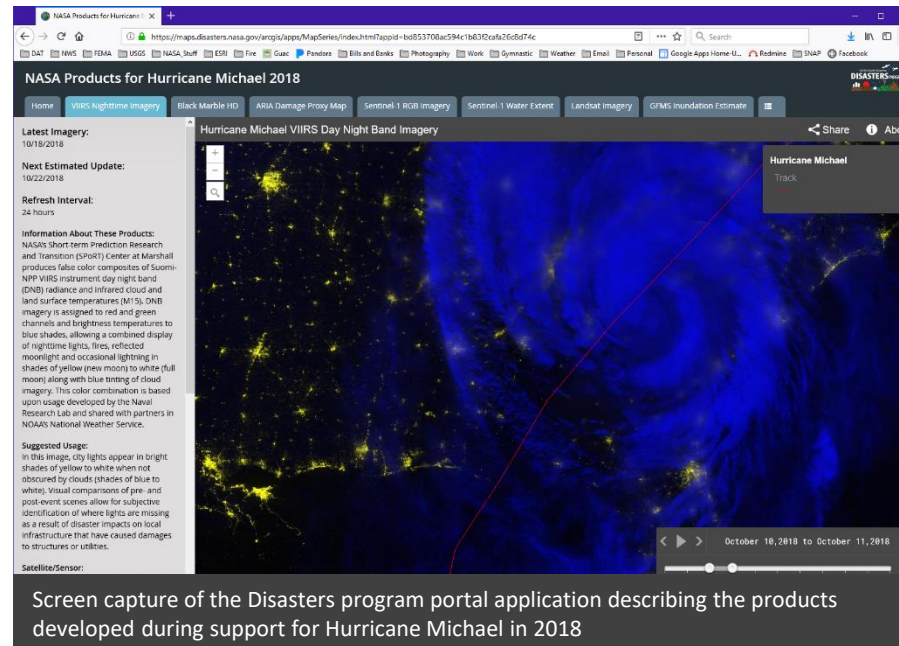
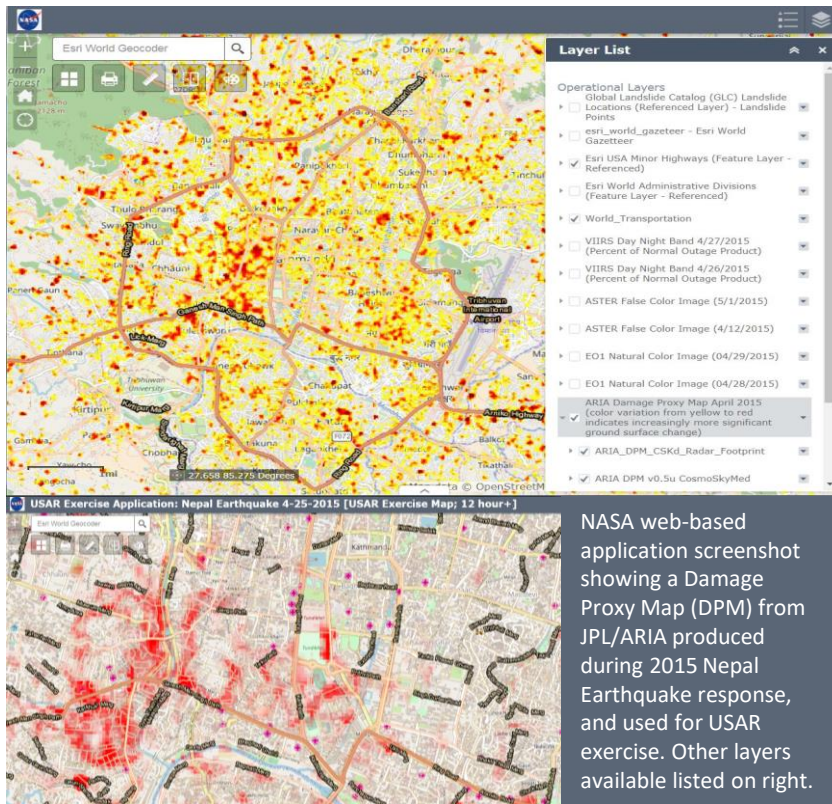
NASA observations are collaborative with numerous other federal agencies, commercial, and international partners.



