GOES-R Proving Ground

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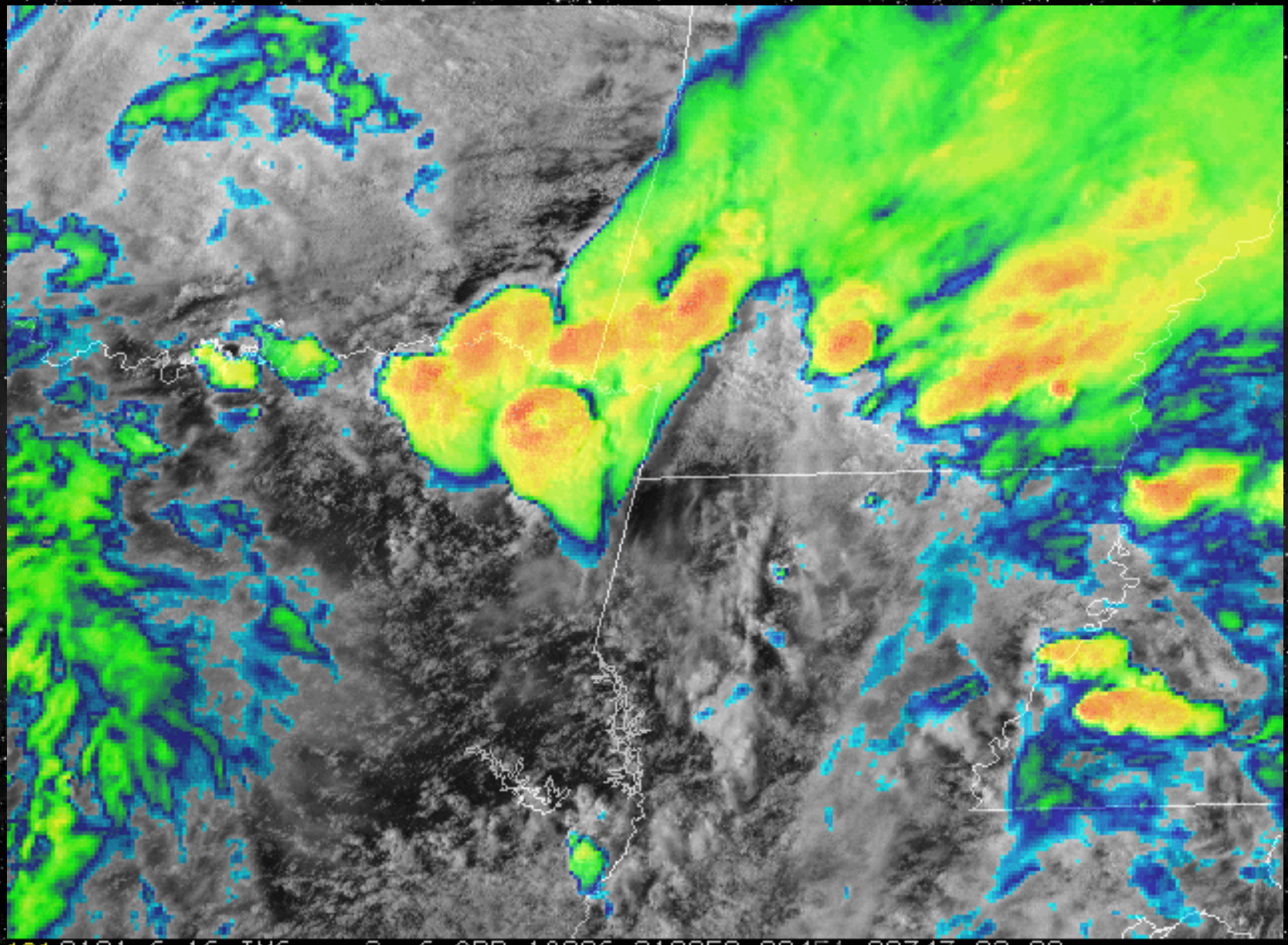
NOAA Testbeds & Proving Grounds Workshop

Kansas City, MO – 10 April 2018

GOES-16 Update

Last Friday (April 6)



GOES-S Launch – March 1, 2018

- GOES-S was successfully launched on March 1, 2018, from Kennedy Space Center
- Reached geostationary orbit on March 12 and was renamed GOES-17
- Will undergo checkout from 89.5 W longitude for 6 months
- NWS will receive imagery and products after “Beta” is declared, probably in June
- Will be moved to 137 W in October, where it will become GOES-West

GOES-16 L2 Product Validation Status

ABI L2+ Products	Beta	Prov	Full
Cloud and Moisture Imagery (CMI) and Sectorized CMI (KPP)	2/28/17	6/1/17	6/1/18
Aerosol Detection (Smoke & Dust)	5/24/17	3/19/18^	11/3/18
Aerosol Optical Depth (AOD)	5/24/17	6/15/18+	11/3/18
Clear Sky Mask	4/19/17	2/16/18	11/3/18
Cloud Optical Depth	6/8/17	2/22/18	11/3/18
Cloud Particle Size Distribution	6/8/17	2/22/18^	11/3/18
Cloud Top Height	5/16/17	2/16/18	11/3/18
Cloud Top Phase	5/16/17	2/22/18	11/3/18
Cloud Top Pressure	5/16/17	2/16/18	11/3/18
Cloud Top Temperature	5/16/17	2/16/18	11/3/18
Derived Motion Winds	6/8/17	2/9/18	11/3/18
Derived Stability Indices	5/16/17	2/22/18	11/3/18

ABI L2+ Products	Beta	Prov	Full
Downward S/W Radiation: Surface	6/23/17	6/15/18	11/3/18
Fire/Hot Spot Characterization	5/24/17	3/30/18	11/3/18
Hurricane Intensity Estimation	9/25/17	6/15/18	11/3/18
Land Surface Temperature	5/24/17	3/19/18	11/3/18
Legacy Vertical Moisture Profile	5/16/17	2/22/18	11/3/18
Legacy Vertical Temperature Profile	5/16/17	2/22/18	11/3/18
Rainfall Rate/QPE	9/13/17	3/30/18	11/3/18
Reflected S/W Radiation: TOA	6/23/17	6/15/18+	11/3/18
Sea Surface Temperature	6/14/17	3/9/18	11/3/18
Snow Cover	TBD*	TBD*	TBD*
Total Precipitable Water	5/16/17	2/22/18	11/3/18
Volcanic Ash: Detection and Height	9/13/17	6/15/18	11/3/18

4/2/18

Validation Maturity Levels: Not Validated | Beta Maturity | Provisional Maturity | Full Maturity

