The GOES-R Algorithm Working Group (AWG): A Status Report

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Satellite Science Week Meeting

March 10, 2014

Contributions from AWG Team Leads and members of the GOES-R AWG teams

Outline

- **AWG Activities**
- **Notable Accomplishments**
- **AWG Priorities Moving Forward**

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- **Notable Accomplishments**
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AWG Activities

- Development of Level-2 product algorithms
- Proxy data generation (ABI, GLM)
- Support to Harris/AER's Algorithm Implementation Activities
- Development of Level-2 product validation tools
- Continued validation and characterization of product performance

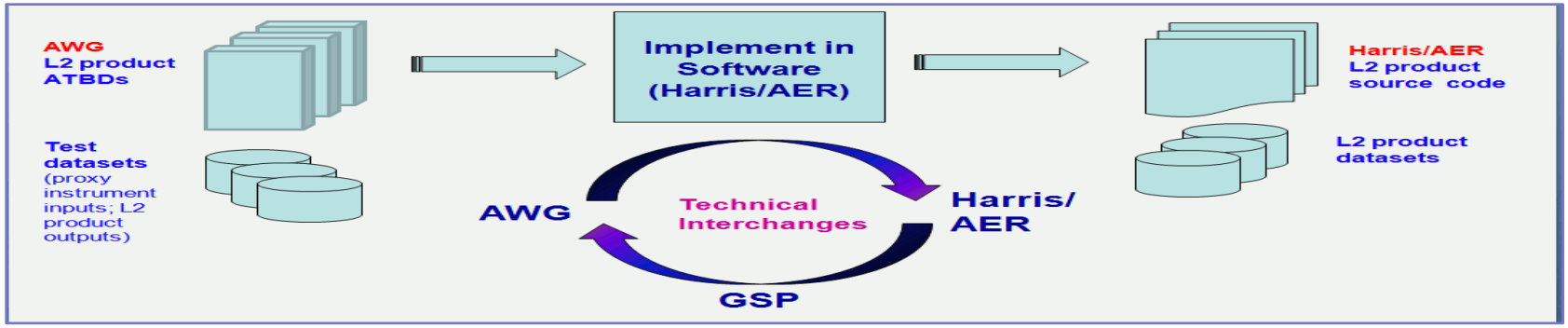
Outline

- AWG Scope of Activities
- **Notable Accomplishments**
- AWG Priorities Moving Forward

Accomplishment 1

Successful completion of AWG support to Harris/AER for the implementation of the baseline Level-2 product algorithms into the GOES-R ground segment

- Big effort that involved numerous technical interchanges between AWG teams and AER to turn AWG provided Level-2 product ATBD's into Level-2 product software
- The number of AWG responses to AER questions **totaled 1777 !!!**
- AIT regenerated/redelivered Algorithm Package (AP) test datasets, as needed
- **Outstanding results were achieved in reproducing the science output for ALL Level-2 product algorithms!!!**

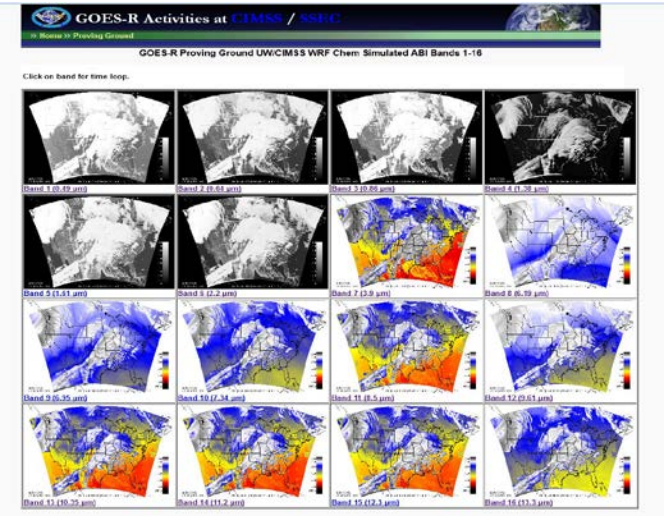


Significance: Establishment of a validated baseline for each of the Level-2 product algorithms within the GOES-R ground segment - Science is correctly implemented!

Accomplishment 2

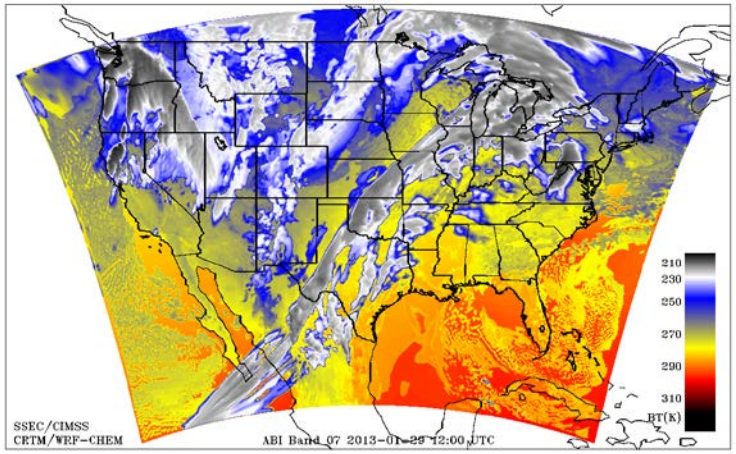
AWG proxy team has established a robust capability for producing high fidelity simulated ABI imagery

- On demand and near real-time capabilities
- Numerous improvements to simulations (visible spectrum, aerosols, ozone, etc)
- Some or all bands, various coverage (FD, CONUS, Meso), spatial resolutions, and formats (GOES-R Fixed Grid Format, NetCDF)



