

Application of LEO RGBs to Polar and Tropical Regions

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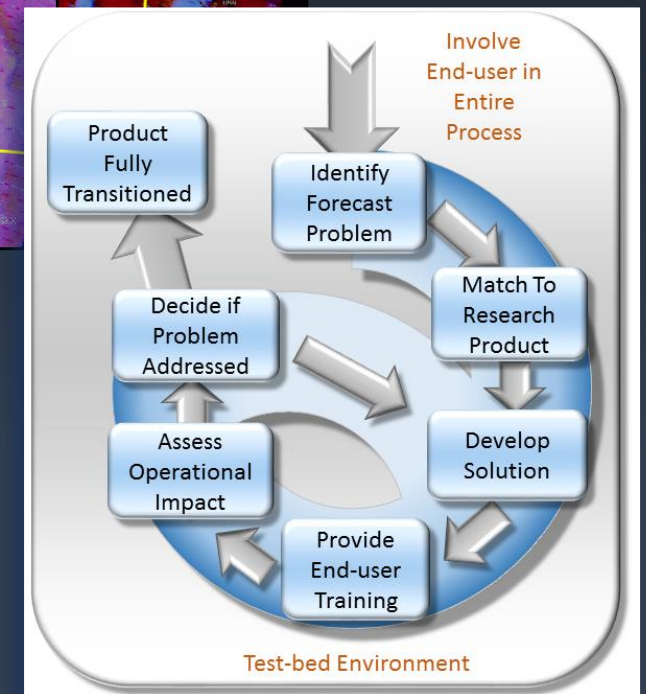
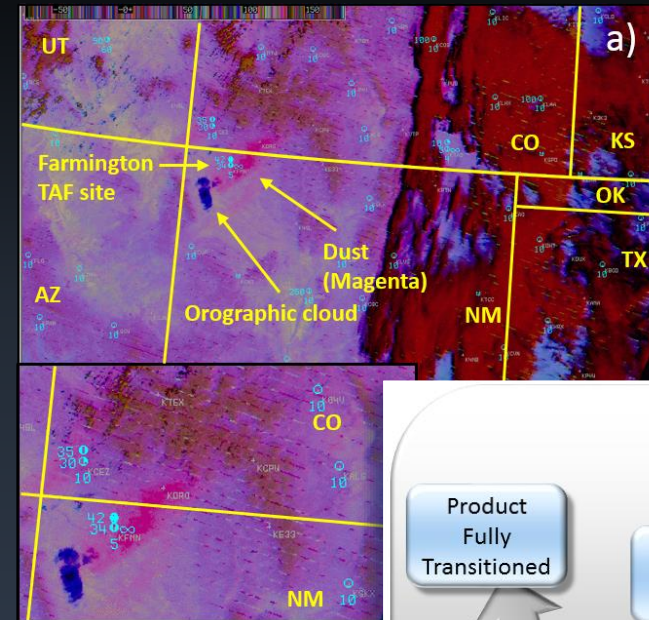
Gary J. Jedlovec (NASA)

RGB Experts and Developers Workshop - November 2017
Tokyo, Japan

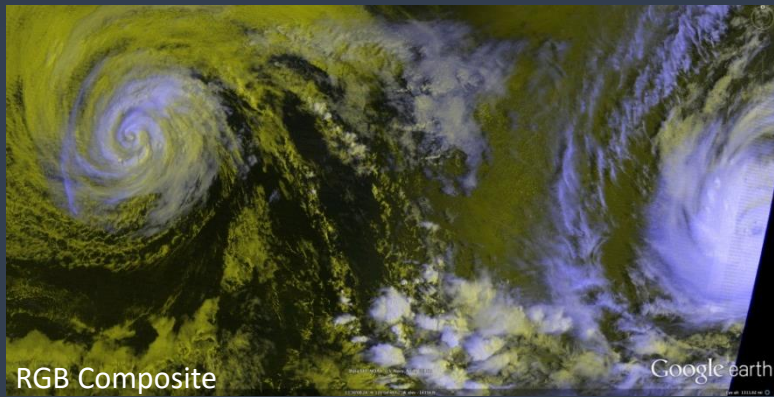
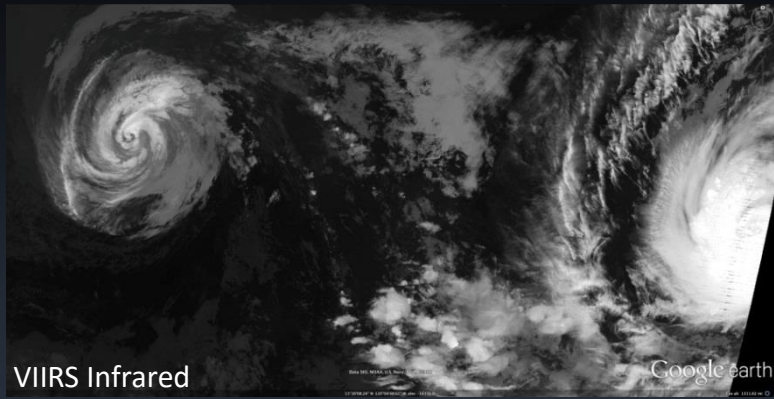


