

JPSS Preparations at the Satellite Proving Ground for Marine, Precipitation, and Satellite Analysis

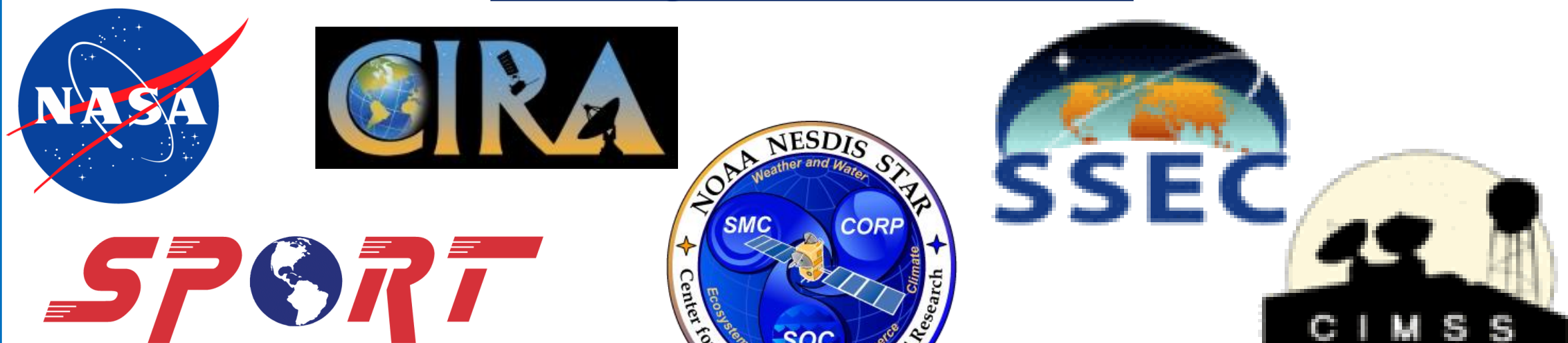
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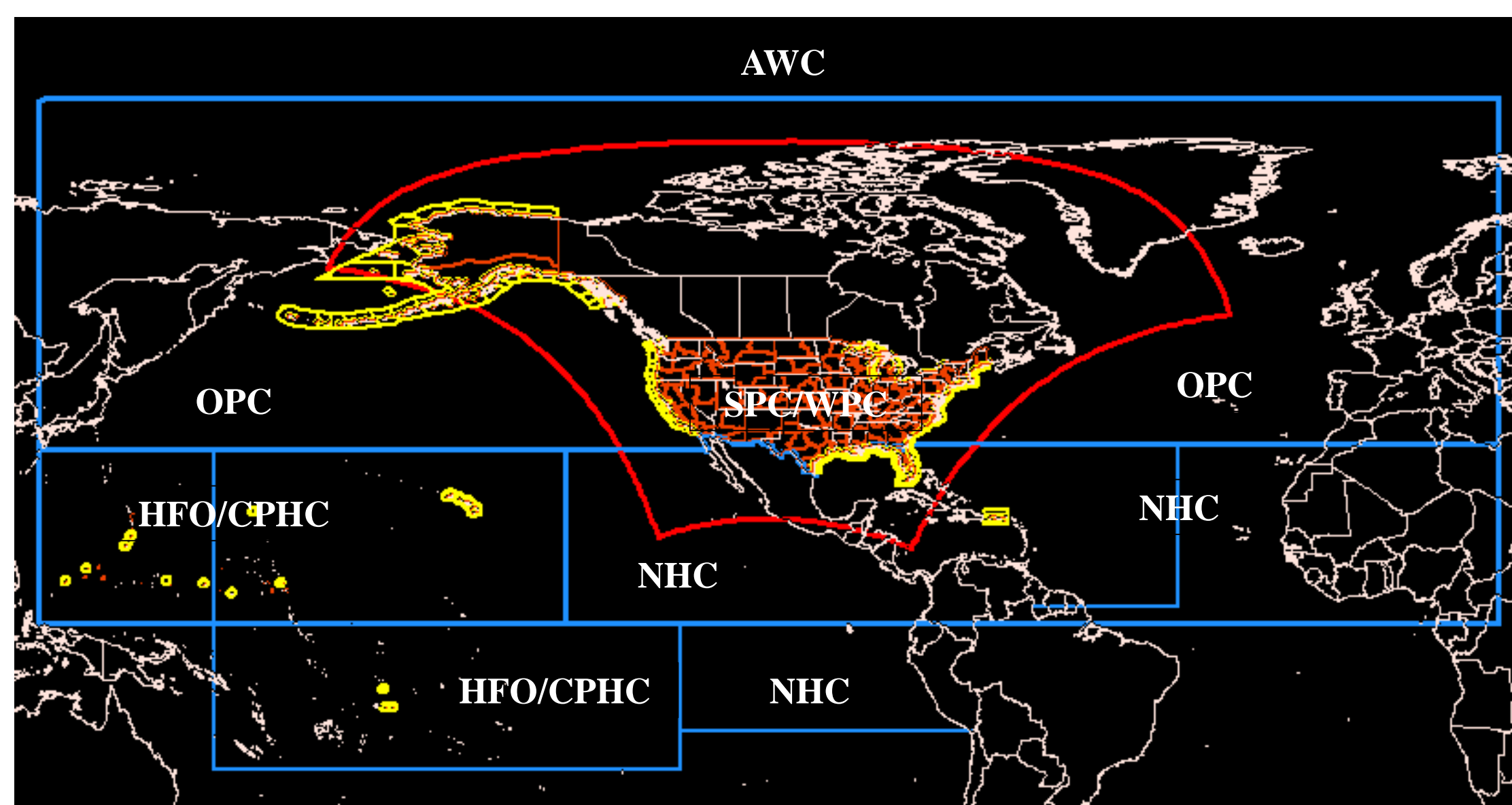
Overview of the Proving Ground

