New Satellite Training
Science & Operations Officer Perspective

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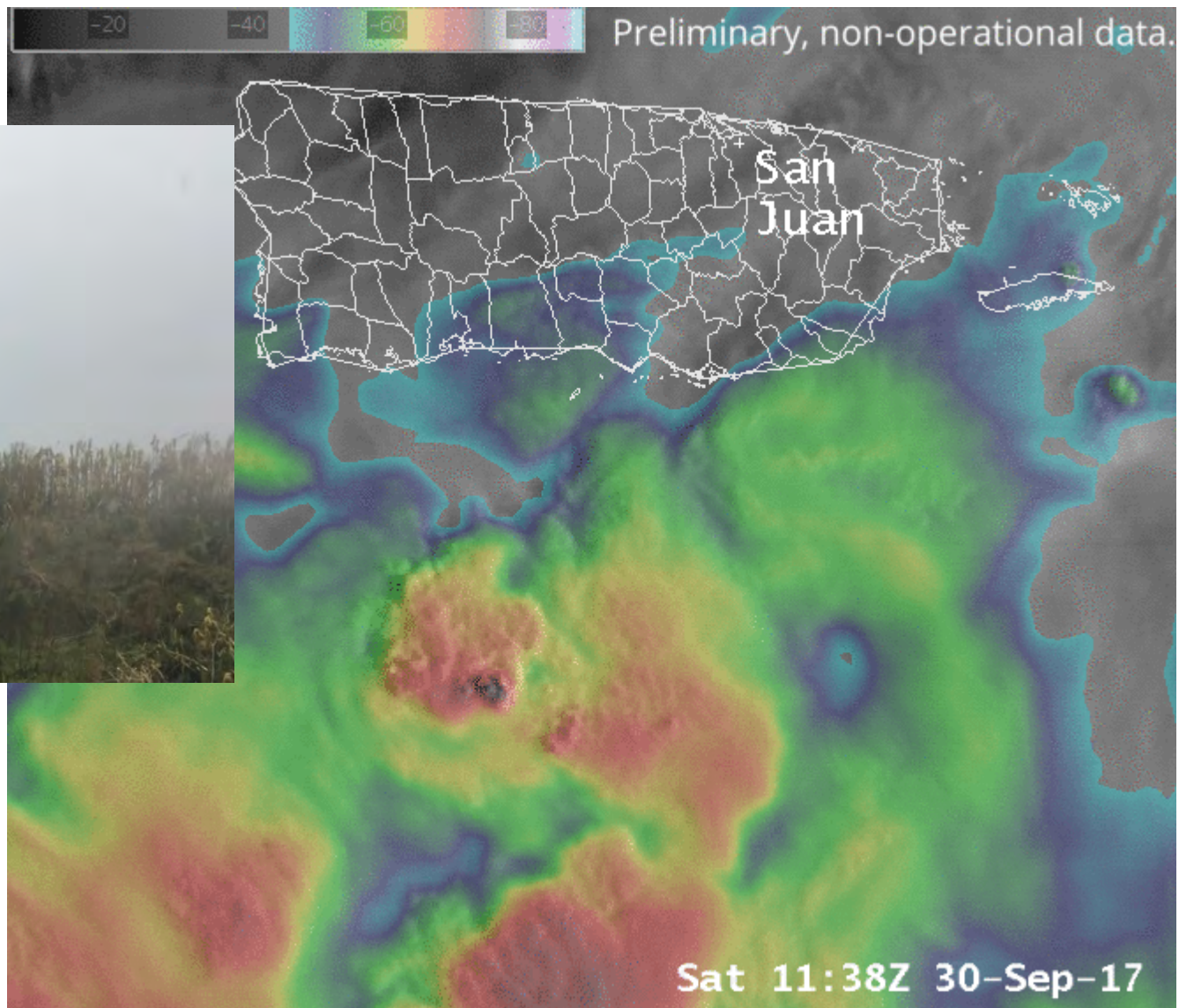
WMO VLAB meeting
Thursday 19 July 2018

NWS Weather Forecast Office Miami Operations Area
Hurricane Irma, September 10, 2017

Loss of Puerto Rico Radar Following Hurricane Maria

NWS Field Office Intranet (Google Sites)

Internal Training Page Example
Local Office Google Site

GOES-R ABI Bands "Quick Guides"

ABI BANDS QUICK INFORMATION GUIDES

The fact sheets in this section are designed as quick reference guides to provide National Weather Service forecasters with information on each of the GOES-R series Advanced Baseline Imager's 16 spectral bands. These include two visible channels, four near-infrared channels and ten infrared channels. Each fact sheet covers what the band measures and how this is operationally relevant. The fact sheets also include links for more information.

An additional set of operationally-focused ABI band fact sheets is available from our partners at the Cooperative Institute for Meteorological Satellite Studies.