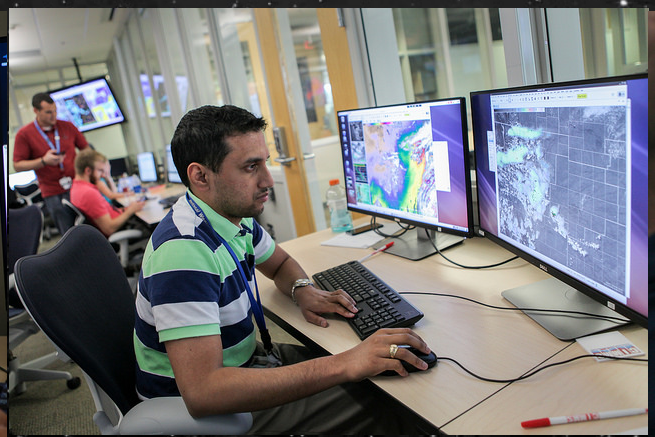
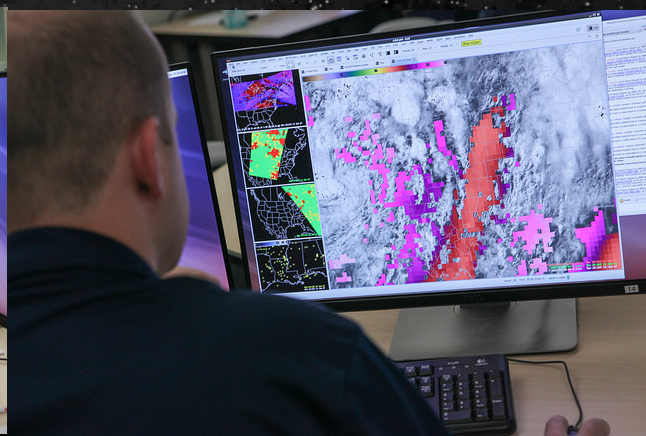
* Snow Cover has a waiver. It is dependent upon a non-baseline Albedo Product which is in development.

\+ Delayed AWG algorithm delivery due to compressed timeframe for providing all algorithm updates. Requires 3 months of validation data.

^ Cloud Particle Size and Aerosol Detection follow-up analysis review to occur 6/15/18.

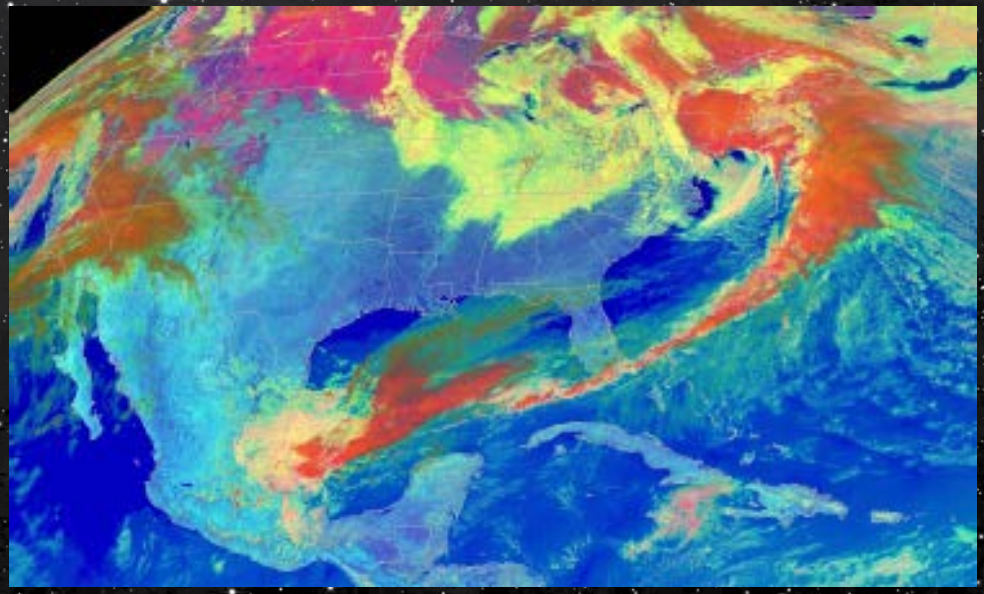
Proving Ground Activities

- Support for Proving Ground Liaisons
  - Michael Bowlan at the Storm Prediction Center and Hazardous Weather Testbed
  - Andrea Schumacher at the National Hurricane Center
  - Michael Folmer at the Ocean Prediction Center, Weather Prediction Center, Satellite Analysis Branch, and Tropical Analysis & Forecast Branch
  - Kaitlin Rutt at the Warning Decision Training Division

Proving Ground Activities

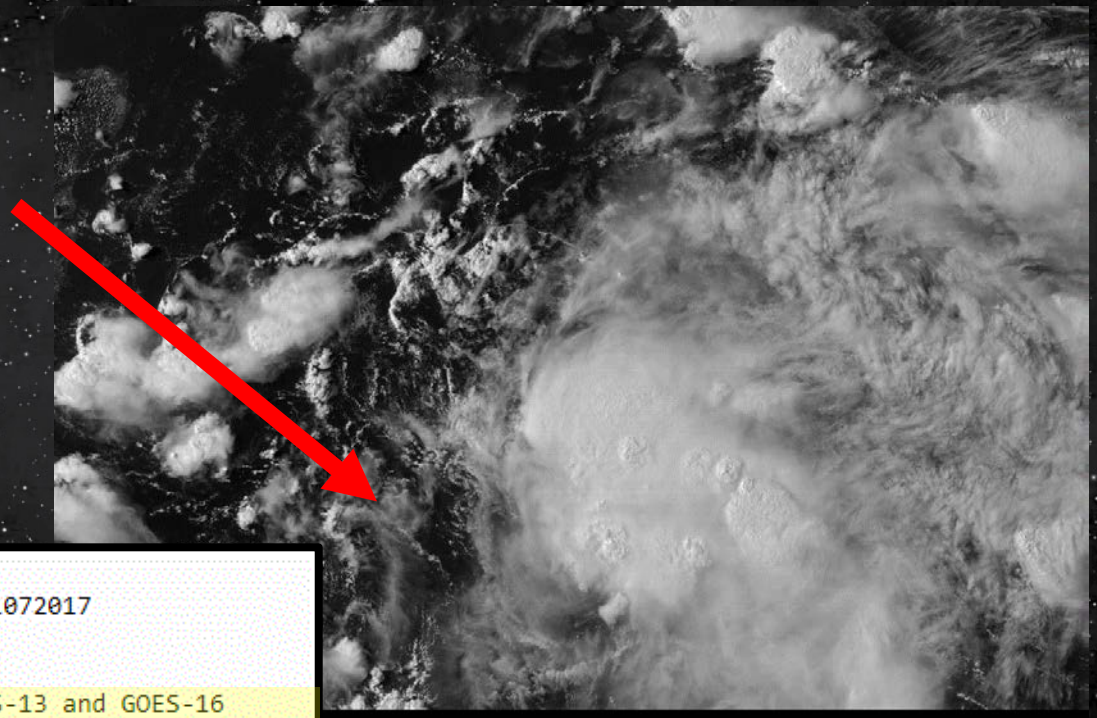
- Support for partners creating and distributing experimental products for evaluations by the NWS
  - CIRA – e.g., GeoColor
  - CIMSS – e.g., ProbSevere
  - CICS – e.g., GLM Gridded Flash Extent Density
  - NASA SPoRT – e.g., RGBs for National Centers
- Operations Proving Ground