The Ocean Prediction Center (OPC), the National Hurricane Center's Tropical Analysis and Forecast Branch (TAFB), the Weather Prediction Center (WPC), and the Satellite Analysis Branch (SAB) of NESDIS make up the Satellite Proving Ground for Marine, Precipitation, and Satellite Analysis (MPS). These centers have had early exposure to JPSS products using the S-NPP satellite that was launched in late 2011. Forecasters continue to evaluate new products in anticipation for the launch of JPSS-1 sometime in 2017.

Proving Ground Partners



NCEP Centers Domains



NUCAPS in AWIPS II D2D

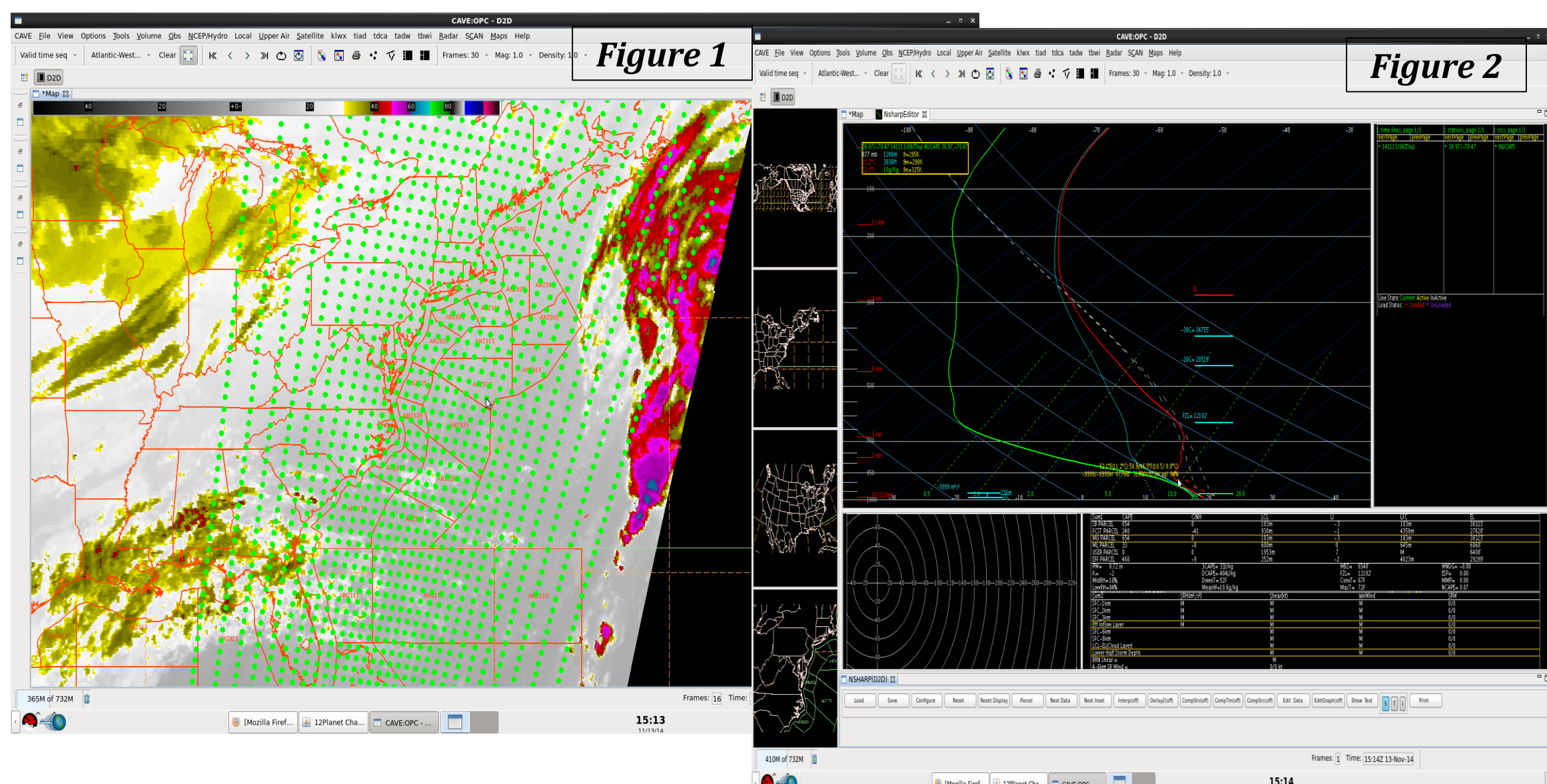


Figure 1: The first NUCAPS displays were made available at OPC, WPC, and SAB in 2015, though they are not yet available in the National Centers Perspective, only in D2D. Although the forecasters like having the atmospheric sounders available (**Figure 2**), there have been requests to make horizontal and vertical cross-sections so they can better assess the overall state of the atmospheric (more synoptic to mesoscale). Additional NUCAPS products will be investigated for 2016.

New JPSS Products Introduced in 2016! CIRA Layered Precipitable Water and NESDIS Snowfall Rate