SPoRT Overview

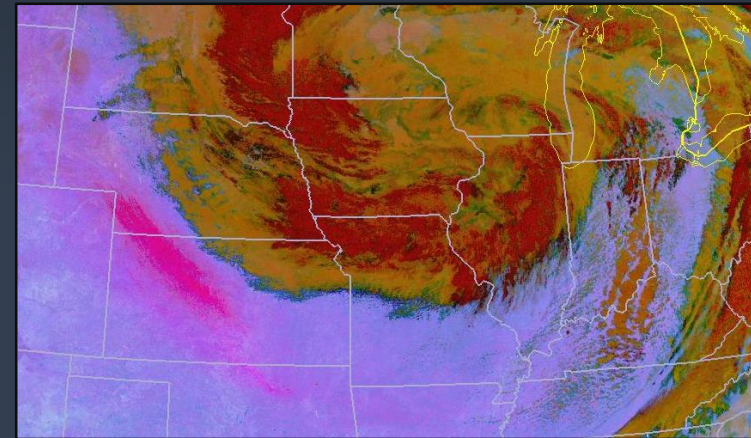
- Started in 2003
- Transition unique observations and research capabilities to the operational weather community
- Mostly scientists and programmers
- Suites of products
- End users
- “Transition” staff focused on good Instructional Design practices
- Training is a key to transition
 - RGB Imagery, Total Lightning, NASA Land Information System, Global Precipitation Measurement products, Disaster Response Imagery, SAR, derived microwave products