National Hurricane Center Examples

GOES-16 5-min Visible Imagery
Pre-Franklin Disturbance

Low-level clouds moving west to east – suggesting a closed circulation near the surface



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Tropical Storm Franklin Discussion Number   2
NWS National Hurricane Center Miami FL       AL072017
1100 PM EDT Sun Aug 06 2017

Last-light visible satellite pictures from GOES-13 and GOES-16
indicated that the low-level circulation of the disturbance had
become better defined and was located near the southwestern edge of
the main convective mass.  NOAA Buoy 42057, located about 90 n mi
northeast of the center, has reported peak 1-minute winds around 35
kt during the past few hours and a gust to 43 kt.  Because the
system has developed a closed circulation and well-defined center,
it is now classified as a tropical storm.  Franklin becomes the
sixth tropical storm of the 2017 Atlantic hurricane season.
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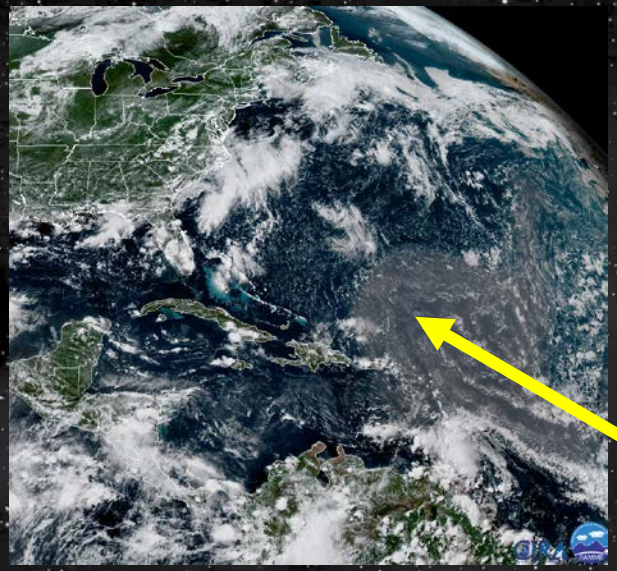
Courtesy of Andrea Schumacher

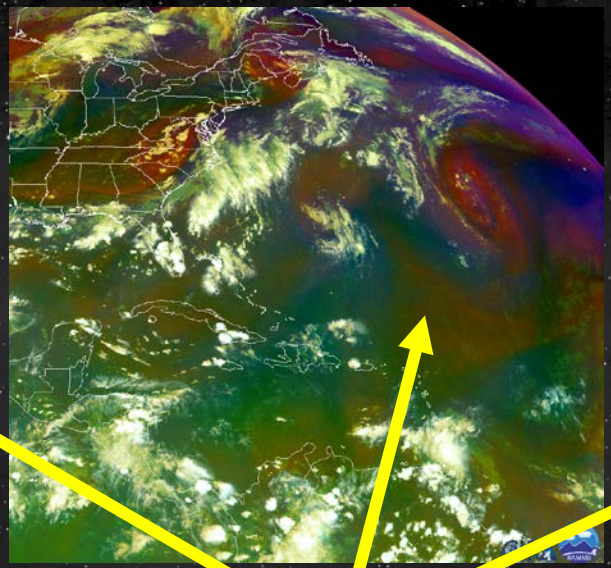
National Hurricane Center Examples

Environmental RGBs – Dust/Dry air

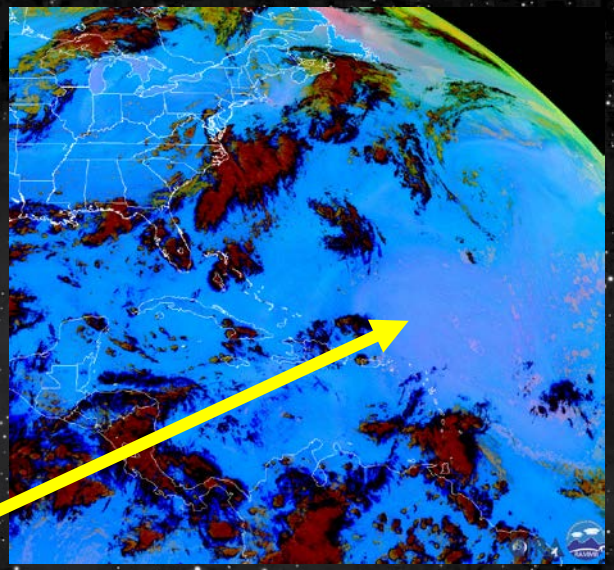
CIRA GeoColor RGB



EUMETSAT Air Mass



EUMETSAT Dust



Saharan Air Layer

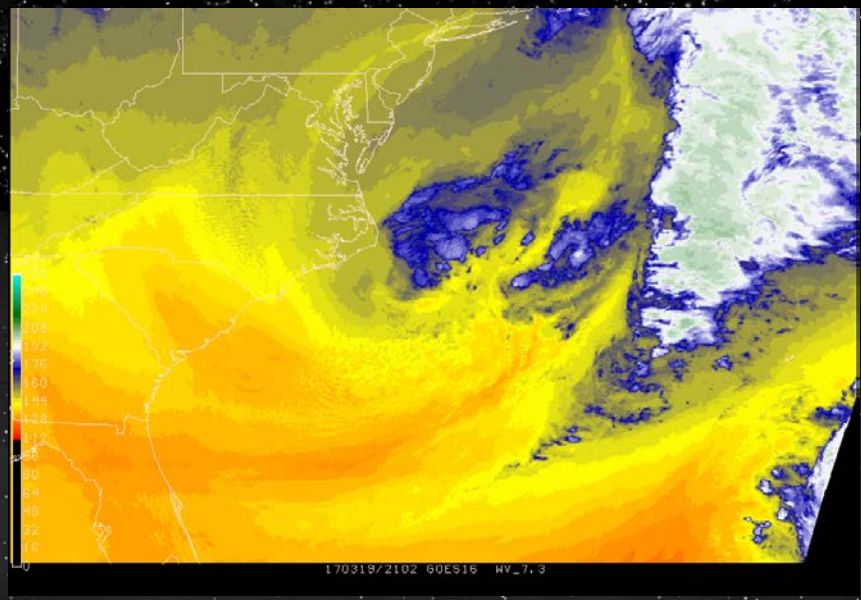
- Dust visible in GeoColor RGB
- Airmass RGB shows boundary between warm, moist tropical air (green) and drier midlatitude air (orange)
- Dust appears pink in Dust RGB