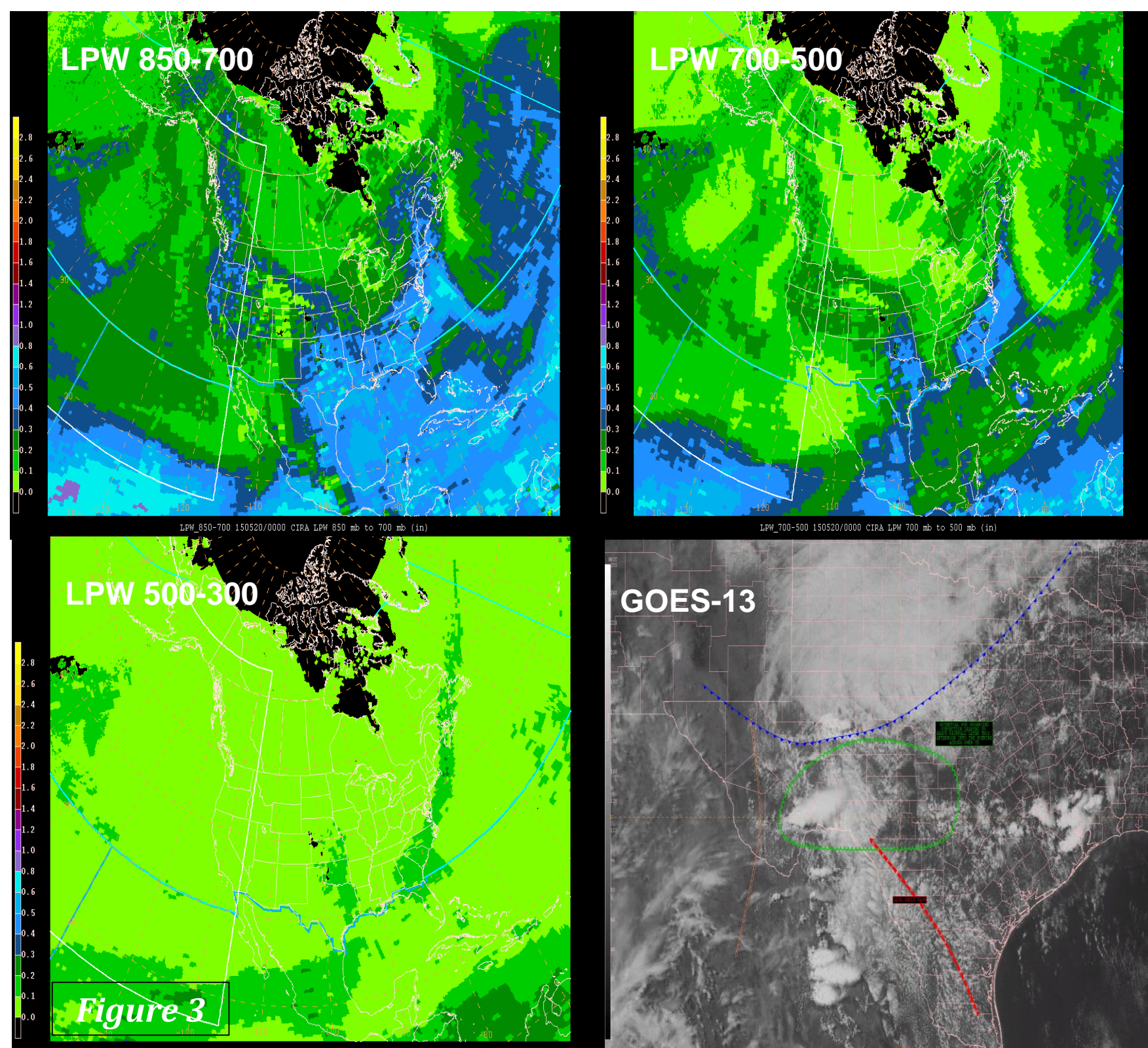