SPoRT RGB Activities

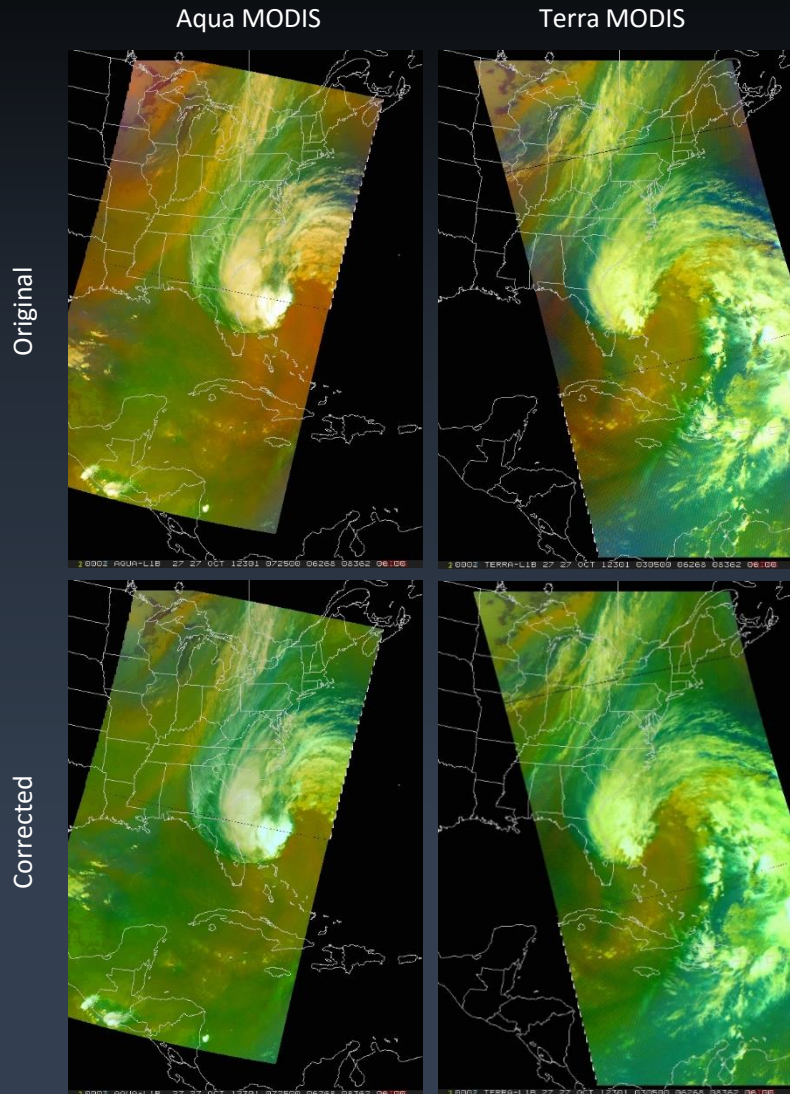


- 2009-2012: Focused efforts to apply EUMETSAT RGB recipes to MODIS, VIIRS, and SEVIRI
 - Products were made available to NWS operational forecasters
 - Assessed for utility in operations



Nighttime Microphysics

SPoRT RGB Activities

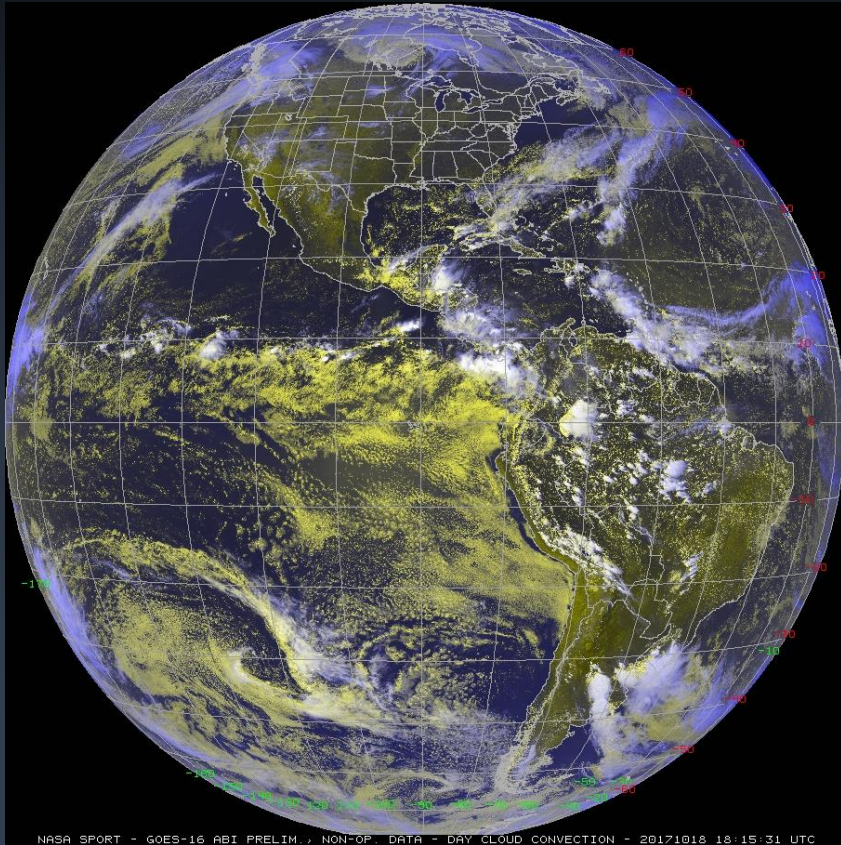


- 2013-2014: Developed methods to make imagery consistent across sensors
 - Limb correction to allow forecasters to utilize full swaths
 - Apply brightness temperature adjustment to match MODIS and VIIRS RGBs to SEVIRI