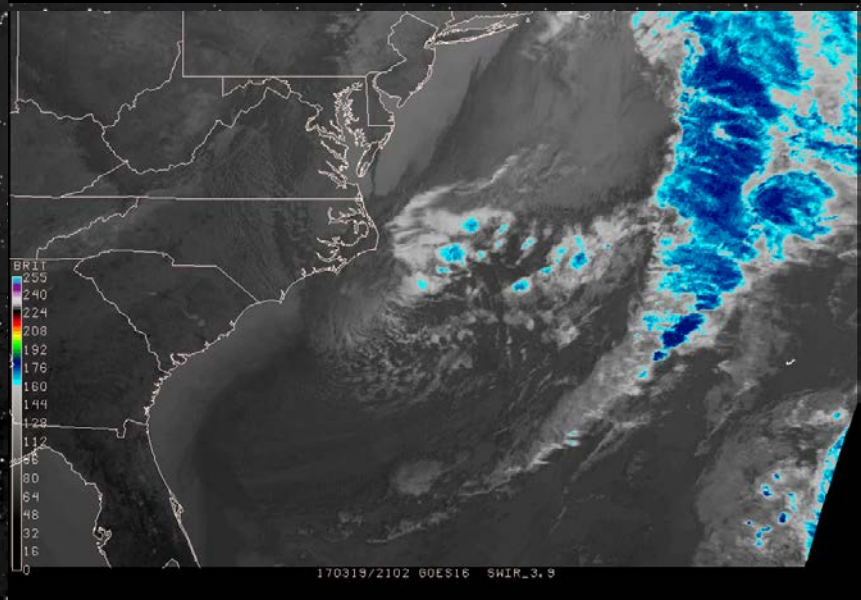
Courtesy of Andrea Schumacher

Ocean Prediction Center Example

Offshore Mesoscale Low

- “The feature was also apparent in the GOES-16 7.3 µm lower-level water vapor imagery, indicating it may be vertically stacked or at least extend through the lower levels.”
- “The three water vapor channels alone indicated there was likely adequate forcing through the upper and mid levels, and even into the lower levels to support the development of a surface low.”
- “However, the low level circulation analyzed in the GOES-16 3.9 µm shortwave infrared imagery confirmed the presence of the surface low.”
- Note the Sea Surface Temperature gradient along the north wall of the Gulf Stream in the 3.9 µm animation.
- ~ Jim Clark (OPC)

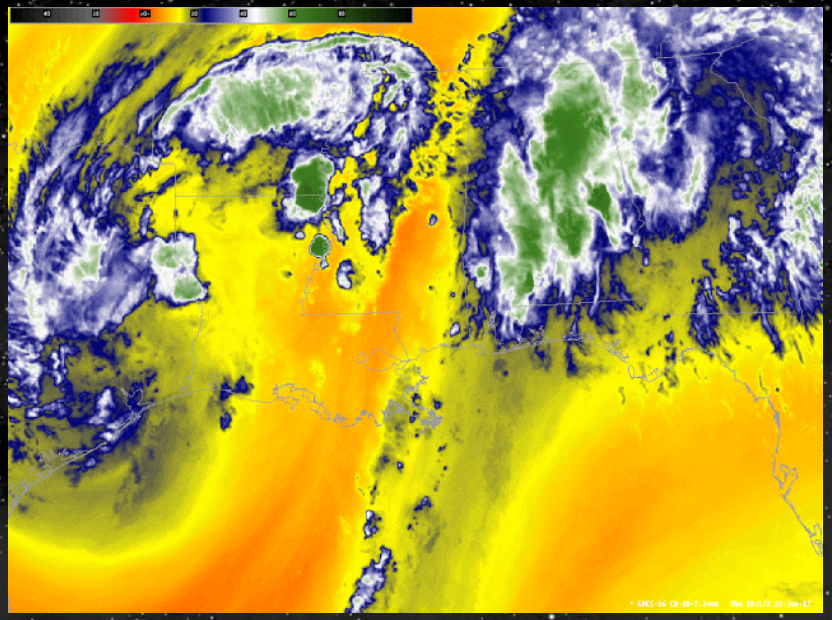


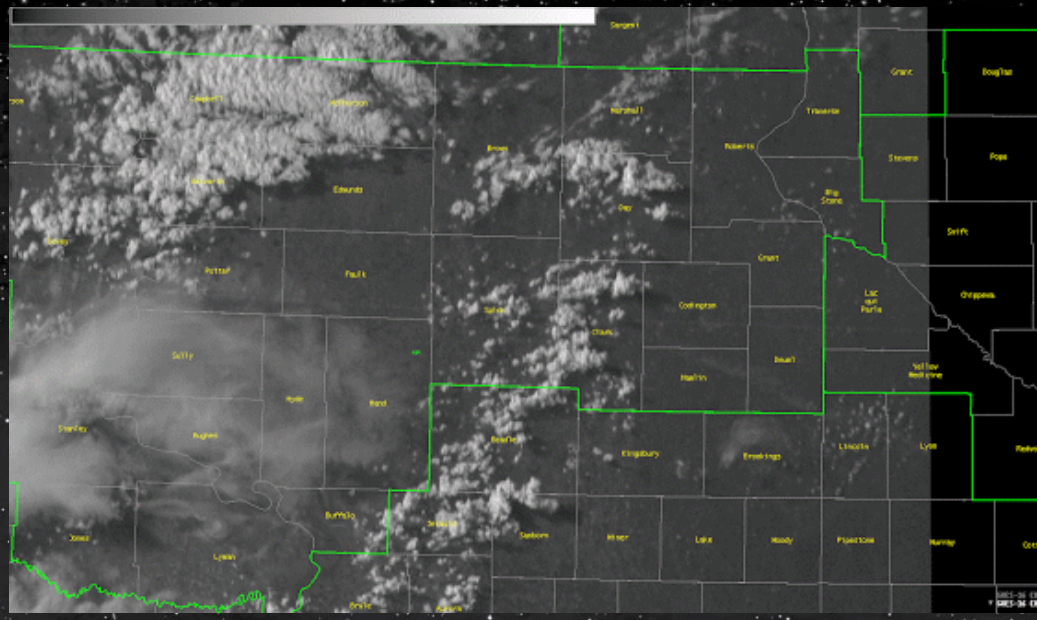


Courtesy of Michael Folmer

Hazardous Weather Testbed Example

Convective Storm Development





- “Some of this upper level moisture can also be seen on the 6.19um… However, very dry air is observed in the middle levels on the 7.34 um channel noted by the deep orange colors.”
- “The use of the three water vapor channels also provides a lot of useful information in terms of identifying subtle features which were possibly not evident in previous GOES imagery.”
- “… I could really get a sense of the explosive updraft development using the 1 min imagery.”
- “…When we were watching storms in SD with the 1-min data, you could see towers developing and dissipating that weren't captured by the 5-min data.”