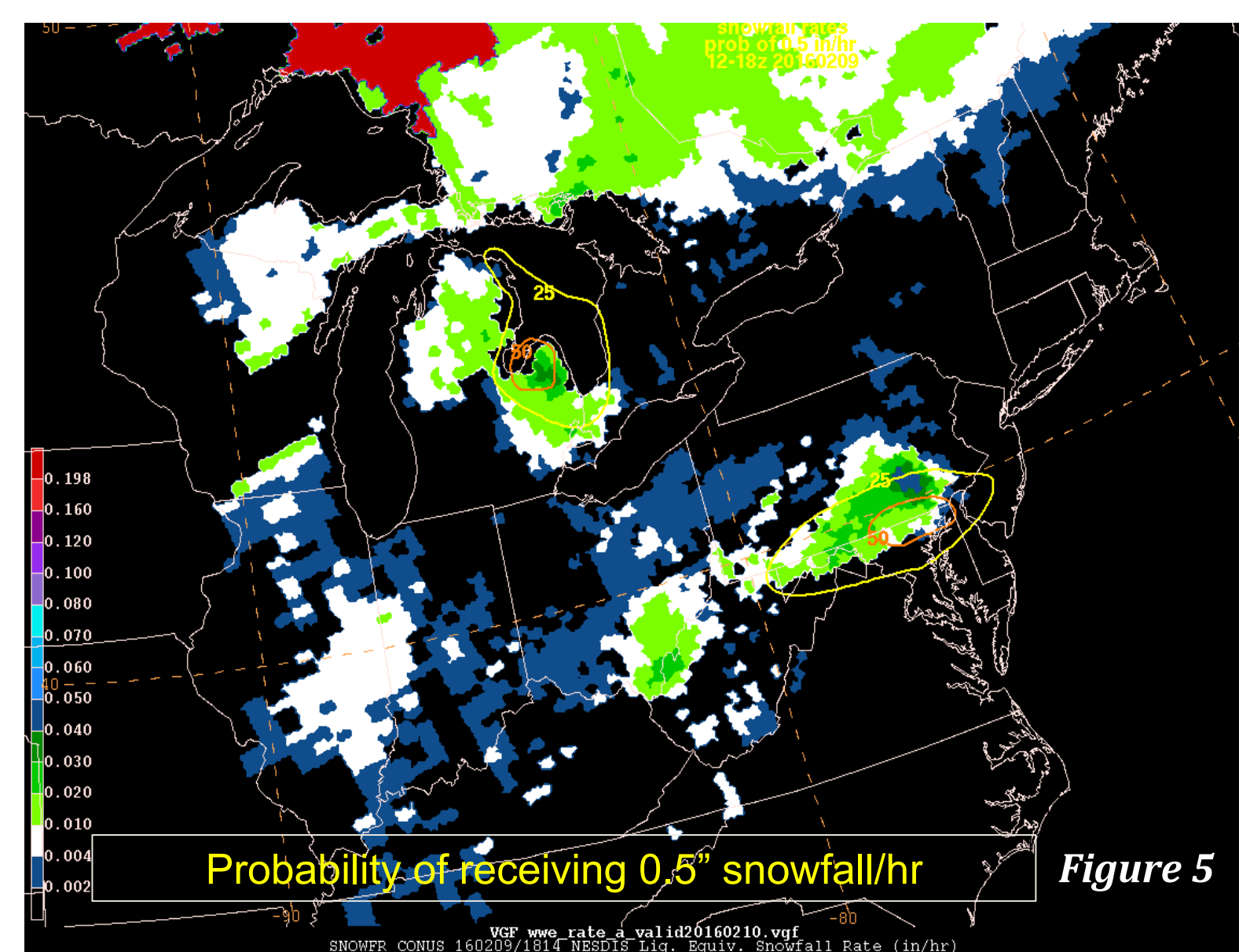
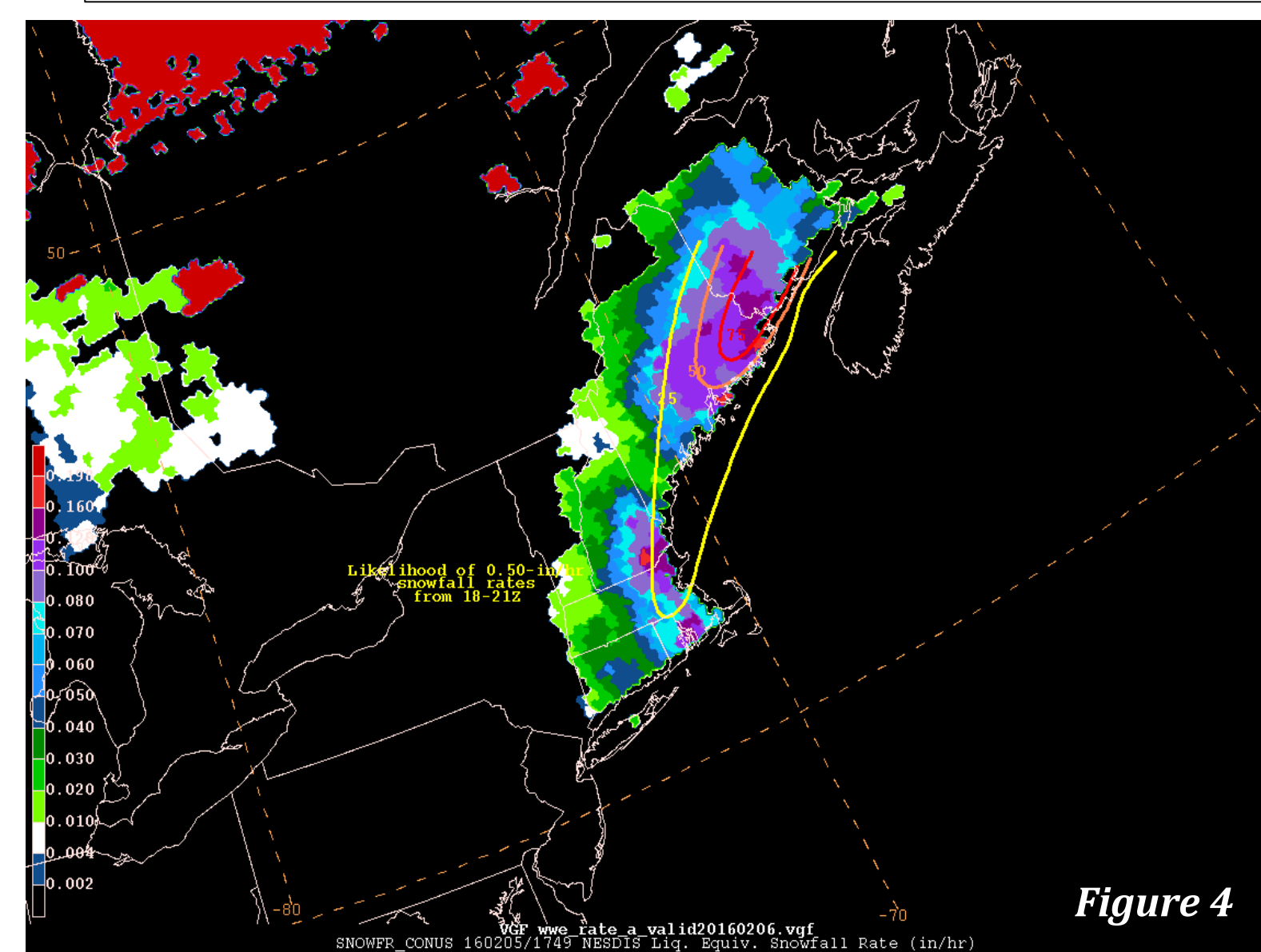