Click on an image in the "ABI Band Fact Sheet" column of the table below to access the information guide for the corresponding ABI band number.

ABI Band Fact Sheet	ABI Band No.	Approx. Central Wavelength (µm)	Band "Nickname"	Band Type
Updated February 25, 2015	1	0.47	"Blue" Band	Visible
	2	0.64	"Red" Band	Visible
	3	0.86	"Veggie" Band	Near-IR

Example "Quick Guide" GOES-R ABI

GOES-R ABI Fact Sheet Band 2 ("Red" visible)

The "need to know" Advanced Baseline Imager reference guide for the NWS forecaster

Above: Simulated image of ABI Band 2 for Hurricane Katrina. This image was simulated via a combination of high spatial resolution numerical model runs and advanced forward radiative transfer models. Credit: CIMSS

The second ABI visible band is the 0.6 μm (or "red" band). During the daytime, it will assist in the detection of fog, estimation of solar insolation and depiction of diurnal aspects of clouds. It is called the red band because the center frequency of this band is near the red part of the visible spectrum. The 0.6 μm visible band is also used for daytime snow and ice cover, detection of severe weather, low-level cloud-drift winds, smoke, volcanic ash, hurricane analysis, and winter storm analysis. A similar band on the current GOES imager has demonstrated many of these applications, although the ABI will offer improved spatial and temporal resolutions. This band is essential for a natural color RGB. Since there is no "green" ABI band on the GOES-R series, this band will be approximated from other spectral bands for use in generating "true color" imagery. In the case of the ABI, this approach will be a look-up table using the "blue" (0.47 μm), red (0.64 μm) and "veggie" (0.86 μm) bands. Source: *Schmit et al., 2005 in BAMS, Miller et al. 2012 and the ABI Weather Event Simulator (WES) Guide by CIMSS.*
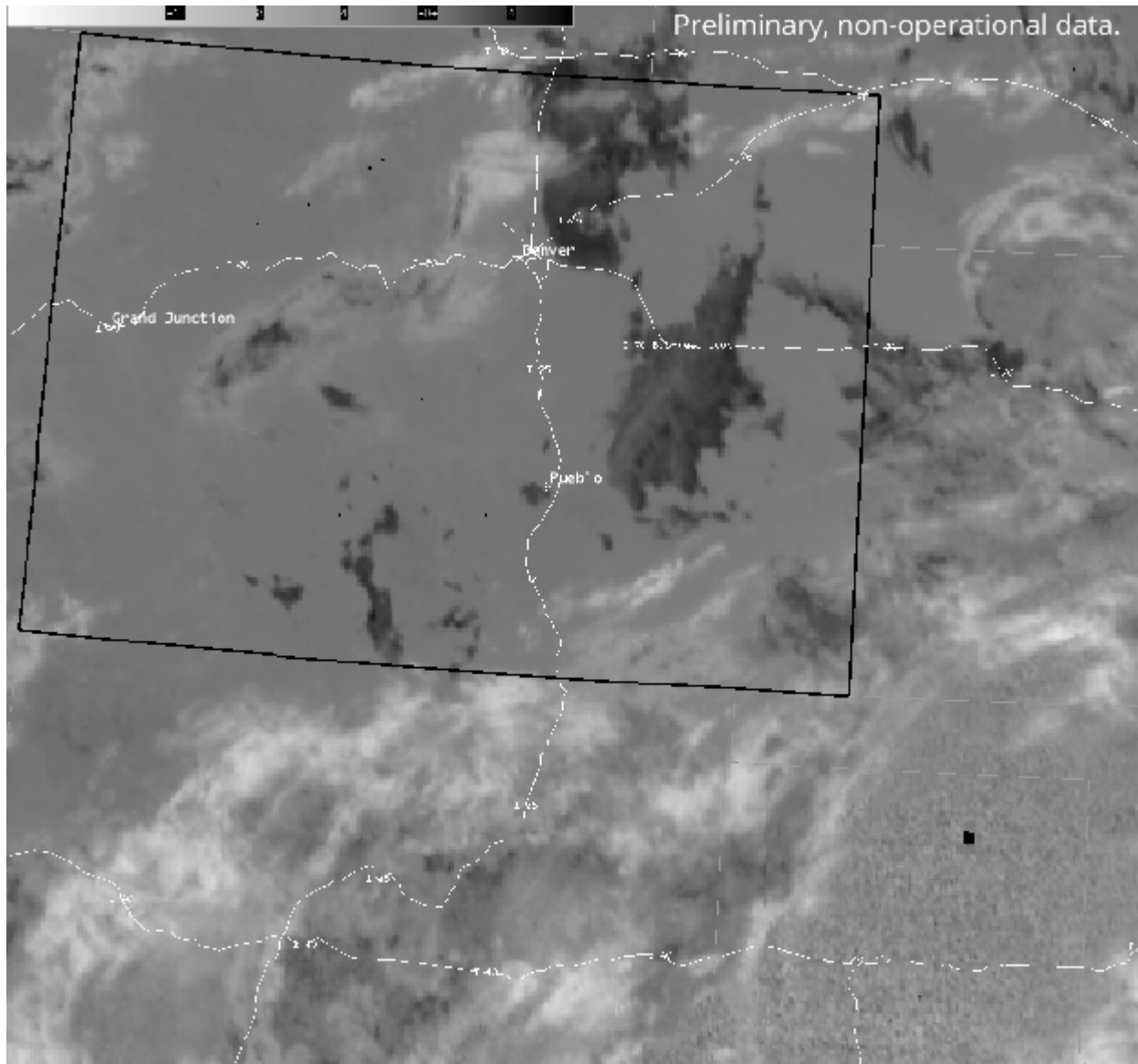
In a nutshell