Courtesy of Michael Bowlan

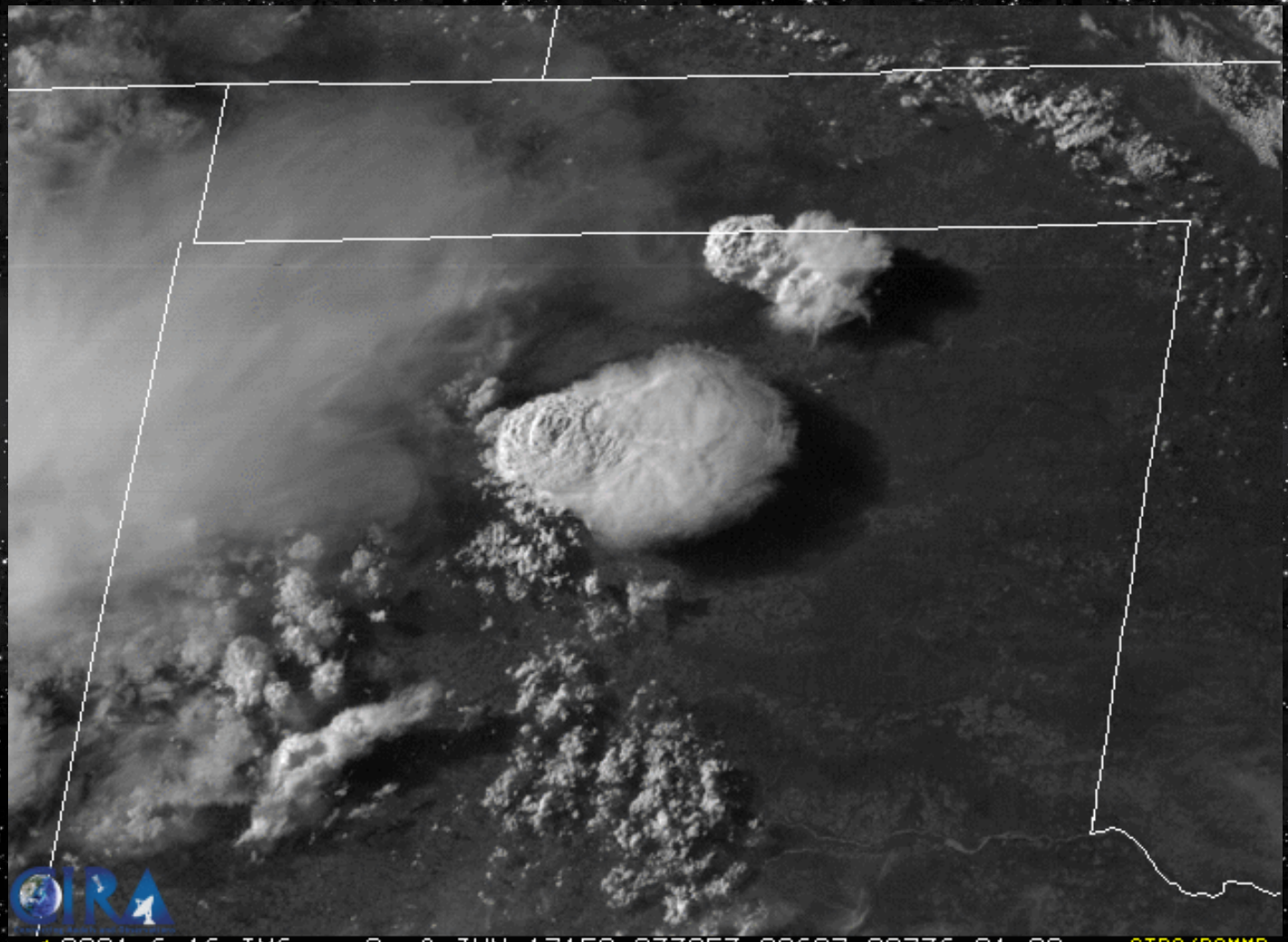
Transition Metrics

GOES-R Proving Ground

Major Tests Conducted	Transitioned to Operations (RL9)	Recommended for Transition to Operations (RL9)	Advanced To Experimental Testing (RL8)	Further Demonstration/ Development (RL 5-7)	Rejected For Further Testing
Rapid Scan Imagery	X				
Geostationary Lightning Mapper (GLM)			X		
ProbSevere			X		
GOES-16 RGBs	X				
GeoColor				X	
GOES-16 Level 2 Products		X	X	X	