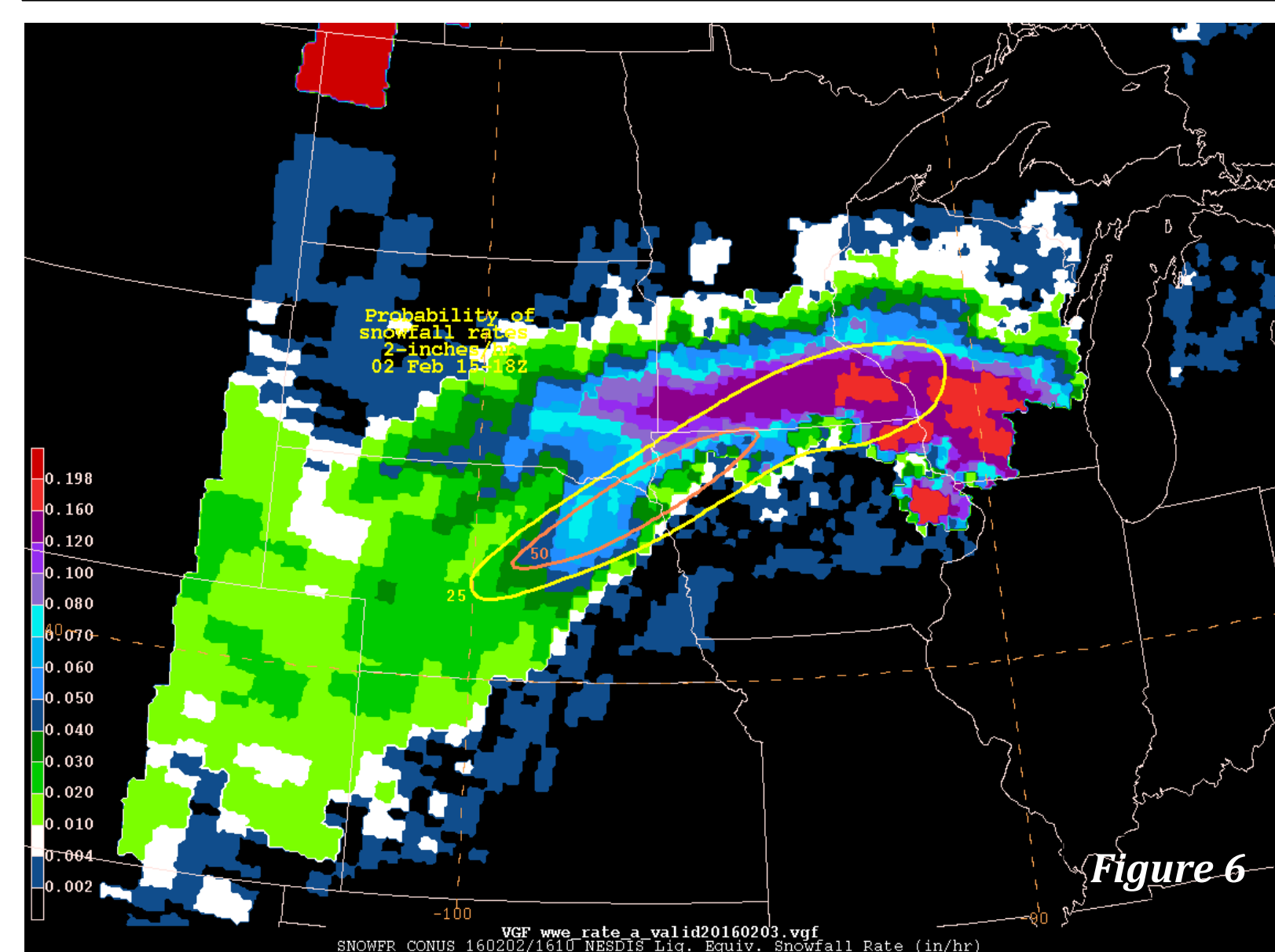