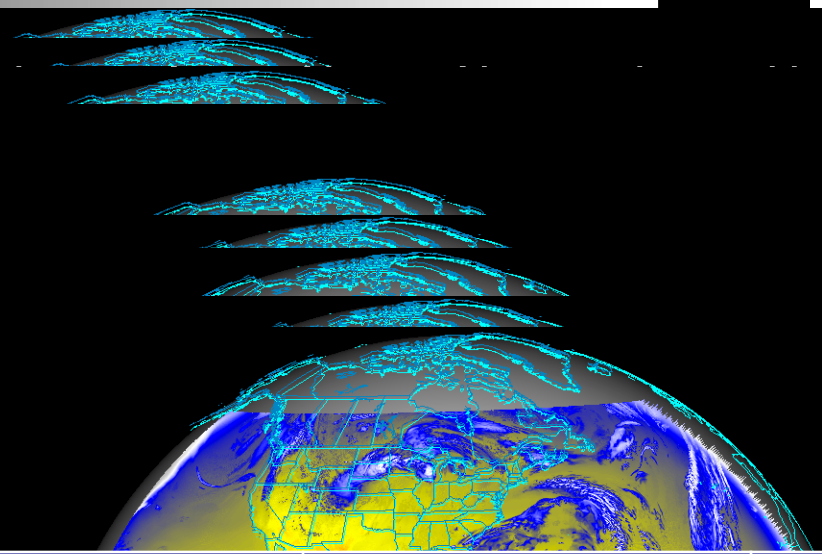
Significance

- Used by AWG product teams and in a number of GOES-R Proving Ground demonstrations
- Used to support ABI waiver analyses (11 done to date)
- To be used in planned GOES-R Ground System **end-to-end** system verification testing activities by the *GOES-R Data Operations Support Team (DOST)*



http://cimss.ssec.wisc.edu/goes_r/proving-ground/wrf_chem_abi/wrf_chem_abi.html

ABI Image Triplet Test Data @ 89.5W Delivered to the GOES-R Program



ABI Image Triplet	75W	89.5W	137W
Model	WRF	WRF	WRF
Number of times	7	7	TBD
Time range	20:00-20:30UTC	20:00-20:30UTC	TBD
Day	04-Jun-2005	04-Jun-2005	TBD
Sectors	FD, CONUS, MESO	FD, CONUS, MESO	TBD
Types	GRB, VAL	GRB, VAL	TBD
Navigation	FGF	FGF	FGF

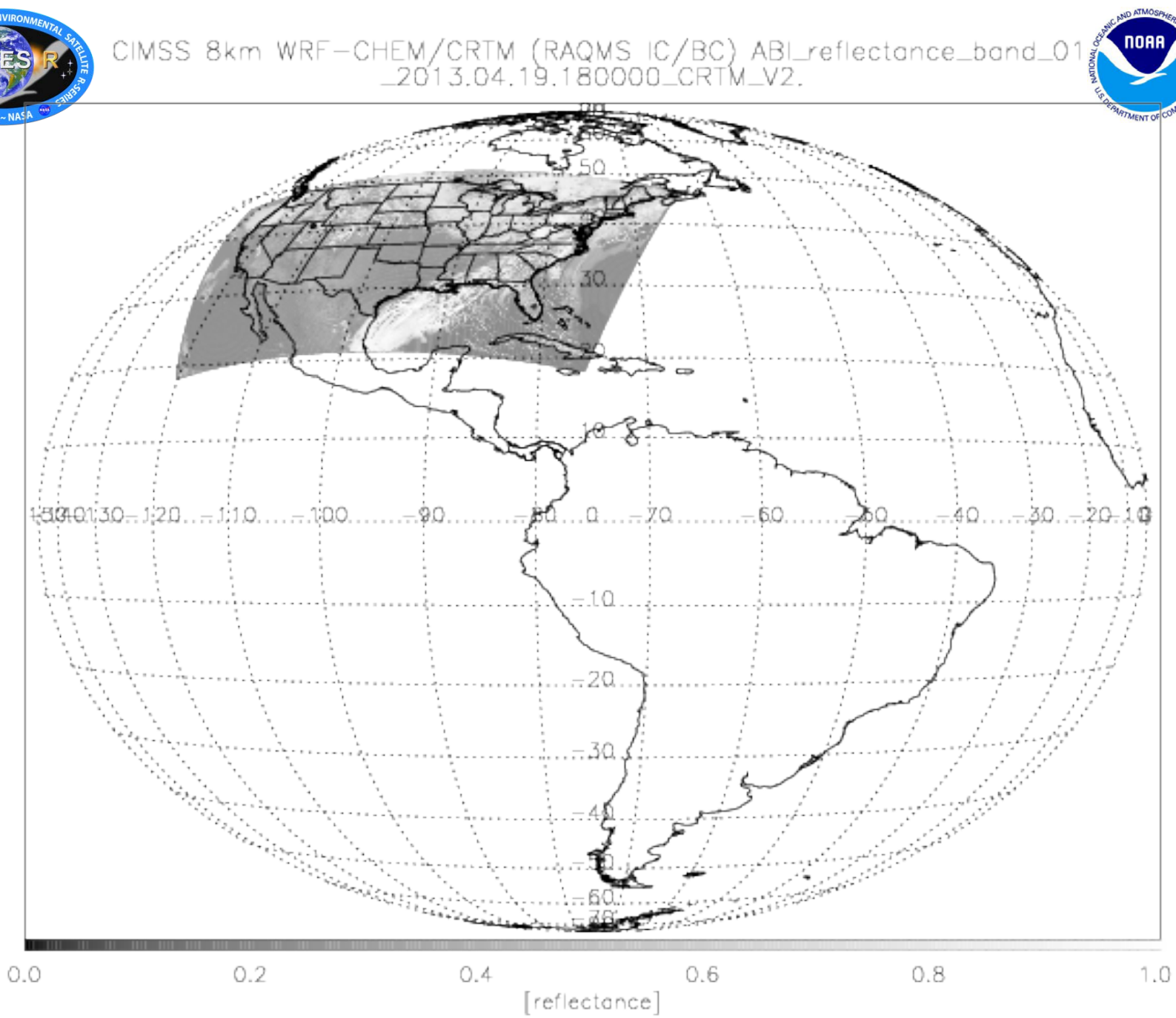
Simulated ABI Radiance Test Datasets for the DOST