GOES-R ABI Band 2 (approximately: 0.64 μm central, 0.60 μm to 0.68

Nighttime Fog Detection
Using channel differences

Fire Detection

Geostationary Lightning Mapper: Gridded Products: AFA and TOE
Quick Guide

AFA and TOE Background

- Average flash area (AFA) is the average area of all flashes spatially coincident with each 2×2 km grid cell during a specified time period

- Total optical energy (TOE) is the sum of all optical energy observed within each grid cell during a specified time period

- AFA and TOE complement flash extent density (FED) to maximize the insights provided by the GLM

- AFA and TOE also help diagnose the GLM data quality and illustrate the subtleties of space-based optical lightning observations

- AFA has units of km^2, with values ranging from a minimum of 1 pixel or ~64 km^2 to several thousand km^2 for regions with extensive stratiform flashes

- TOE has units of fJ, with values on the order of decimals for the dimmest flashes to over 1000 for regions with many bright flashes

Primary AFA Applications

- Detect electrically active storms – the AFA colormap accentuates small flashes to highlight the earliest flashes in active pre-convective scenes

Flash Extent Density

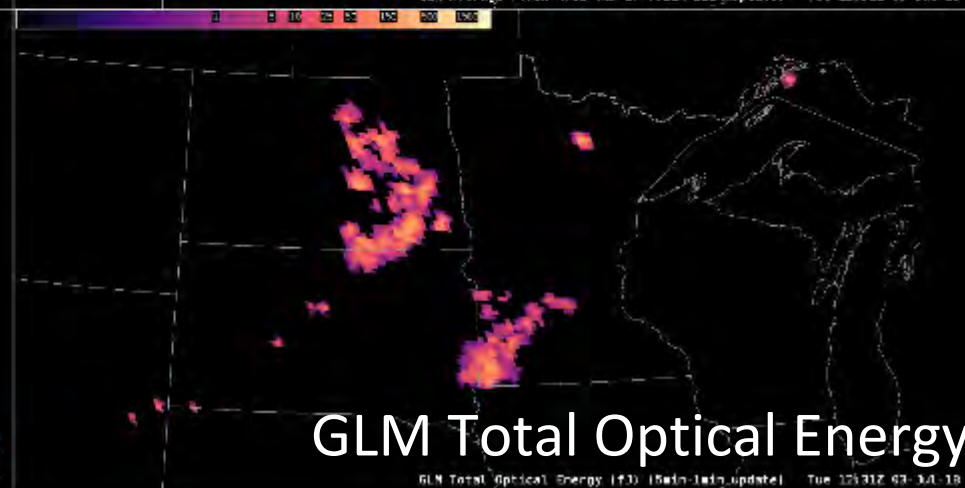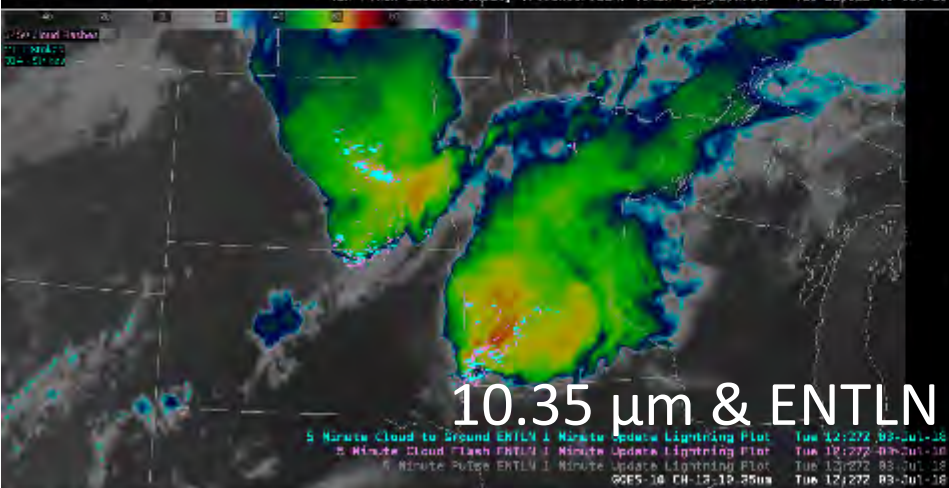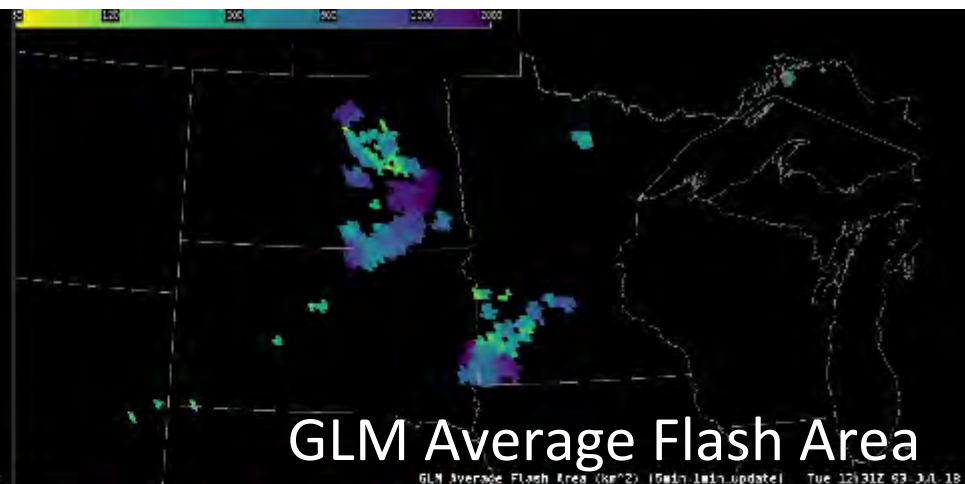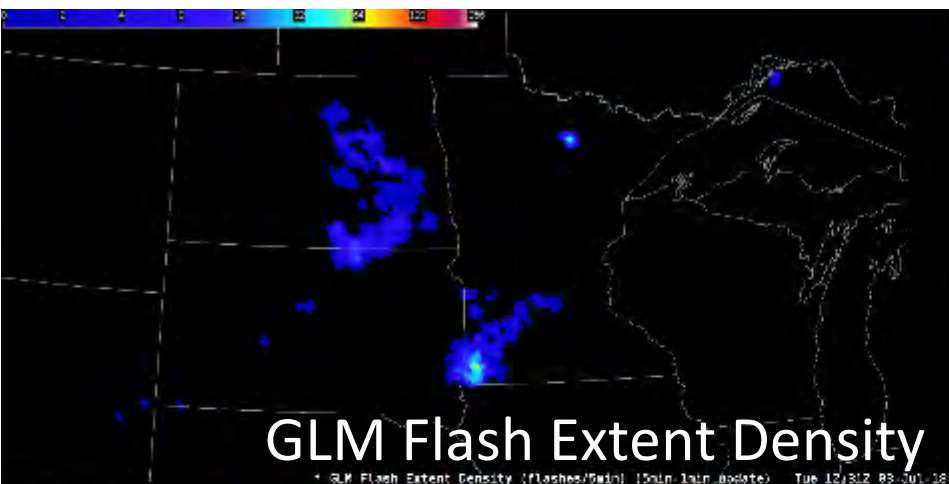Average Flash Area

Total Optical Energy

Primary TOE Applications

- TOE directly represents the optical lightning observations, providing the most intuitive portrayal of the GLM imagery