Figure 3: SATELLITE PRECIPITATION ESTIMATES...DATE/TIME 05/20/15 1942Z
 LATEST DATA USED: GOES-13 1930Z GOES-14 1938Z WARREN

SATELLITE ANALYSIS AND TRENDS...WATER VAPOR LOOP SHOWS MID LVL RIDGE AXIS RETREATING EWD WITH ACCELERATING HEIGHT FALLS/UL JET STREAK ACROSS SRN CA/AZ. PIECES OF MID-LVL ENERGY WITHIN RETURNING SUBTROPICAL JET SHOULD PROMOTE CONVECTIVE INITIATION ACROSS SW TX OVER THE BIG BEND REGION. LATEST SFC ANALYSIS SHOWS COLD FRONT SINKING SWD ACROSS NRN SW TX AND CENTRAL TX BECOMING MORE W-E ORIENTED WITH S-N DIRECTED DRY LINE BTWN PEQ AND MRF. EXPERIMENTAL CIRA/NASA SPORT STLT DERIVED BLENDED LAYER PRODUCT SUGGESTS SOMEWHAT SHALLOW (SFC TO 700 MB) GULF MOISTURE PLUME (1.2-1.6" PW VALUES) POOLED ACROSS WRN/CENTRAL TX. THIS SORT OF MOISTURE PROFILE WOULD SEEM TO SUGGEST COLD POOL DEVELOPMENT AND FORWARD PROPAGATING ORGANIZED CONVECTION. HOWEVER BUNKERS TECHNIQUE OFF OF THE 12Z DRT SOUNDING IS SUGGESTING THAT SUPERCCELL CONVECTION COULD BE QUITE SLOW MOVING INITIALLY.