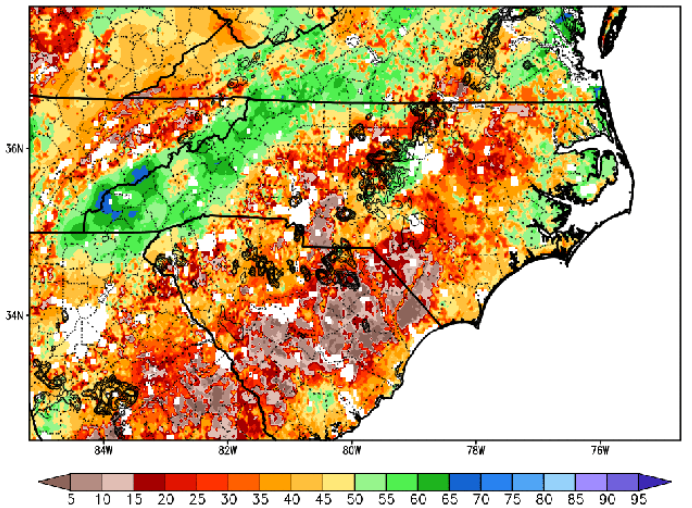
Video Credit: NASA's Scientific Visualization Studio <https://svs.gsfc.nasa.gov/4558>

Data for Disaster Applications

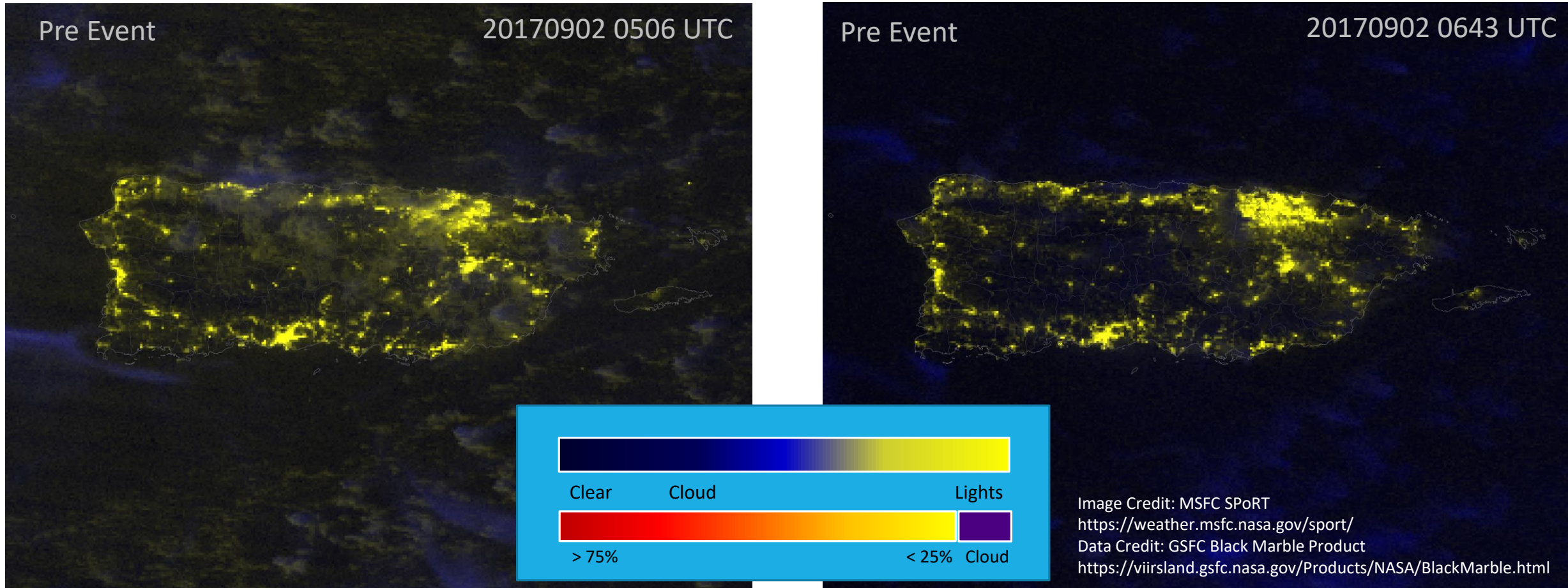
NASA's collaborative Disaster Response Team partners with end users to support use of NASA and partner mission data in various exercise and response scenarios, providing relevant training and GIS delivery methods.