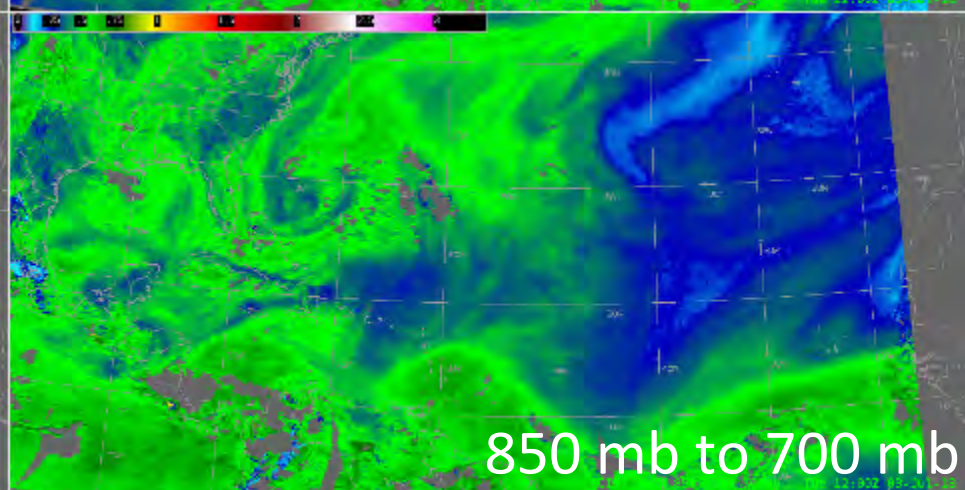- Identify strengthening and weakening storms – the brightest areas in the TOE product coincide with
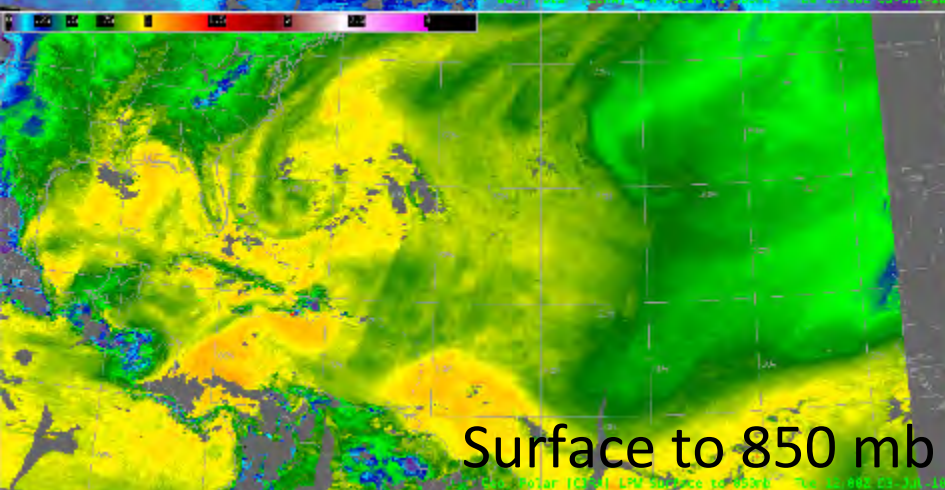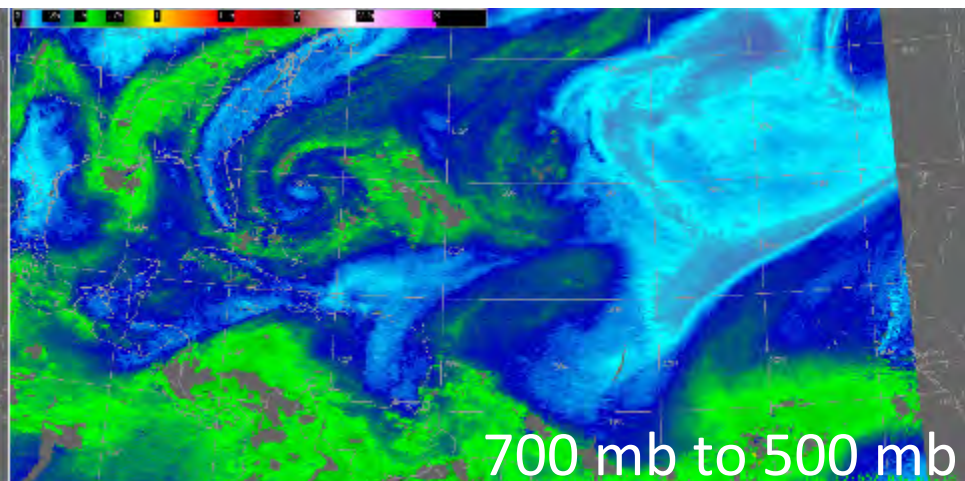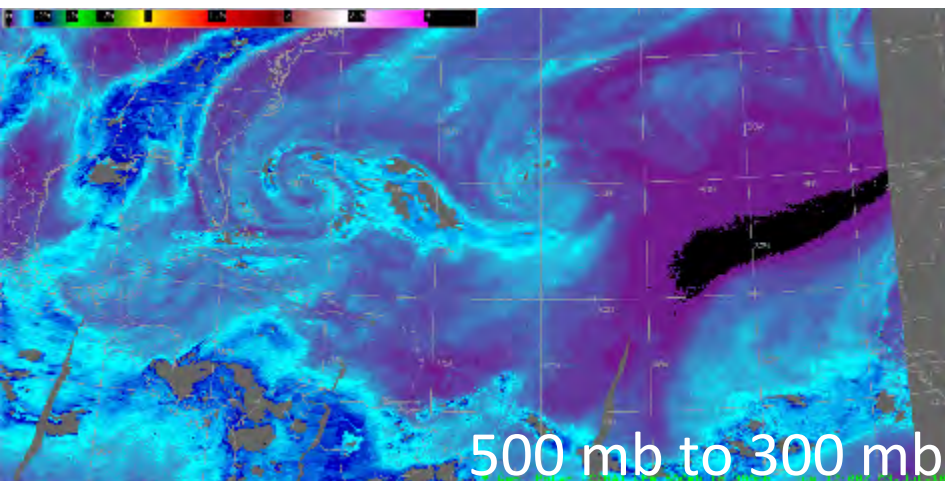
Geostationary Lightning Mapper