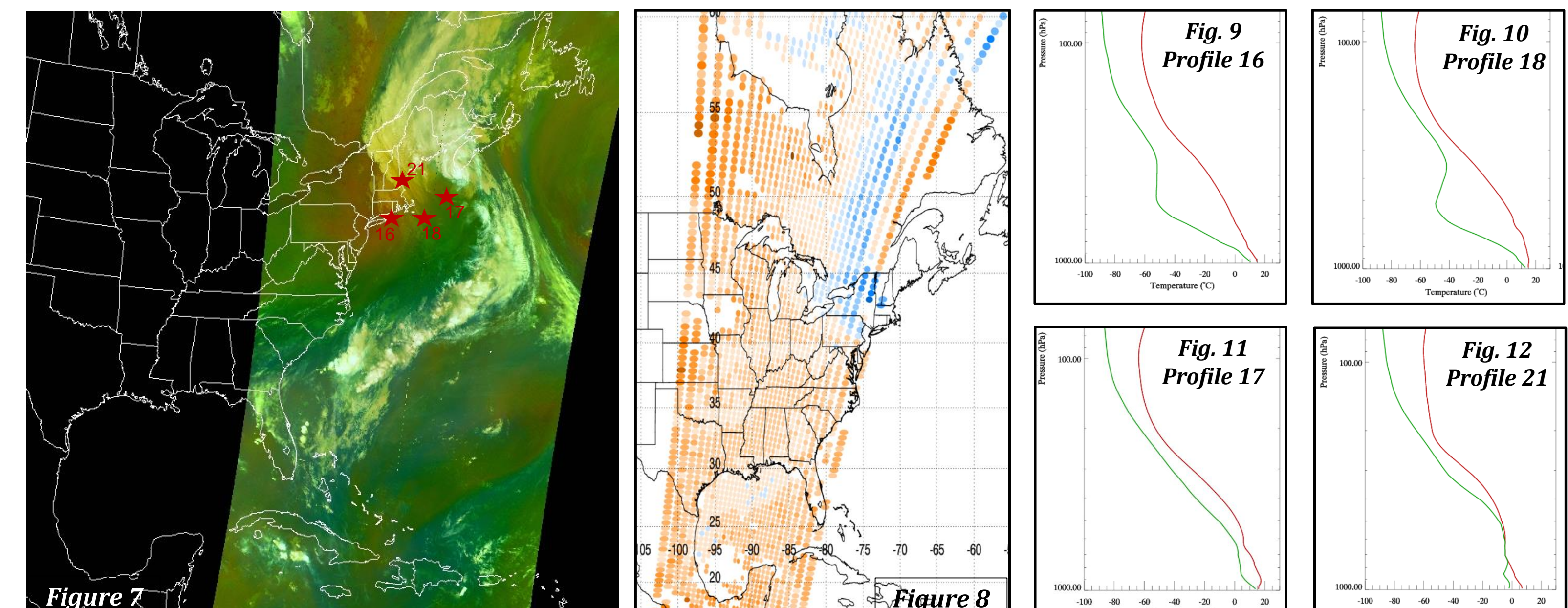
Figures 4, 5, 6: The NESDIS Snowfall Rate product was introduced unofficially during the 2015-2016 winter and made a debut as a verification tool in the 2016 Winter Weather Experiment. The Hydrometeorological Testbed staff and Satellite Liaison put together these comparisons to show the usefulness of the product compared to the probability forecasts for a given snowfall rate (0.5"-2"/hour) to occur during a 24-hour period.

- ❖ Training for the SFR Algorithm continues for WPC Operational Forecasters and Testbed Staff heading toward the 2016-2017 winter
- ❖ The SFR Algorithm will be utilized operationally on the forecast floor at WPC, SAB, and tentatively SPC
- ❖ The 2017 Winter Weather Experiment will utilize the SFR Algorithm to verify probabilistic snowfall rate forecasts when passes align with the forecast window



JPSS Research Projects

Extratropical Transition of Tropical Cyclones and Identifying the Precursors of Explosive Cyclogenesis that leads to Hurricane-Force wind events are two JPSS and GOES-R projects that are ongoing in the MPS Proving Ground. Both projects combine NUCAPS products, Ozone products, Multispectral Imagery, and other ancillary data sets such as scatterometers to help build a better understanding on how integrating these products into a forecaster's routines can better assist in analyzing and forecasting these extreme events.