Proving Ground Product Demos

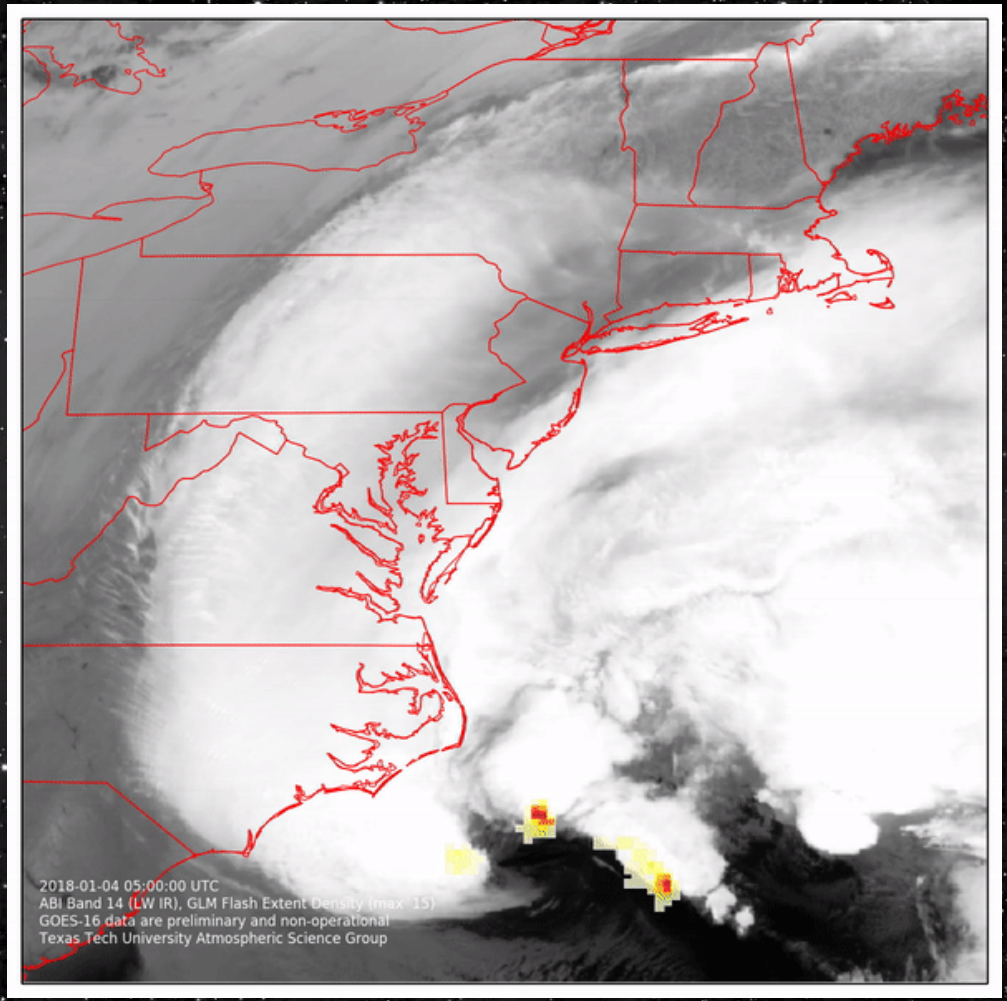
1. Rapid Scan Imagery – Now Operational with GOES-16



Proving Ground Product Demos

2. Geostationary Lightning Mapper Detection (CICS, TTU, SPoRT)

- Initial GLM AWIPS tool deemed useless
- A reworking of the GLM display in AWIPS is underway
- GLM Flash Extent Density (FED) will be mapped onto the ABI 2-km grid
- This gridded product will be provided to some NWS offices for an initial demonstration at the end of April
- The product will be rolled out to additional offices throughout the summer
- Target for full NWS implementation is August 2018



Courtesy of Scott Rudlosky and Geoffrey Stano

Proving Ground Product Demos

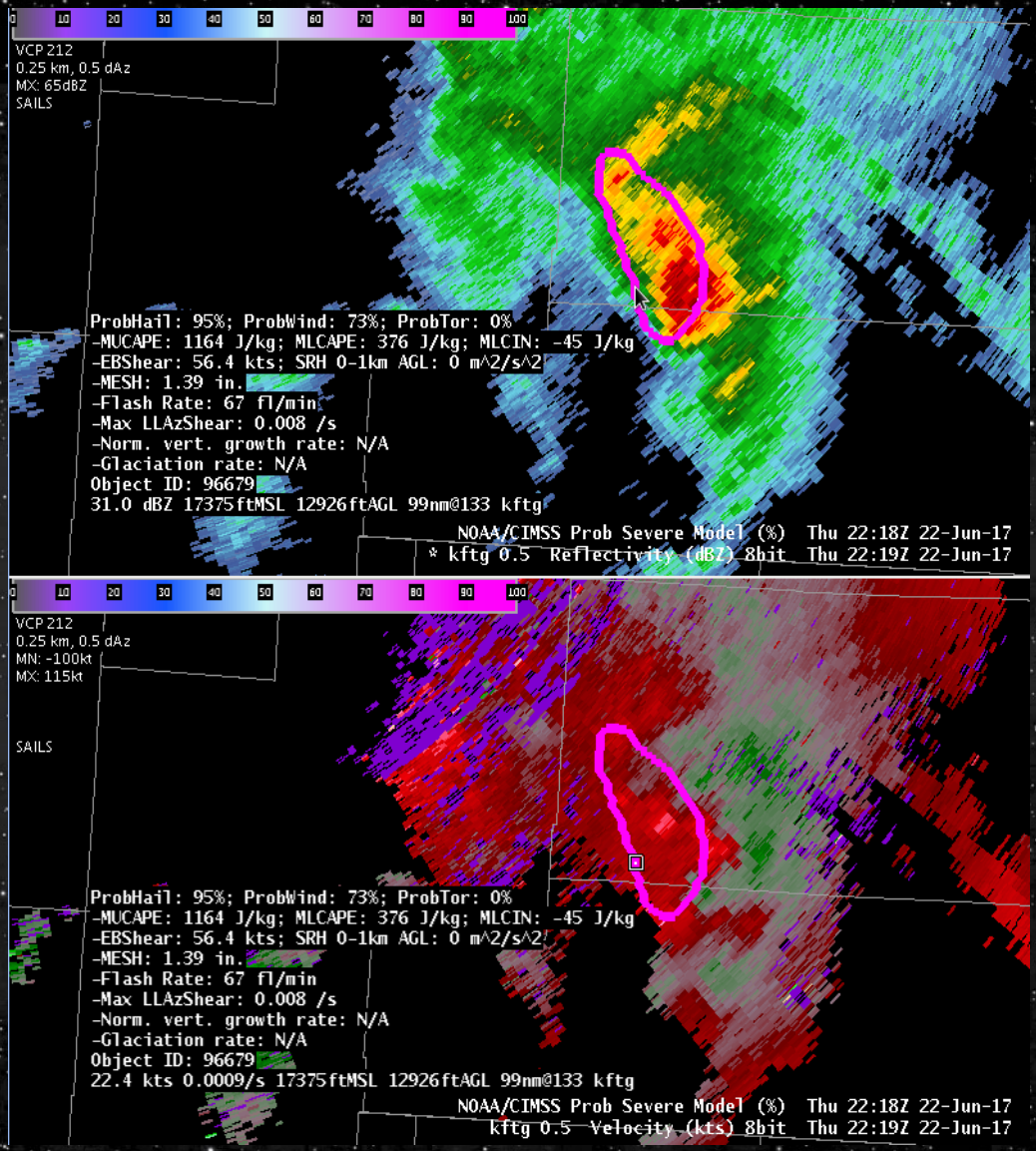
3. ProbSevere (CIMSS)

"Useful for SA with lots of storms"

"I feel there is utility to the ProbSevere model and could supplement our normal radar interrogation. It gave me more confidence in warning issuance and helped with lead time and wording in my warnings."