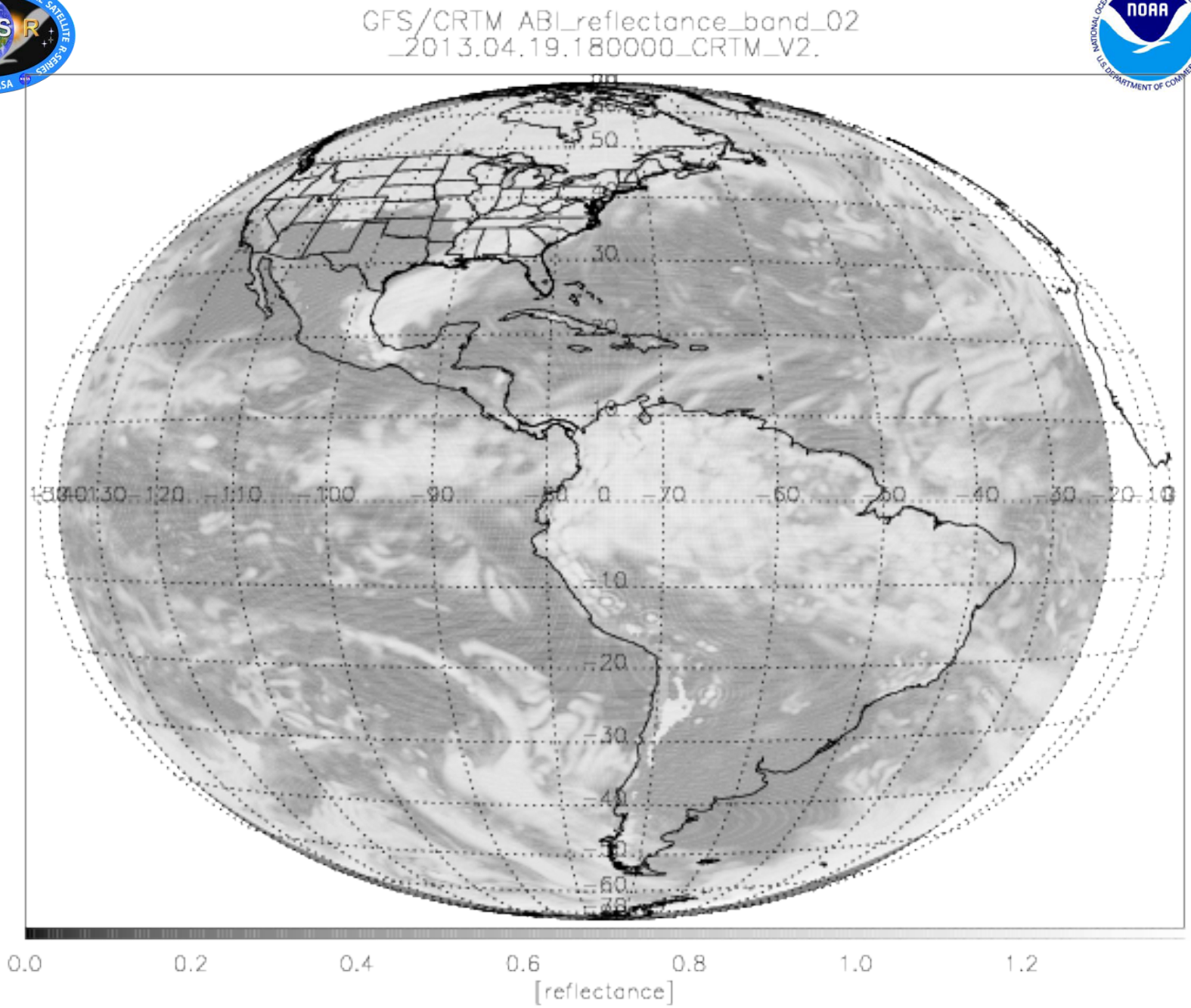
- Provide the ground system with “plausible data” (ie., realistic) that will enable system verification and system validation by injecting these data into the ground system

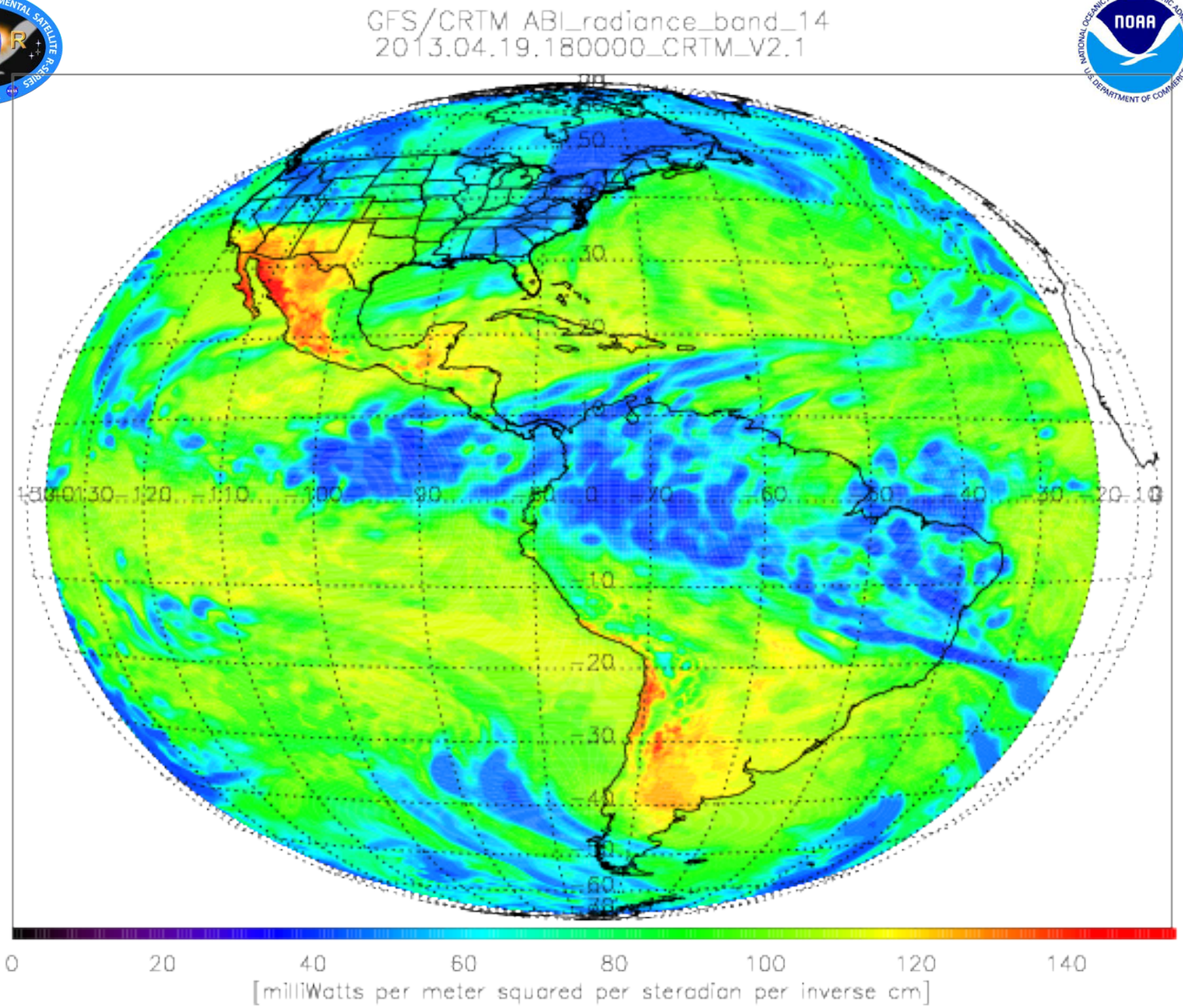
- Initial Capability/Demonstration by AWG proxy team at CIMSS
  - WRF-Chem model met/aerosol forecasts (8km) over CONUS using the Community Radiative Transfer Model (CRTM) to simulated all 16 ABI bands.
  - NCEP/GFS model 3 hr forecast (T574L64, an effective grid point spacing of ~27 km) outputs used, together with CRTM (v2.1), to produce ABI simulated radiances (all bands) at 3hr intervals
  - Generate simulated ABI radiances at 1hr intervals via interpolation of 3hr GFS forecast output and running CRTM every hour