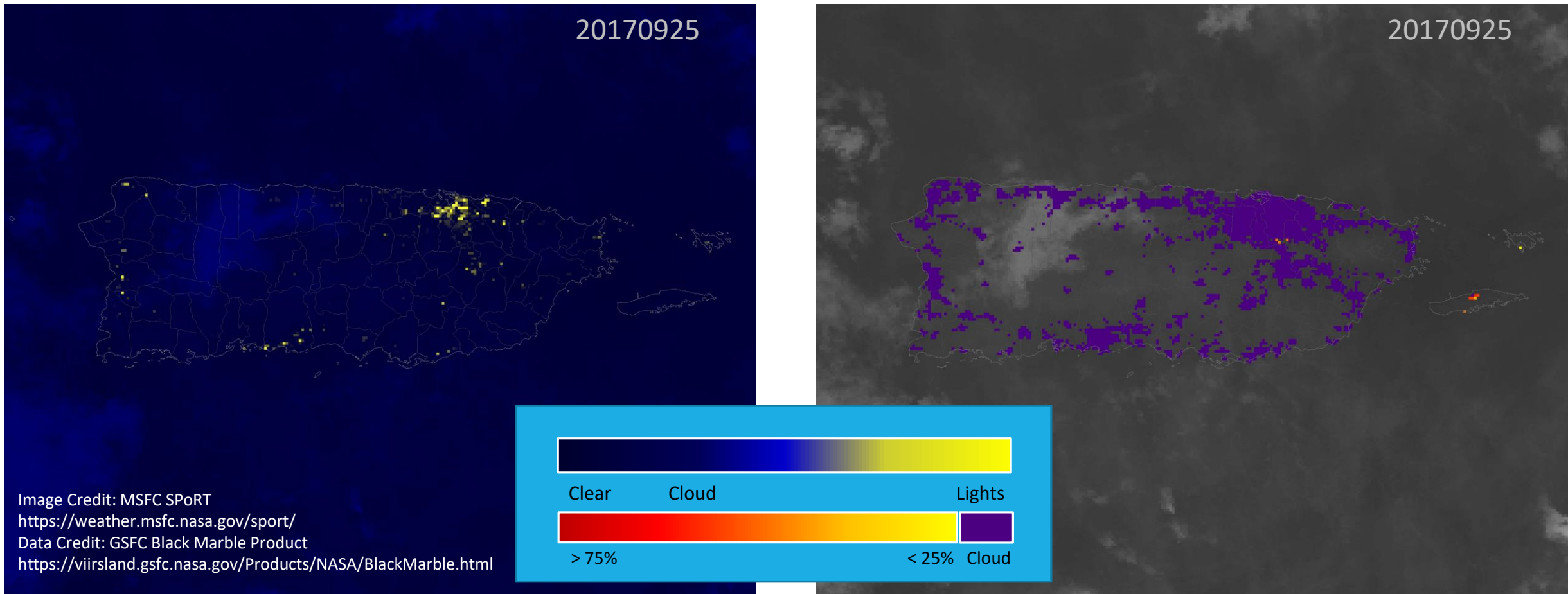
0-100 cm Relative Soil Moisture (available water; %) valid 00z 12 Sep 2018
Precipitation in previous hour (1,2,5,10,15,20,25 mm contours)