Figures 7-12: During Hurricane Arthur (2014), the Air Mass RGB product and the SPoRT ozone products were available to National Center forecasters via the Proving Ground to monitor Arthur's extratropical transition. NOAA Unique CrIS/ATMS Processing System (NUCAPS) soundings are available to forecasters in AWIPS-II but soundings are typically used to forecast severe convection. This project focuses on an additional application for NUCAPS soundings and investigates their utility for anticipating stratospheric drying in the pre- and post-extratropical transition environment. In this example: NUCAPS ozone anomaly (Fig. 8) and profiles (Fig. 9) confirm upper-level dry air in the RGB is stratospheric. Profile 18 (Fig. 10) shows mid-level dry air below moist upper-levels in the near storm environment. Profiles 17 (Fig.11) and 21 (Fig. 12) show the dry air has not penetrated the storm yet. At this stage in the ET, the tropical cyclone is moving rapidly NNE ahead of the digging shortwave. Both Profile 16 and 18 capture the slant-wise descent of the stratospheric drying at mid-levels associated with the shortwave, yet the Air Mass RGB shows less drying near 18.

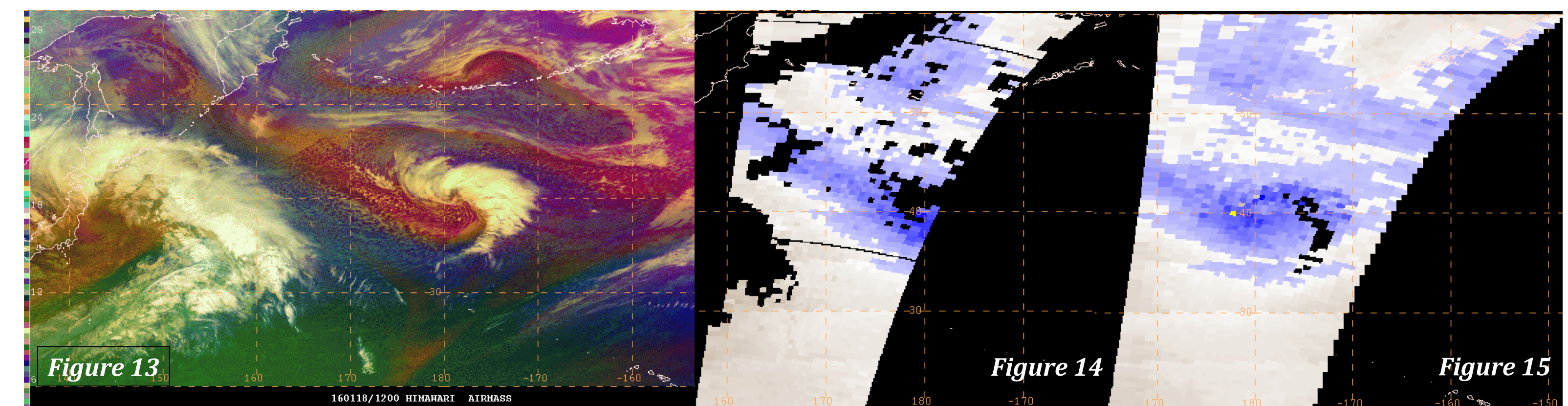


Figure 13-15: The OPC Student Intern (Kelsey Malloy – UMD) is comparing Ozone products, Air Mass RGB imagery, WV imagery, and eventually NUCAPS products to identify the precursors to hurricane-force wind events associated with explosive cyclogenesis in the North Pacific. In this example, the Air Mass imagery from Himawari-8 (Fig. 13) shows a small, potent storm near the dateline with complimentary ozone anomaly imagery from AIRS (Fig. 14) and NUCAPS (Fig. 15) showing anomalies greater than 120% (blue shading).

MPS Proving Ground JPSS Vision for 2017

- The 2017 demonstration/evaluation focus will continue to explore the usage of the CIRA Layered Precipitable Water product in identifying/monitoring tropical waves in TAFB to assisting in the forecasting for heavy rain events at WPC or front analysis at OPC.
- NUCAPS will continue to be evaluating for its utility in identifying the precursors to extratropical transition of tropical cyclones or the evolution of explosive cyclogenesis in the North Atlantic and North Pacific.
- The NESDIS Snowfall Rate product will be included in the Hydrometeorological Testbed's 2017 Winter Weather Experiment and will also be evaluated at WPC.
- New products will be introduced when possible, meanwhile products that have been in operations will remain until further notice, allowing for additional feedback and suggestions.
- Ongoing research projects will continue to focus on maritime convection, hurricane-force wind events (land and sea), tropical to extratropical transitions, and heavy rainfall.