- Following slides shows an example of one of the first (ie., single time period) test datasets delivered to the GOES-R Program
  - Simulated data (all bands) are remapped from WRF-chem & GFS grids to the GOES-R ABI fixed grid at their expected resolutions and converted to GRB

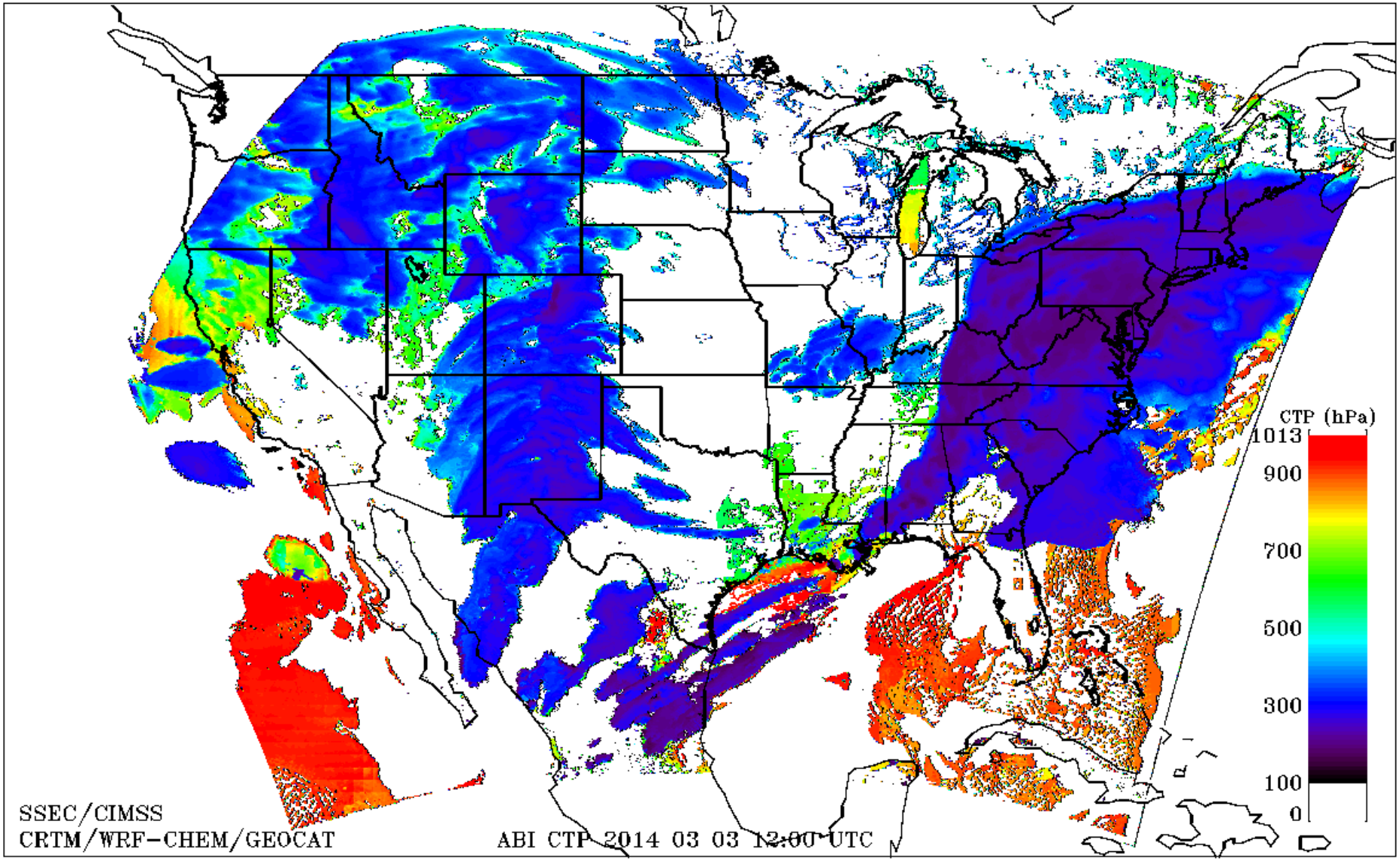
- Test datasets (Aug 20-22, 2012) delivered to GOES-R Ground Segment Project


CIMSS 8km WRF-CHEM/CRTM (RAQMS IC/BC) ABI_reflectance_band_01
_2013.04.19.180000_CRTM_V2.
0.0
0.2
0.4
0.6
0.8
1.0
[reflectance]