Example: Nighttime Lights

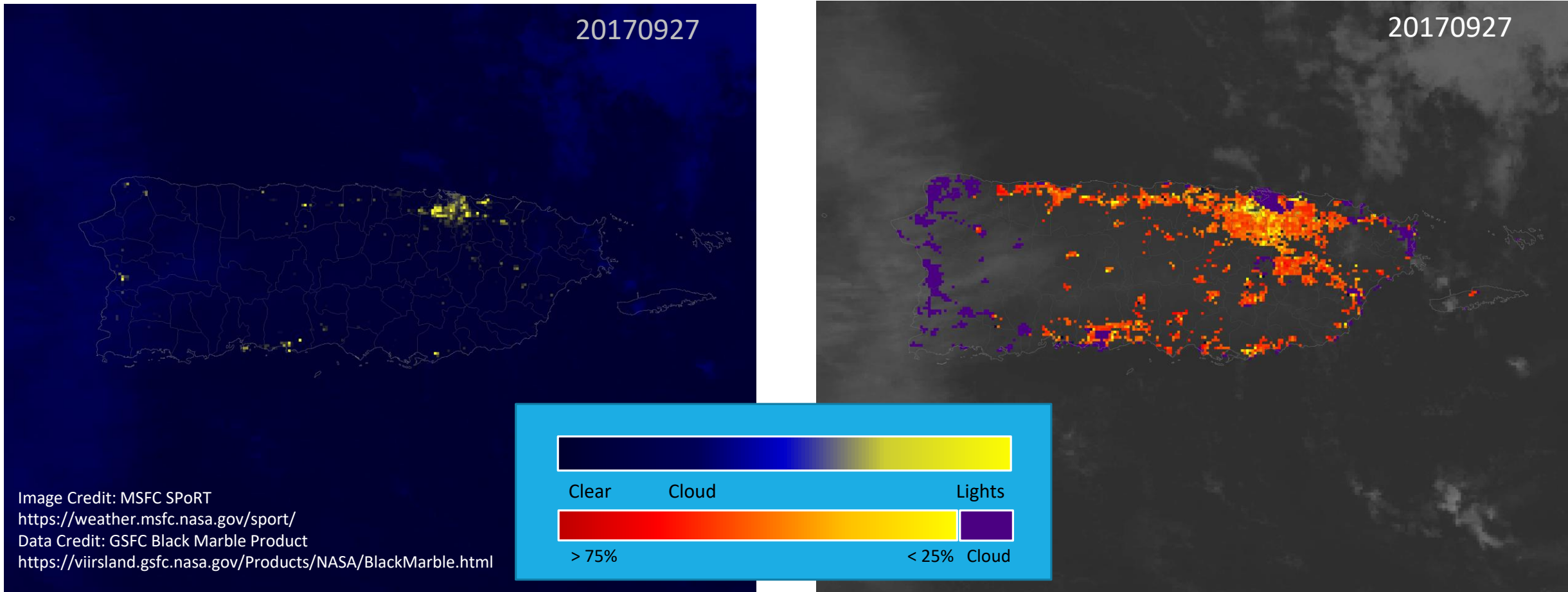


Example: Nighttime Lights



Suomi-NPP False Color Composite (Left) and “Percent of Normal” Analysis (Right), derived from GSFC Black Marble product