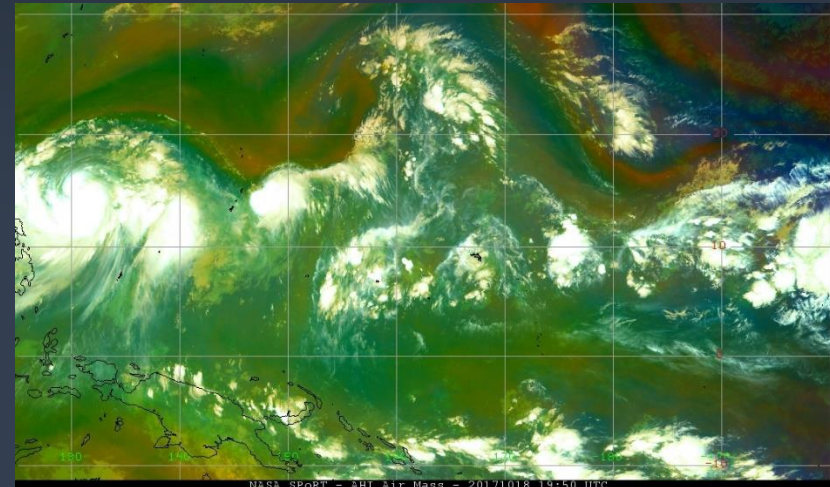
MODIS Air Mass RGB composites (original and corrected) showing a developing Hurricane Sandy with a dry air intrusion

SPoRT RGB Activities

- 2015-Present: Expansion of efforts to other sensors
 - Inclusion of AVHRR to provide additional overpasses to polar regions
 - Apply recipes to AHI to prepare for GOES-16
 - Developed methodology to adjust GOES-16 recipes to match SEVIRI



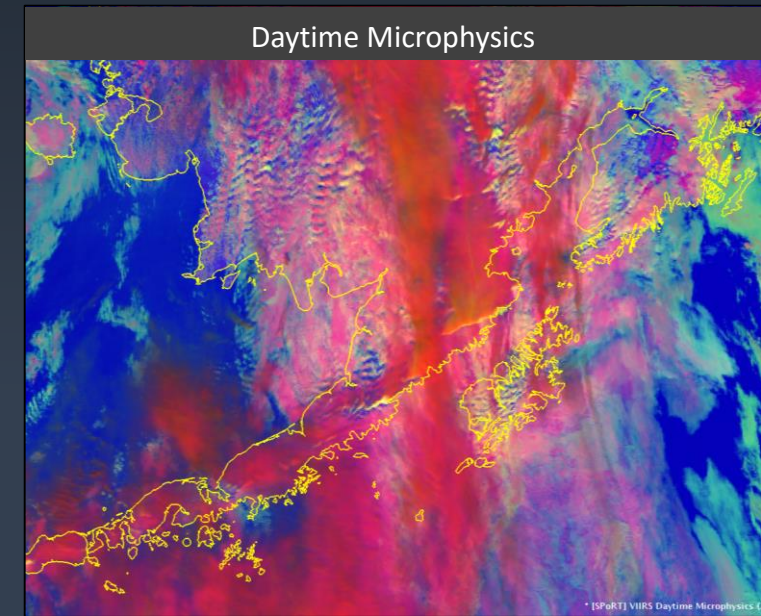
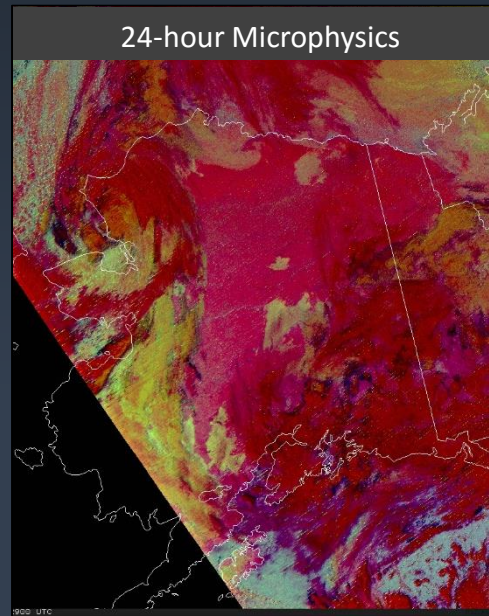
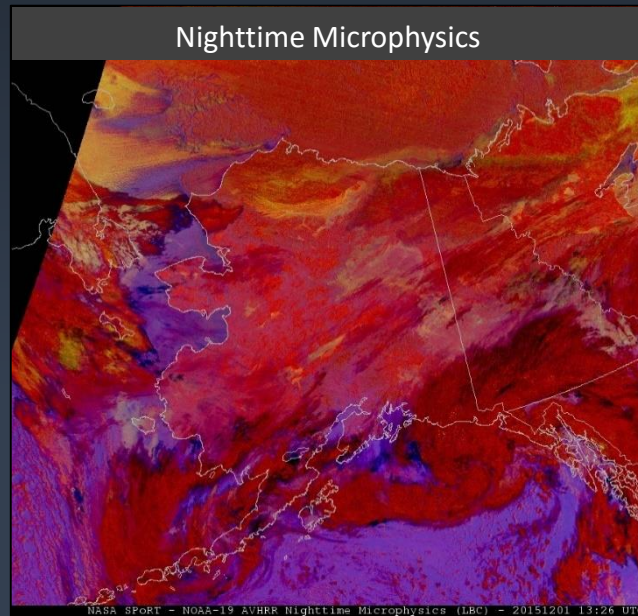
ABI Day Cloud Convection