"ProbSevere is great. Best with hail, not so much due to displacement issues in wind."

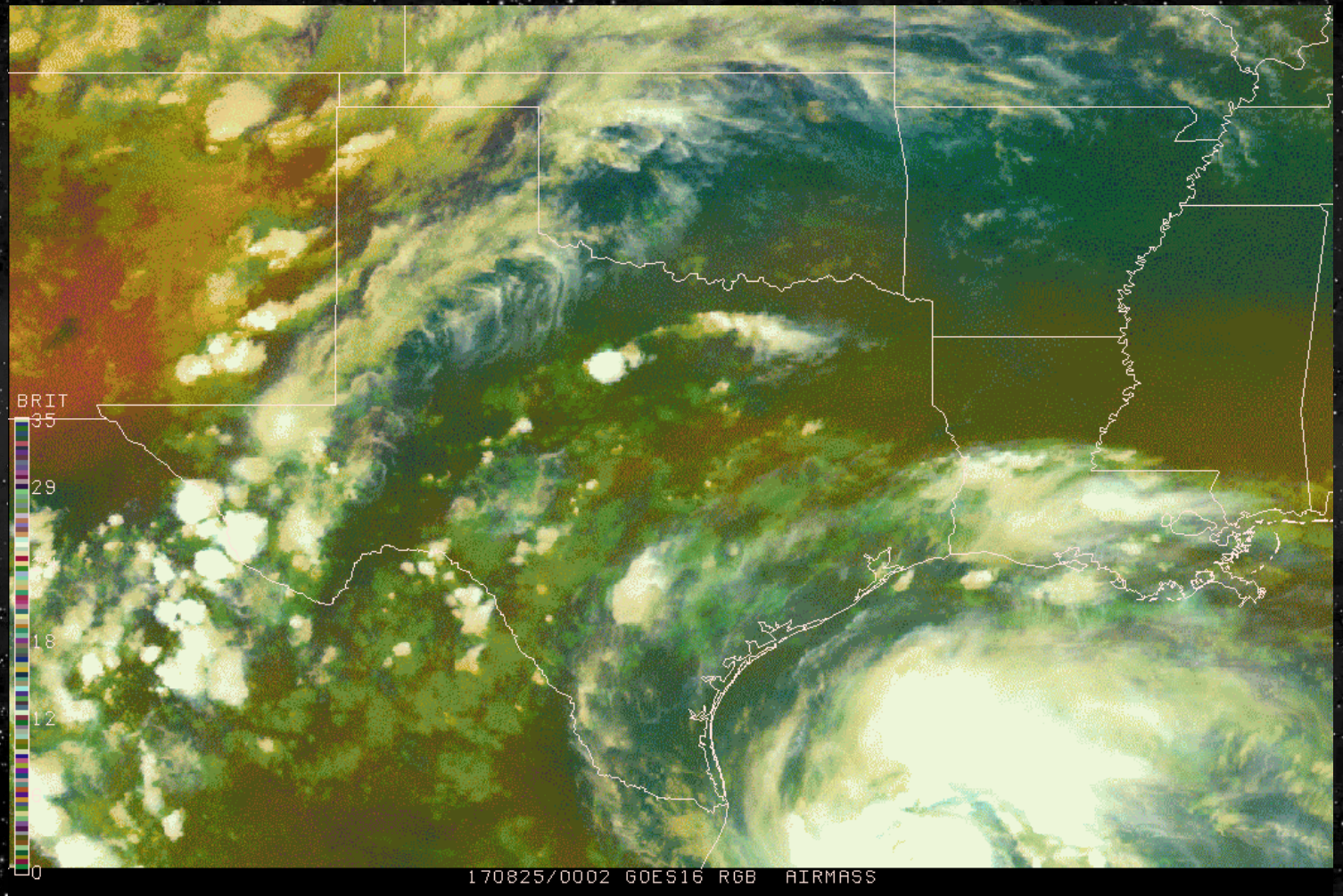
Suggestions: better and smaller storm tracking, continued improvement with diagnosing and tracking severe wind, product trends time series



Courtesy of Michael Bowlan

Proving Ground Product Demos

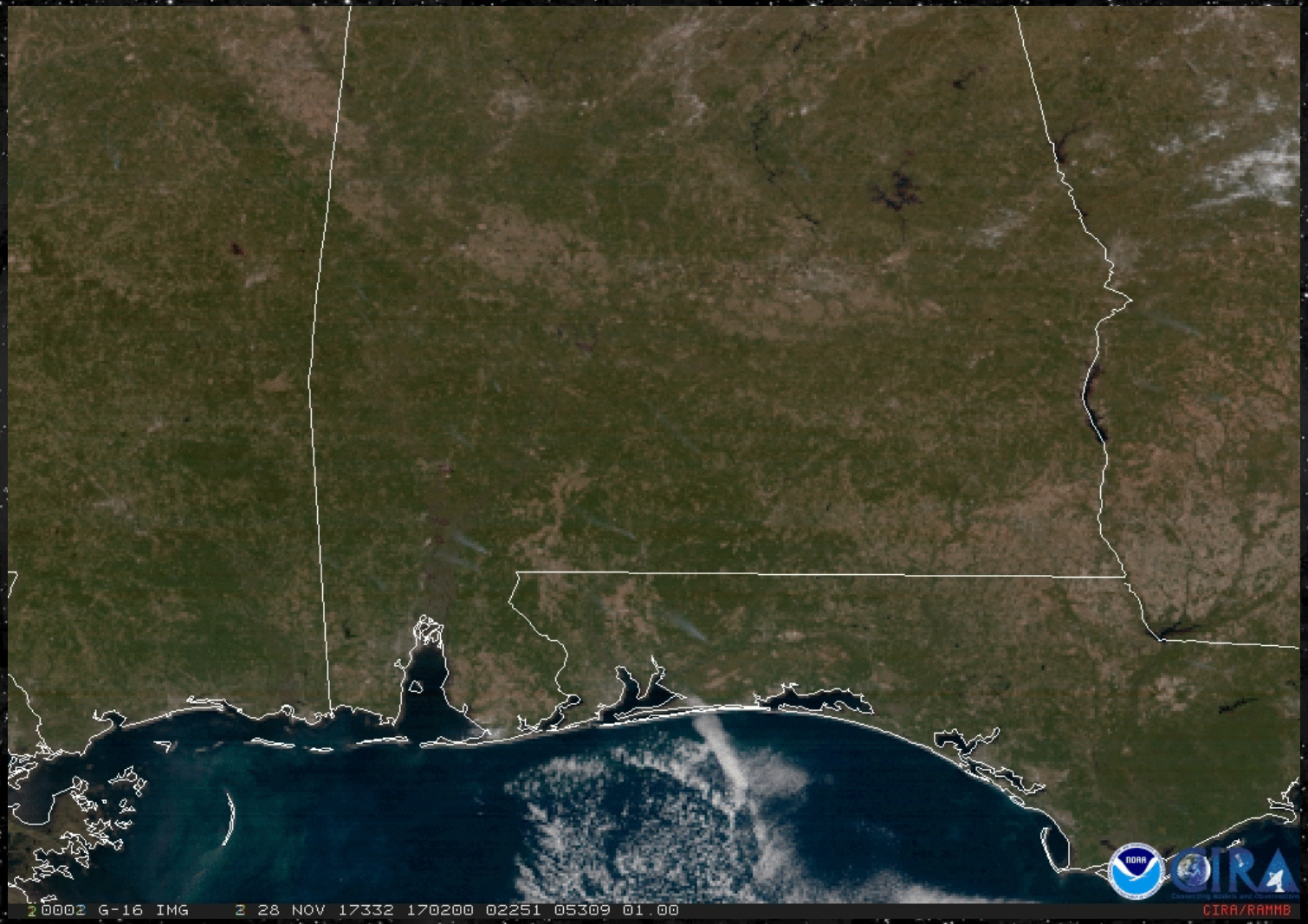
4. GOES-16 RGBs (SPoRT, Michael Folmer)