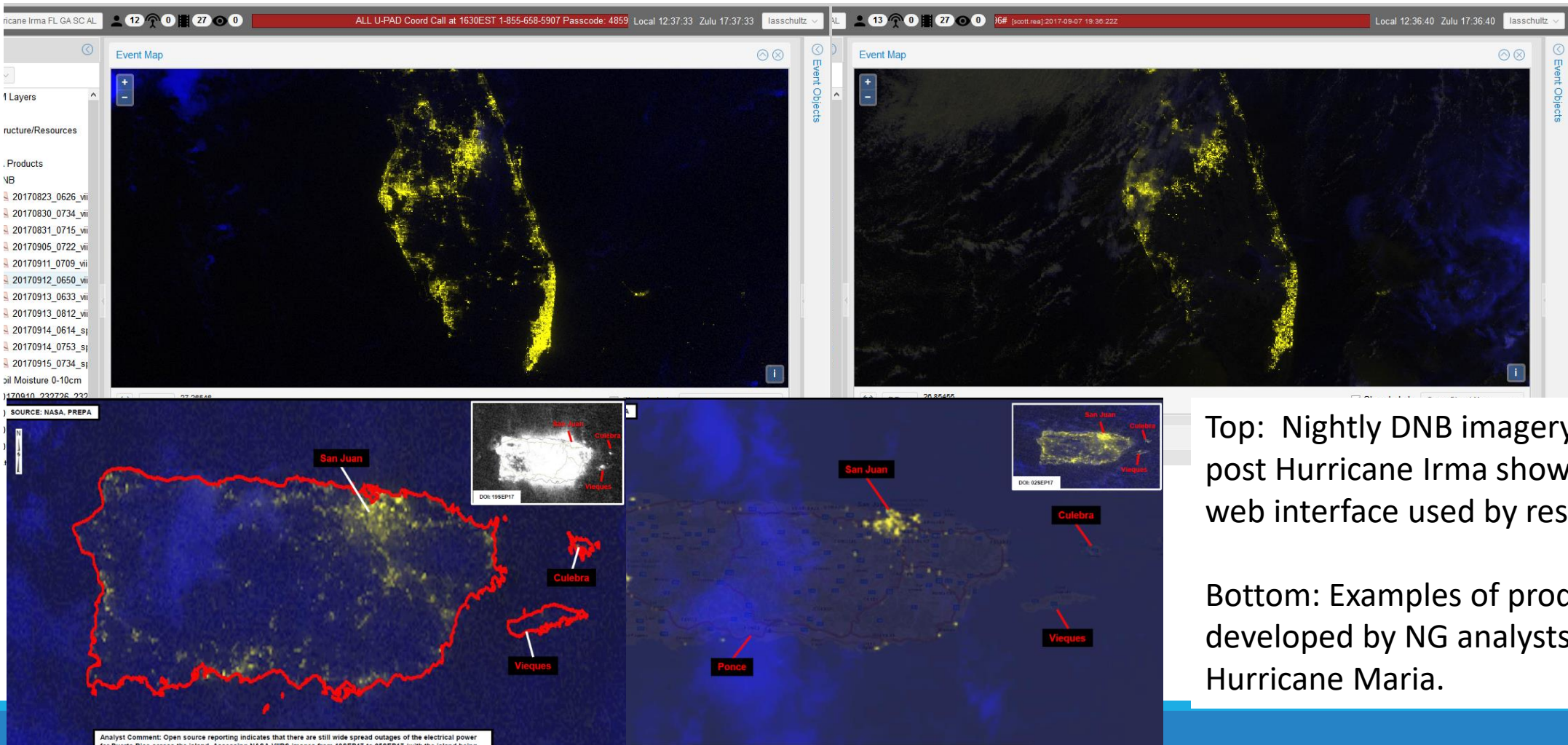
Example: Nighttime Lights



Suomi-NPP False Color Composite (Left) and “Percent of Normal” Analysis (Right), derived from GSFC Black Marble product

National Guard & FEMA Interactions

Image Credits: 1: National Guard Bureau DAART interface (<https://daart.us/>) showing VIIRS DNB imagery, 2 & 3: Imagery analyses provide by NG UPAD units assigned to response during Hurricane Maria recovery, 4 & 5: FEMA Geospatial Coordination call daily slides, publically available at: <https://data.fema.gov/data/NationalDisasters/>



Top: Nightly DNB imagery over Florida post Hurricane Irma shown in the NG web interface used by response teams.

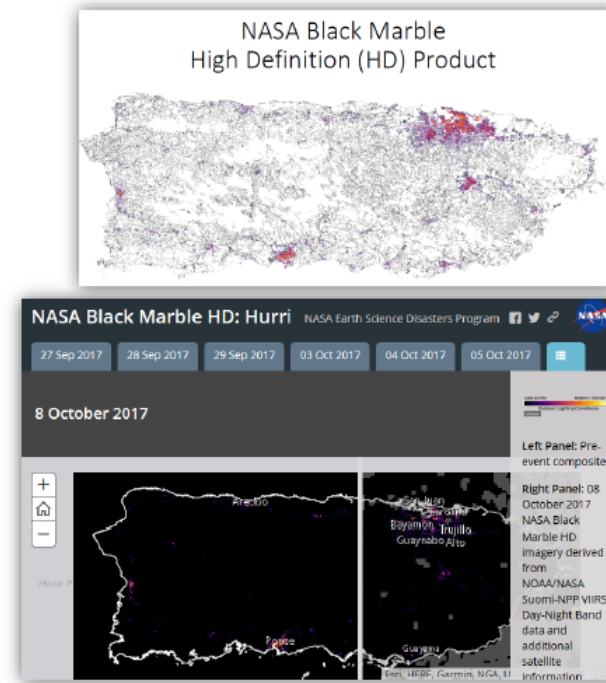
Bottom: Examples of products developed by NG analysts pre- and post-Hurricane Maria.