AHI Air Mass

Alaska

- SPoRT first transitioned and trained Alaska forecasters on the use of the Nighttime Microphysics product
- Eventually introduced 24-hour Microphysics & Daytime Microphysics
- Began with MODIS and VIIRS; expanded to include AVHRR



Alaska

- Collaboration with Geographic Information Network of Alaska (GINA)
 - MODIS/VIIRS RGB products had been generated at SPoRT; then at
 - Desire to generate RGB products on-demand in AWIPS II
 - Developed and transitioned client-side RGB capability into AWIPS II that implements the EUMETSAT RGB recipe
 - GINA disseminating single channels to WFOs
 - SPoRT generating “corrected” IR channels, allowing for RGBs that compare well between sensors



Tropics

- SPoRT acquires real-time data from the Global Precipitation Mission (GPM) constellation and provides single channel, RGB, and rain rate products to the National Hurricane Center
- GMI used as baseline to inter-calibrate PM sensors from other satellites
- Rain Rate is a *quantitative* product vs. *qualitative* product

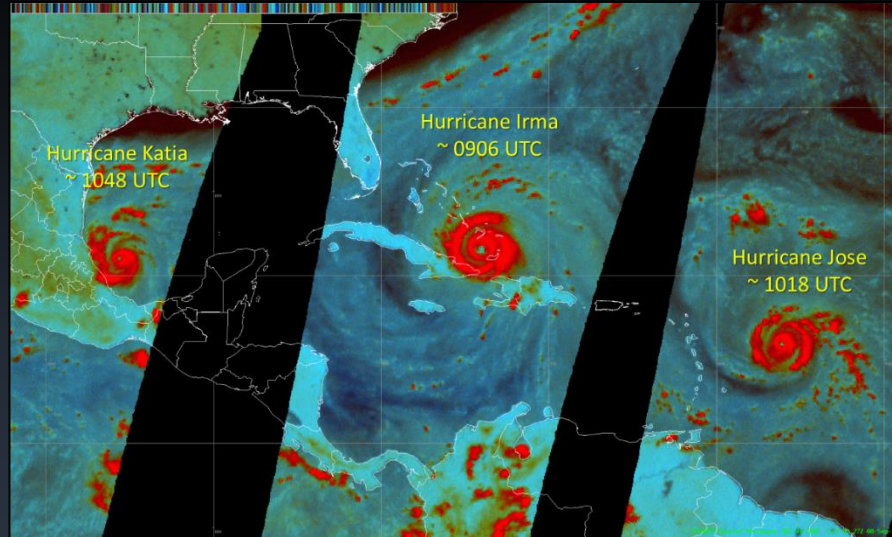


Tropical Applications

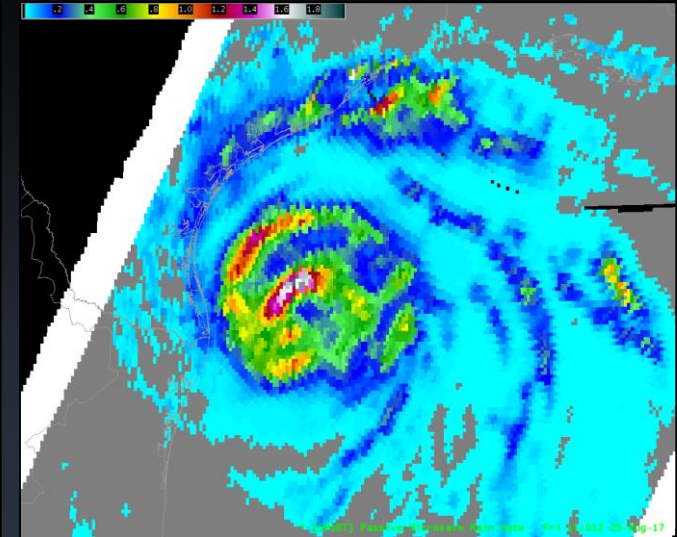
Hurricane Irma Discussion Number 37
 NWS National Hurricane Center Miami FL AL112017
 500 AM EDT Fri Sep 08 2017

Microwave images and data from an Air Force Reserve Hurricane Hunter aircraft indicate that Irma is currently undergoing an eyewall replacement cycle. A recent GMI overpass showed an 50 nmi wide outer eyewall, with the inner eyewall weakening. The Hurricane Hunter aircraft reported peak 700-mb winds of 147 kt in the outer eyewall near 0500 UTC, and maximum SFMR winds were in the 125-130 kt range. Based on these data, the initial intensity is reduced to 135 kt.

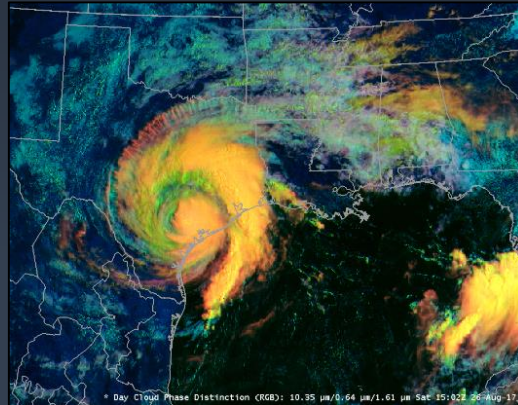
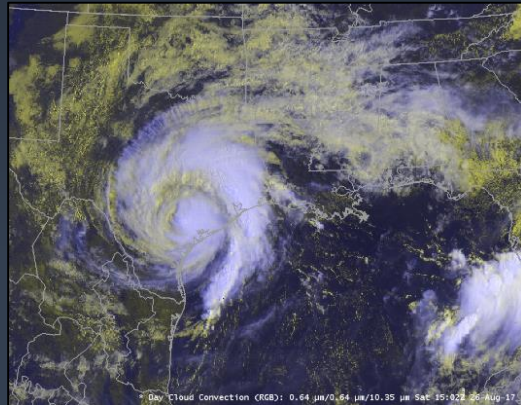
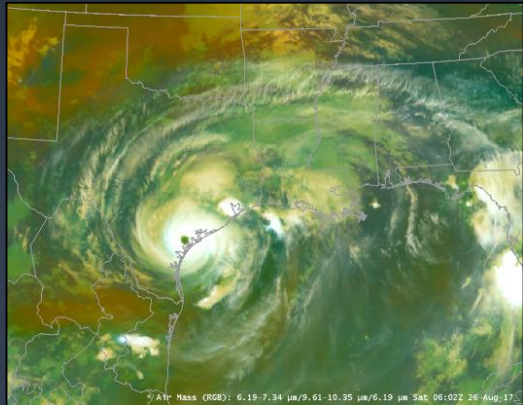
Use of GMI imagery by the National Hurricane Center