Courtesy of Michael Folmer

Proving Ground Product Demos

5. GOES-16 GeoColor (CIRA)



Proving Ground Product Demos

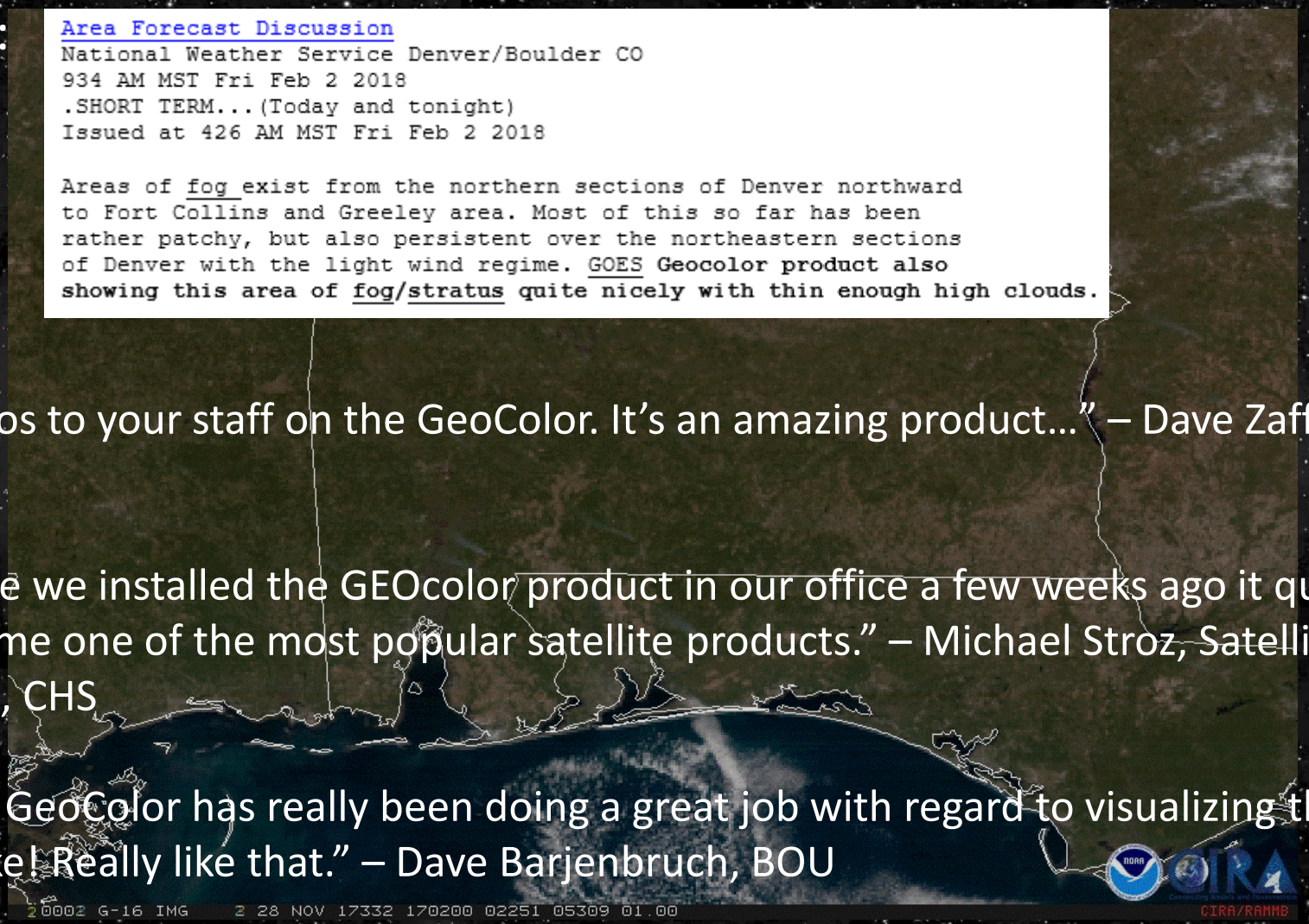
5. GOES-16 GeoColor (CIRA)

- AFD:

Area Forecast Discussion
National Weather Service Denver/Boulder CO
934 AM MST Fri Feb 2 2018
.SHORT TERM...(Today and tonight)
Issued at 426 AM MST Fri Feb 2 2018

Areas of fog exist from the northern sections of Denver northward to Fort Collins and Greeley area. Most of this so far has been rather patchy, but also persistent over the northeastern sections of Denver with the light wind regime. GOES Geocolor product also showing this area of fog/stratus quite nicely with thin enough high clouds.

- "Kudos to your staff on the GeoColor. It's an amazing product…" – Dave Zaff, SOO, BUF
- "Since we installed the GEOcolor product in our office a few weeks ago it quickly became one of the most popular satellite products." – Michael Stroz, Satellite Focal Point, CHS
- "The GeoColor has really been doing a great job with regard to visualizing the smoke! Really like that." – Dave Barjenbruch, BOU



Summary and Future of the Satellite Proving Ground

- Proving Ground Demonstrations continue to be an excellent method to get experimental products in front of operational forecasters for 2-way feedback
- The most successful demos include the satellite products *in concert with* other everyday NWS products and decision aids
- The Operations Proving Ground does an excellent job with this
- In the future we hope to merge GOES-R and JPSS activities into a single integrated Satellite Proving Ground