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Day-Night Band (DNB) Products*

- **NASA MSFC, Goddard, and Black Marble Teams**
 - Providing radiance and atmospheric corrected DNB products and percent change products:
<https://data.fema.gov/data/NationalDisasters/HurricaneMaria/Data/RemoteSensing/NASA%20MSFC/>
 - New DNB imagery was provided to FEMA and posted to the FEMA FTP for Black Marble HD products and %Normal
 - The “NASA Black Marble” product removes moonlight, atmospheric scattering, and other issues from the raw VIIRS information
 - **NOTE: A Readme text file in the location above provides additional details**
 - Additional RGB products for each day are available on the NASA FTP at:
ftp://geo.nsstc.nasa.gov/SPoRT/disasters/HurricaneIrma_Carib/DayNightBand_Radiance_RGB/
 - Map Slider for NASA DNB Products:
<https://www.arcgis.com/apps/MapSeries/index.html?appid=6135434f7ffe4b13b815afc6dd052eb3>
 - **FEMA FTP, NASA FTP and Map Slider are updated with VIIRS DNB products through 10/11/17**



Slide example showing the availability of the DNB products through the daily FEMA Geospatial Coordination calls.

This information was both used by FEMA personal as well as made available to partners (through the links listed)

* VIIRS DNB Products are being produced from multiple agency partners. Please contact FEMA-Remote-Sensing@fema.dhs.gov for questions regarding the differences.

Devastating Earthquakes: Working with the VA Search and Rescue team

Virginia Task Force 1 (VTF1)

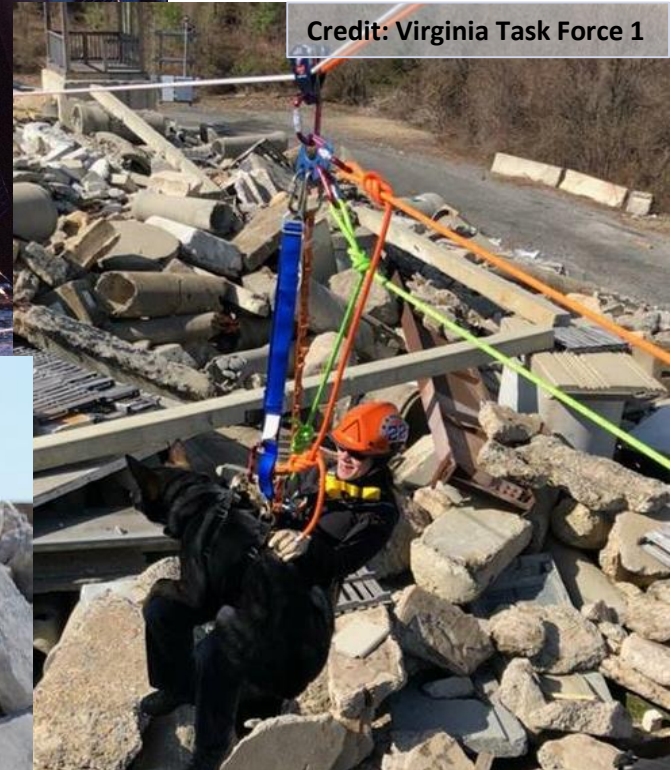
○ <https://www.vatf1.org/>

- ❖ Established in 1986 to provide both domestic and international disaster response resources.
- ❖ Typical responses include
 - Earthquakes
 - Floods
 - Terrorist Attacks
- ❖ Investigate how NASA science products could support VTF1 response activities.
 - Hard locations can suffer from a lack of accurate support data and tools to allow even the most basic of location/map services.
 - Availability of Global science information combined with hazard specific resources available during/after a natural disaster.