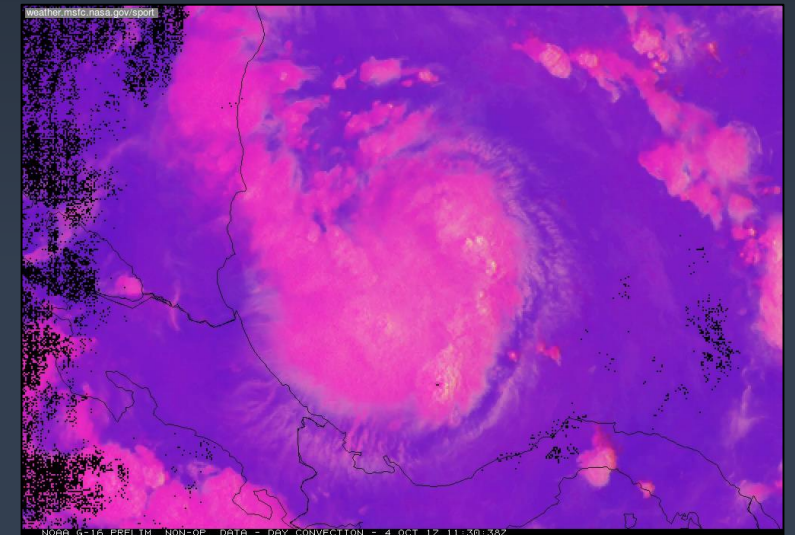
GMI 89 GHz RGB



GMI Rain Rate



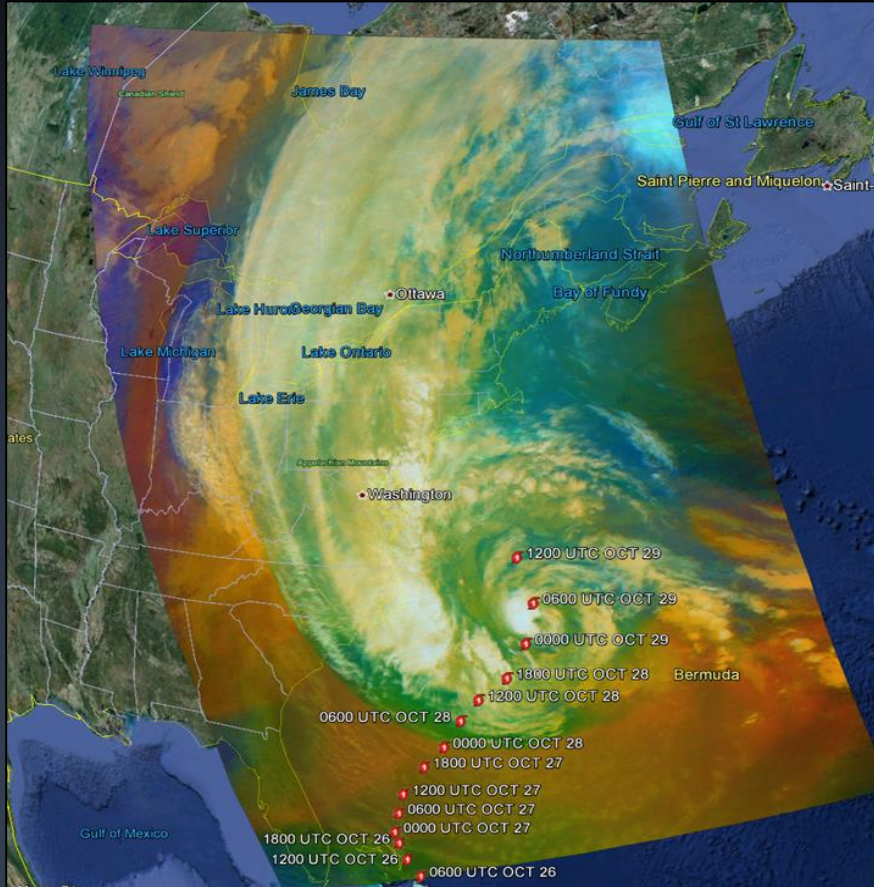
GOES-16 RGB products aid in identifying dry-air intrusion and discriminate cloud phase during Hurricane Harvey



GOES-16 Day Convection RGB



Data Fusion



VIIRS/CrIS Air Mass RGB

- VIIRS lacks water vapor channels
- Air Mass product created by fusing VIIRS and CrIS data
- Used by forecasters to anticipate high winds associated with tropical systems
- Most useful over polar regions where geostationary data is lacking
- Initial success with forecasters
- Could be applied to other products requiring water vapor

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