GLM Flash Extent Density

GLM Average Flash Area

10.35 μm & ENTLN

GLM Total Optical Energy

Layer Precipitable Water

500 mb to 300 mb

700 mb to 500 mb

Surface to 850 mb

850 mb to 700 mb

GOES-16/MSG-11 Air Mass RGB

- Useful for identifying the different air masses that may interact with the SAL environment.

- Does NOT detect dust!

- The 6.2μm-7.3μm WV difference may detect drying in strong events co-located with the SAL front (arcing area of warm (dry) air in the yellow circle).

- Notice the relatively higher moisture (green area in the black circle) that contrasts with the 7.3 μm single channel image of the previous slide. What is happening here?

- Available 24 hours in N-AWIPS, AWIPS II, and via CIRA Slider or other sources.

Saharan Air Layer
Daytime 4-panel

0.47 μm

0.64 μm

CIMSS Natural Color

0.87 μm
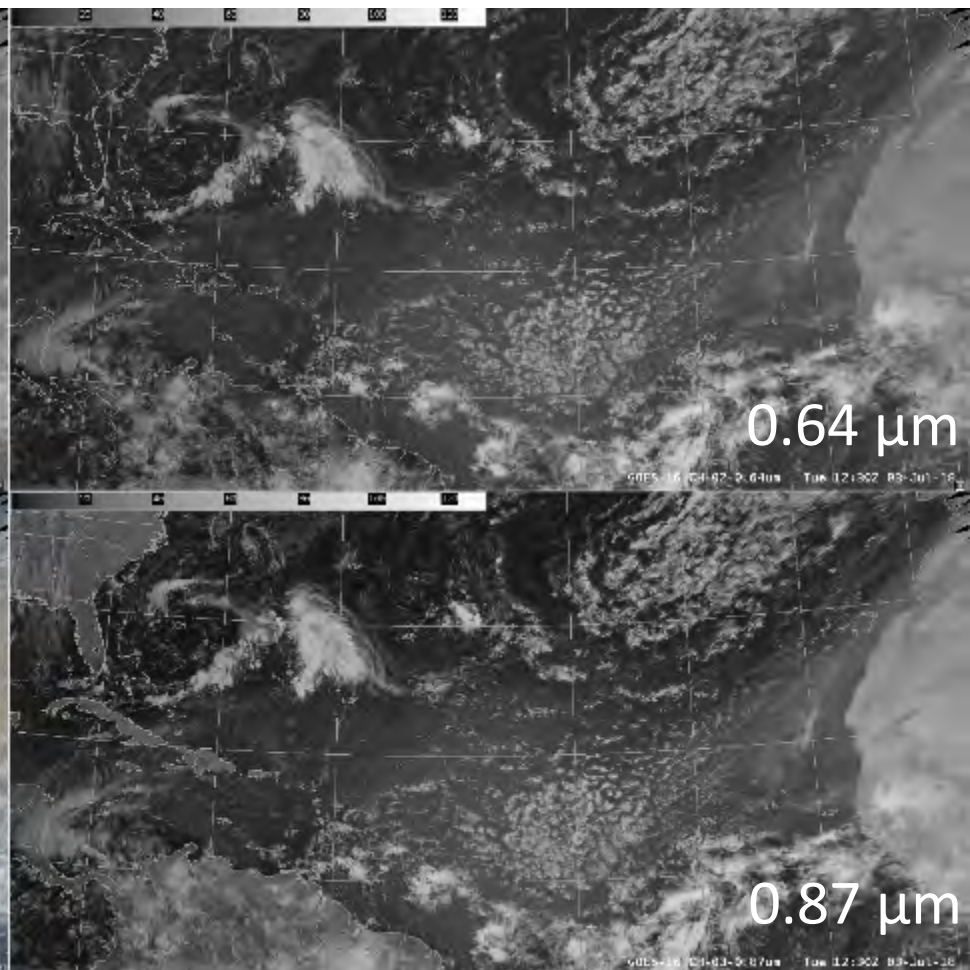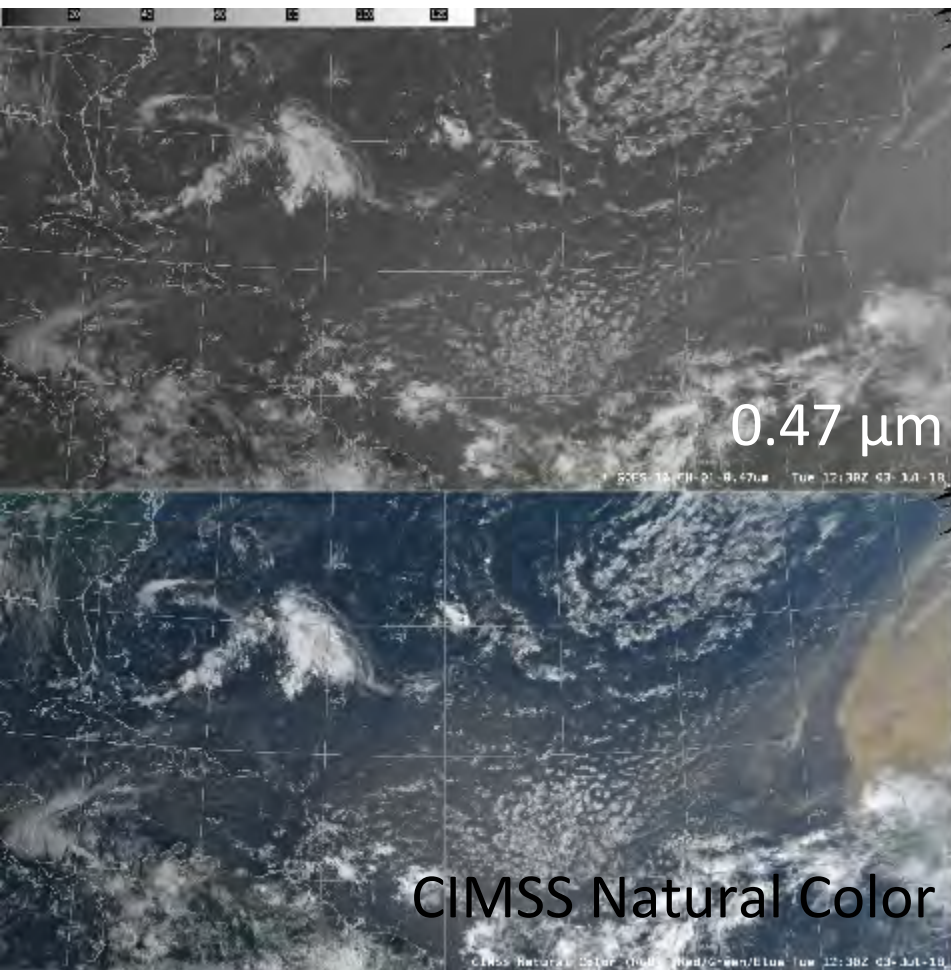
Saharan Air Layer
4-panel