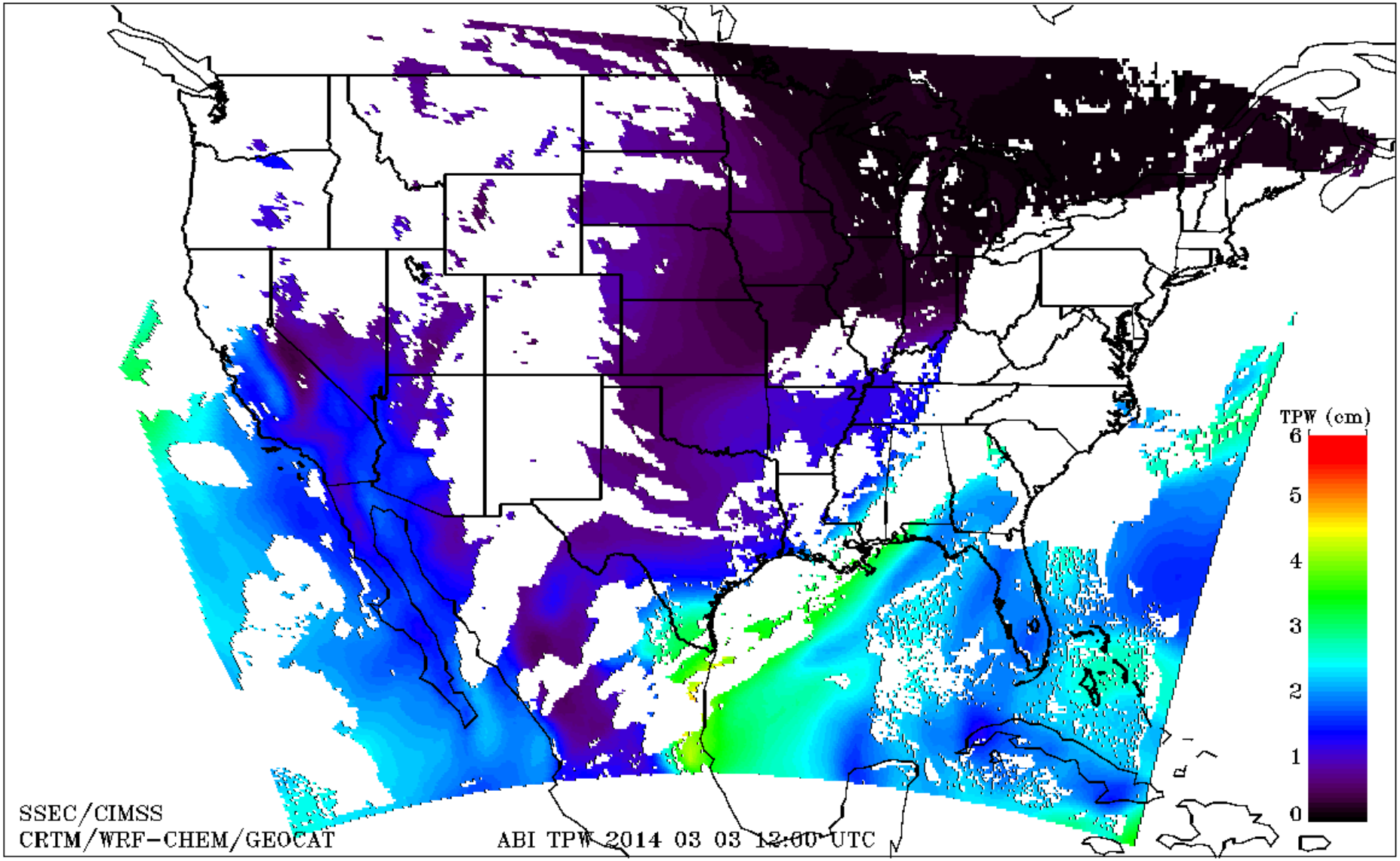

GFS/CRTM ABI_reflectance_band_02
_2013.04.19.180000_CRTM_V2.
0.0
0.2
0.4
0.6
0.8
1.0
1.2
[reflectance]


GFS/CRTM ABI_radiance_band_14
2013.04.19.180000_CRTM_V2.1
0
20
40
60
80
100
120
140
[milliWatts per meter squared per steradian per inverse cm]

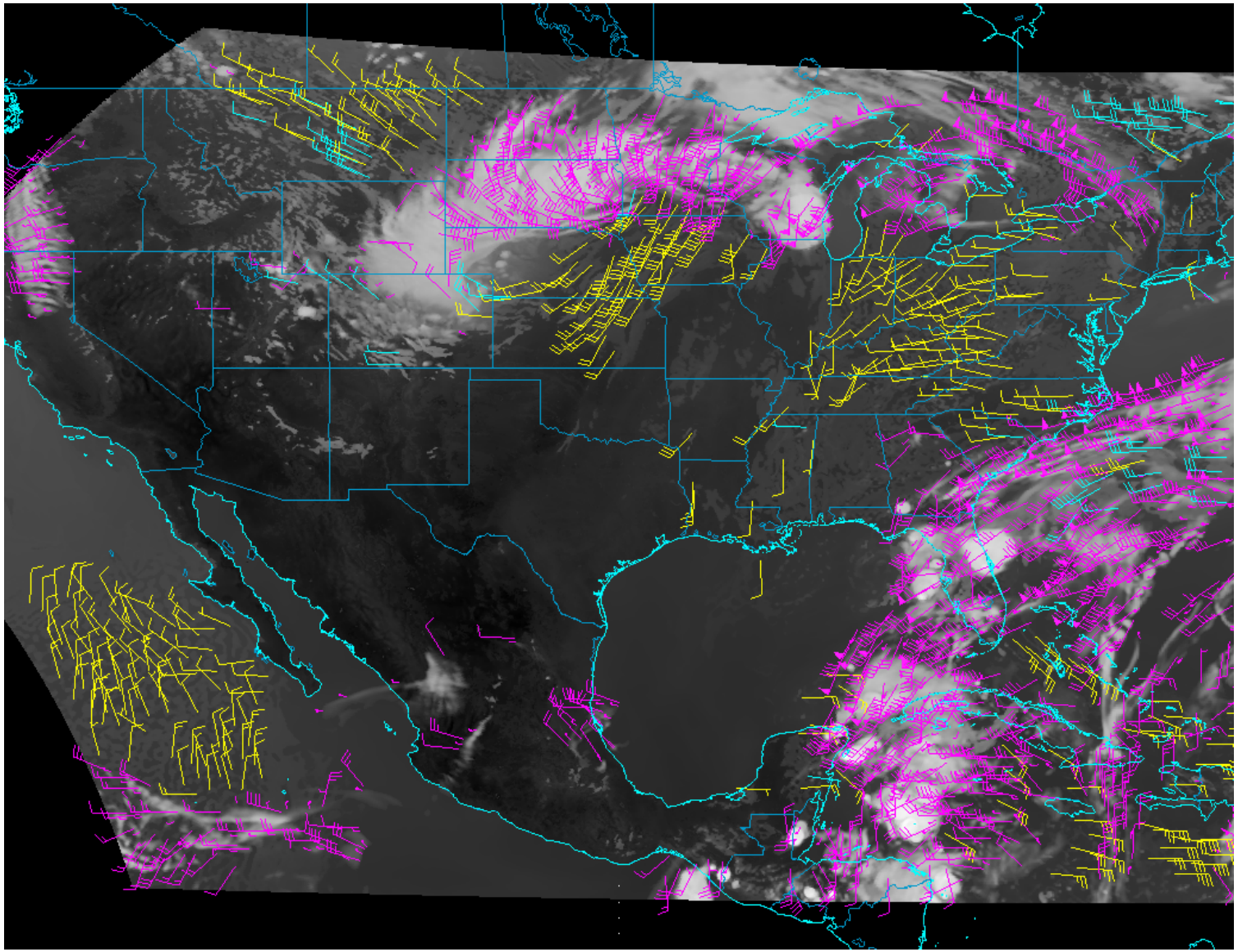
Cloud-top Pressure Derived from WRF-CHEM Simulated ABI Imagery