Credit: U.S. Geological Survey Department of the Interior/USGS/I.D. Celebi



Credit: Virginia Task Force 1

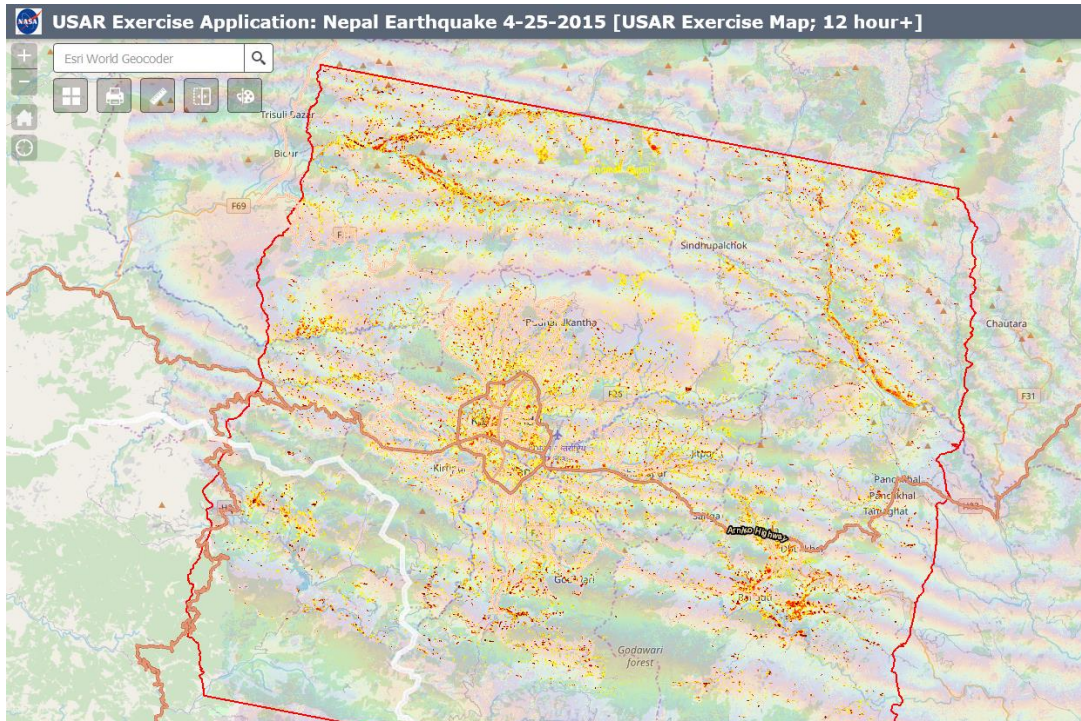


Credit: Virginia Task Force 1

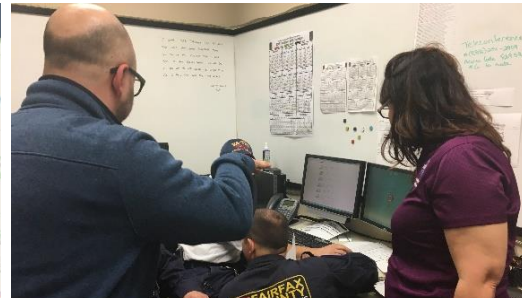


Exercise: 2015 Gorkha Earthquake, Nepal

Image credits: NASA Disasters Program



NASA web-based application screenshot from the NASA Disasters Program map portal website showing a JPL/ARIA Damage Proxy Map (DPM) and SAR interferogram produced during 2015 Nepal Earthquake response, and used for USAR exercise.



NASA Disasters Team provides orientation on geospatial application to Planning Section during exercise



VTF1 briefing operations near detailed scaled map of Kathmandu using NASA web application tools



Onsite at the Exercise: USAR teams create and practice in simulated post-quake environments



Lt. John Morrison describing the work ongoing at the exercise

Lessons Learned

Partners of the NASA Disasters Team including FEMA, the U.S. National Guard, and the Virginia Task Force 1 have response missions with diverse needs, skill sets, and interests.

- ❖ To integrate NASA science data, our experience to date suggests that:
 - Developers must understand the partner mission, knowledge, and how products will be used
 - Identify and understand products of routine use, and their integration with other products
 - Information should be GIS capable with services integrable in their decision support system
 - Provide information complimentary to tools and products that are already well-established
 - Limit technical jargon and provide translation. Honestly share strengths, weaknesses, and limitations
- ❖ Decision makers will attempt to make use of many information sources in their response efforts
 - Keep in mind that fielding new products may lead to confusion and unnecessary distractions.
 - Post-event, important to follow up as an after-action review, asking:
 - “what worked, what didn’t, and what could be improved”

Thank You!!

Sincere and grateful thanks to the men and women of both the National Guard and Virginia Task Force 1 for their patience, insights, feedback and the privilege to support them.

NASA Disasters Program, <https://disasters.nasa.gov/>

NASA Disasters Mapping Portal, <https://maps.disasters.nasa.gov/>

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