Dust RGB

Aerosol Optical Depth

Air Mass RGB

7.34 μm
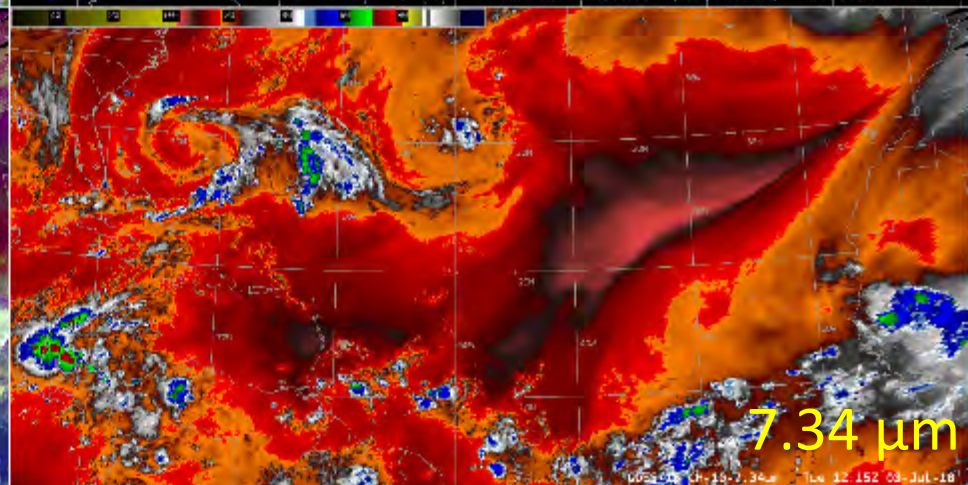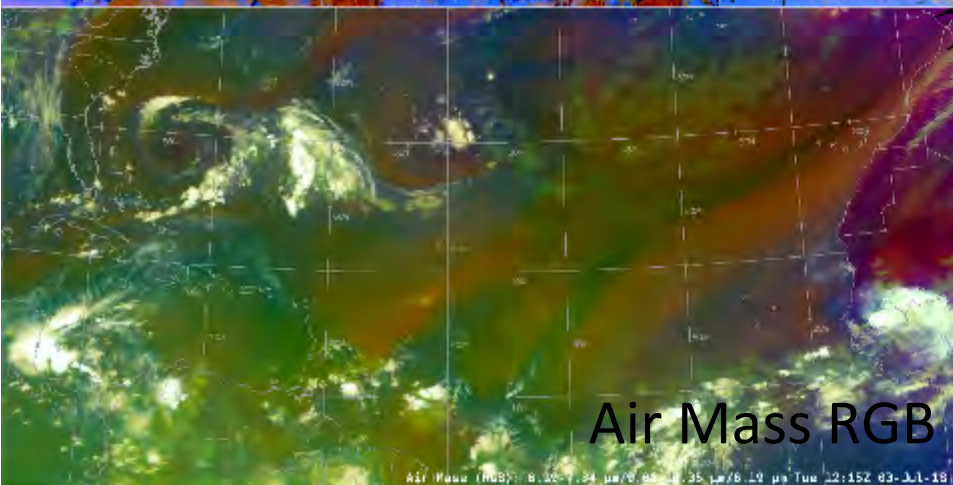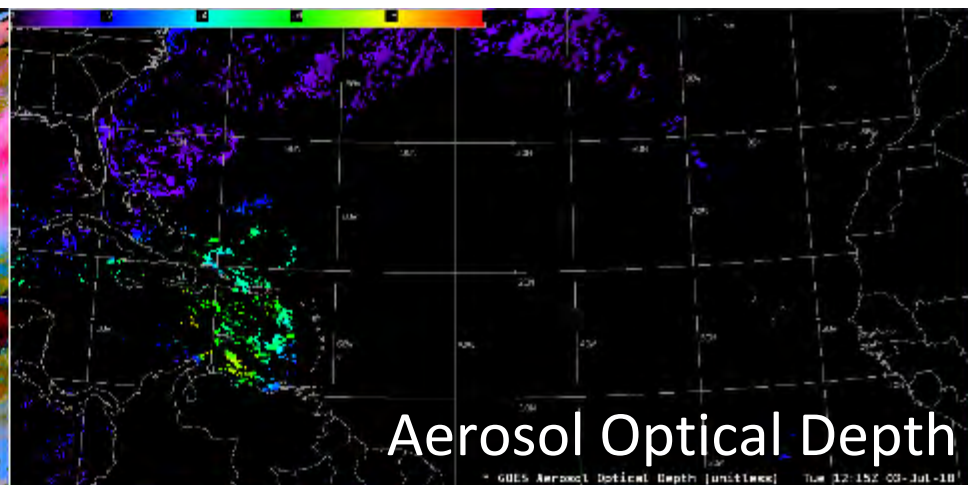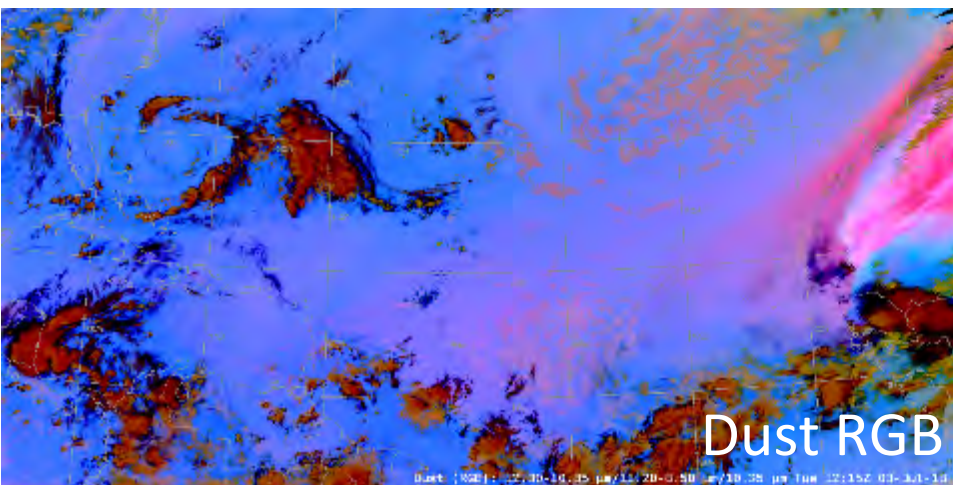
Summary

- One page "quick guides" are valuable

- Fast access to training material via office "intranet"

- New products such as RGB are a steeper learning curve

- Motivation to learn more by contribution to operational issues:
  - Loss of primary radar
  - Lightning over areas not covered by ground-based detection systems
  - Better detection of nighttime fog/low stratus
  - Operational detection of dust and smoke

"GOES-16 products have become an indispensable part of our operations"
Lead Forecaster, NWS Miami Weather Forecast Office