Total Precipitable Water (TPW) Derived from WRF-CHEM Simulated ABI Imagery



AMVs Derived from WRF-CHEM Simulated ABI Imagery

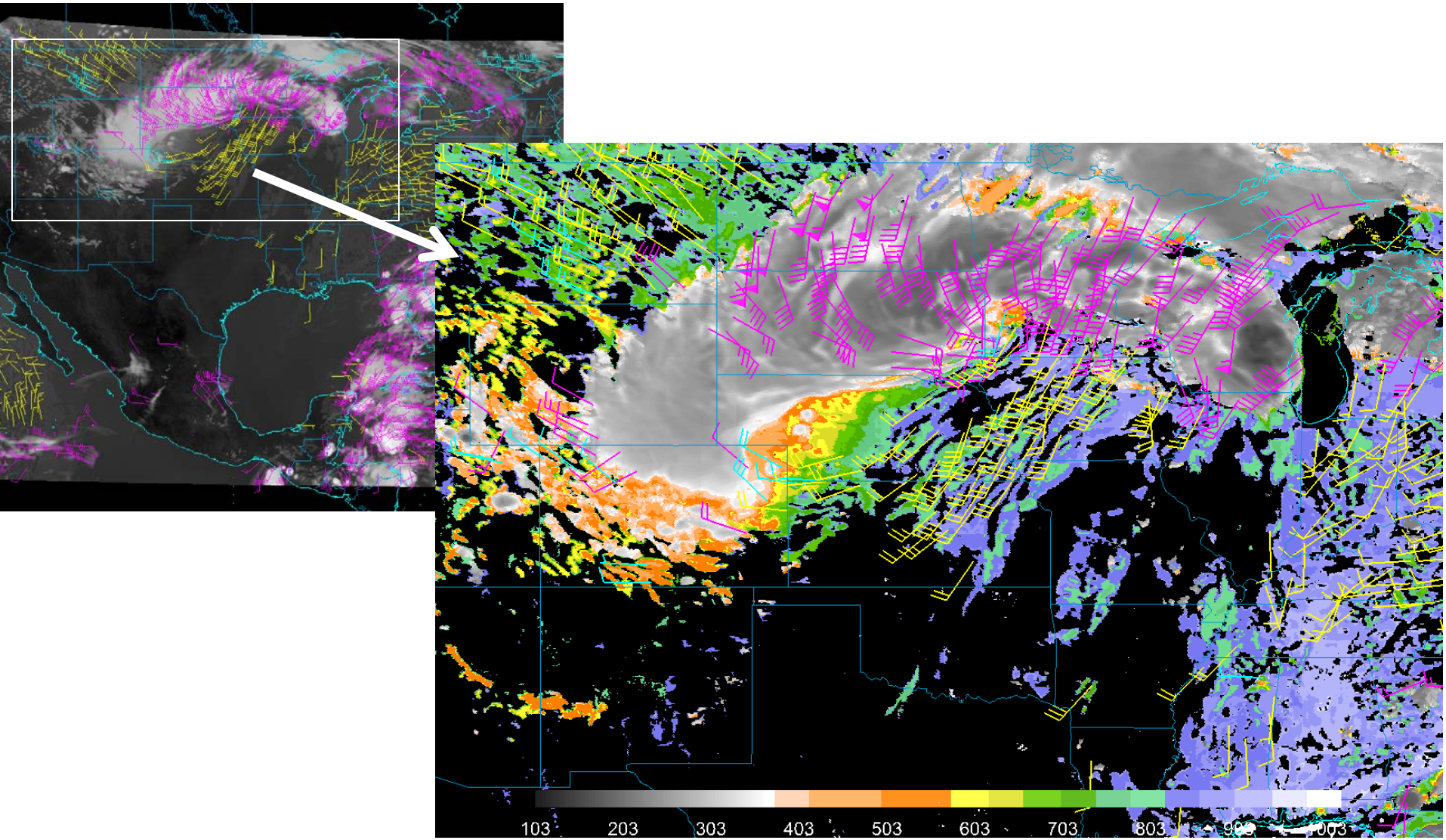


High-Level 100-400 mb

Mid-Level 400-700 mb

Low-Level >700 mb

AMVs Derived from Simulated ABI Imagery

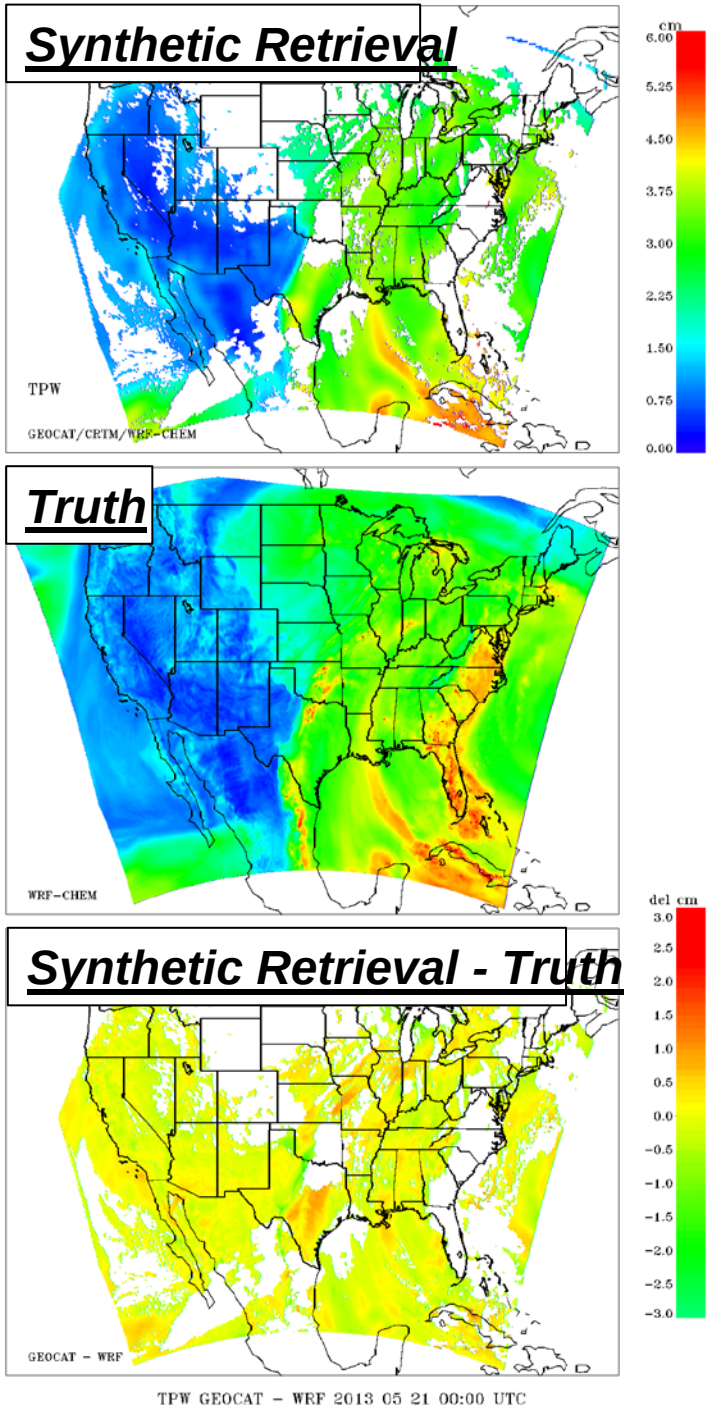


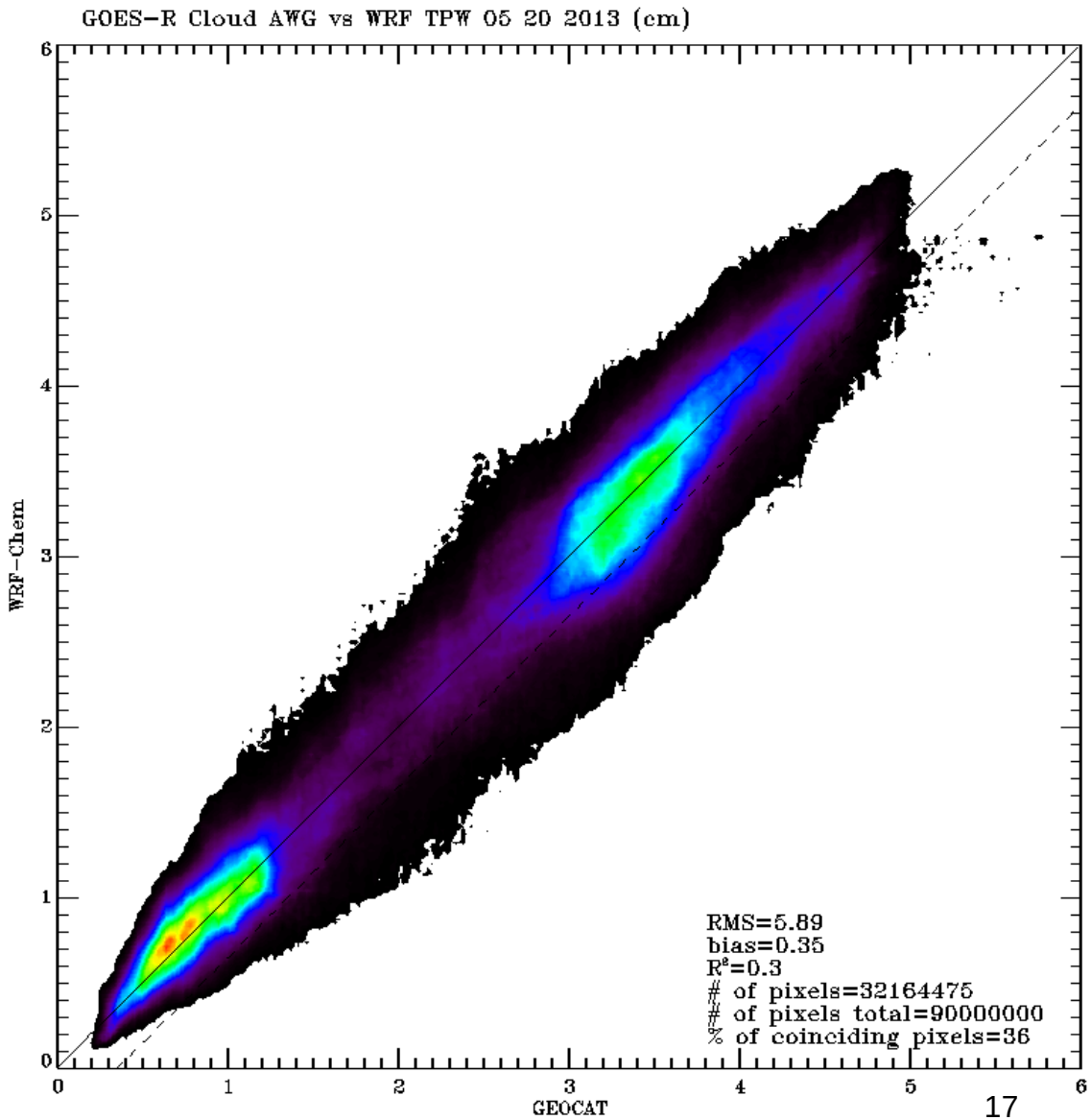
High-Level 100-400 mb

Mid-Level 400-700 mb

Low-Level >700 mb

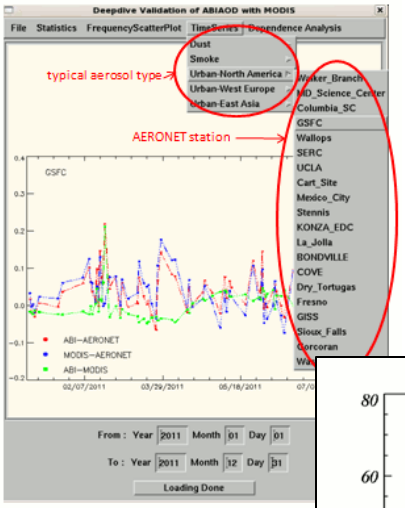
Total Precip Water (TPW) Validation

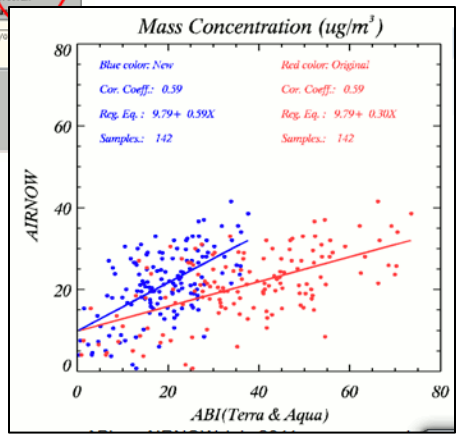




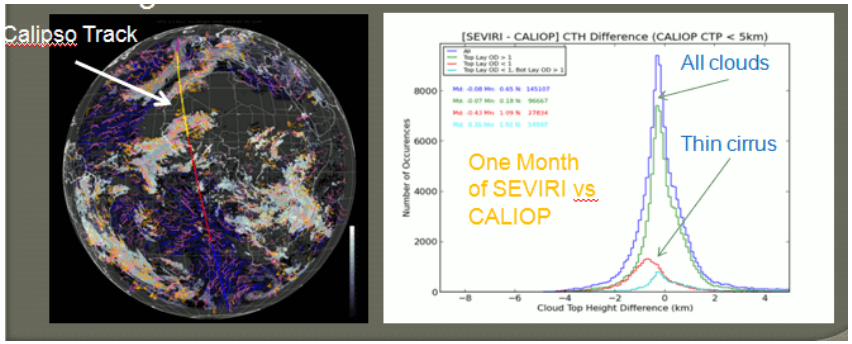
Accomplishment 3

AWG teams have developed a cadre of product validation tools as part of their ongoing product validation activities



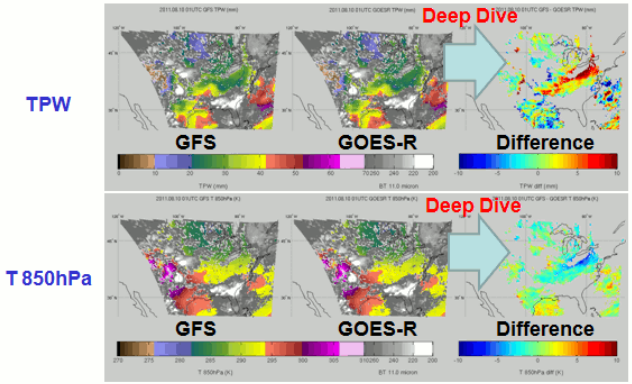


Aerosols



Clouds

Imagery of 2D variables in Validation Tool



TPW

Temp

Significance: The tools will enable the routine monitoring of L2 product performance and for "Deep-dive" assessments and analysis of products to resolve any issues/anomalies that may arise

Accomplishment 3 *(cont'd)*

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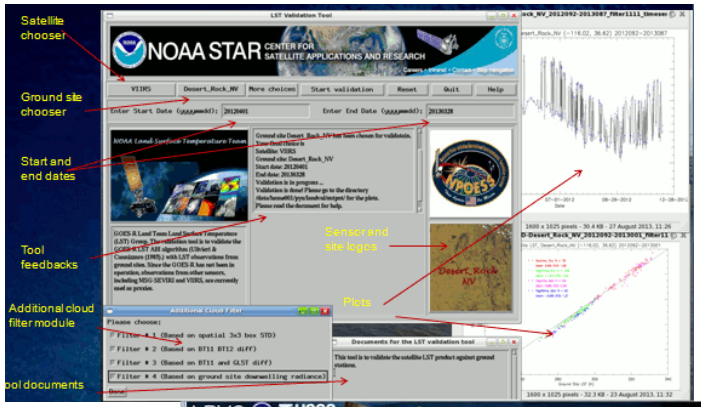
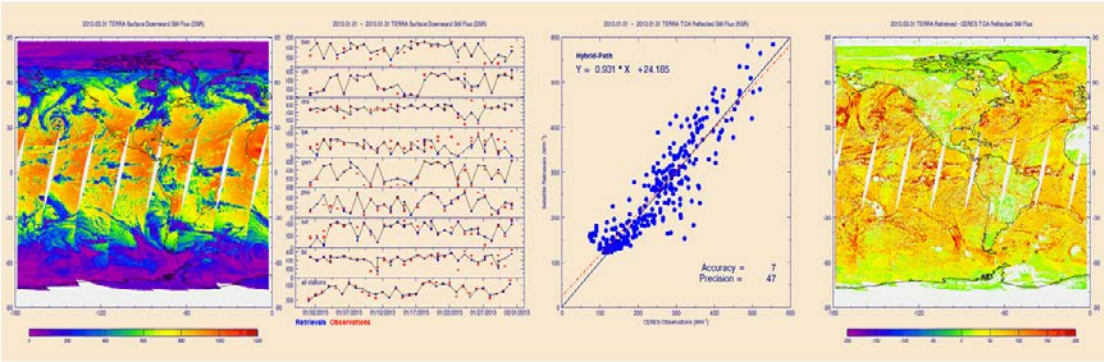
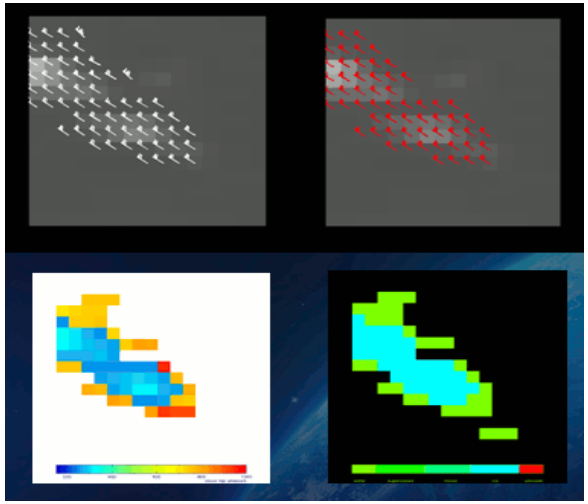




Radiation

LST



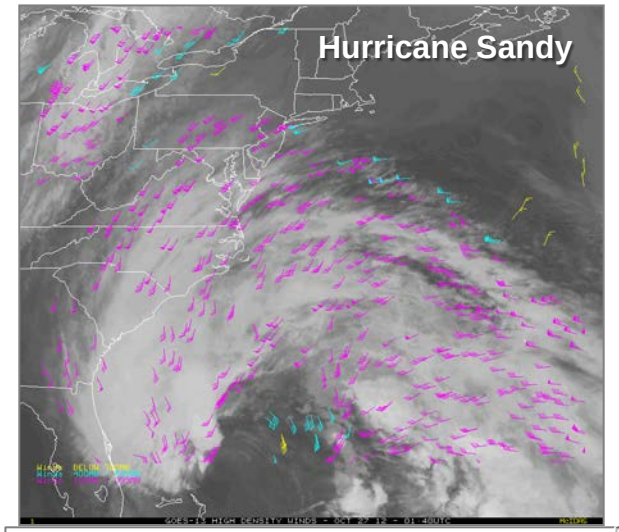
Winds

Significance: The tools will enable the routine monitoring of L2 product performance and for "Deep-dive" assessments and analysis of products to resolve any issues/anomalies that may arise

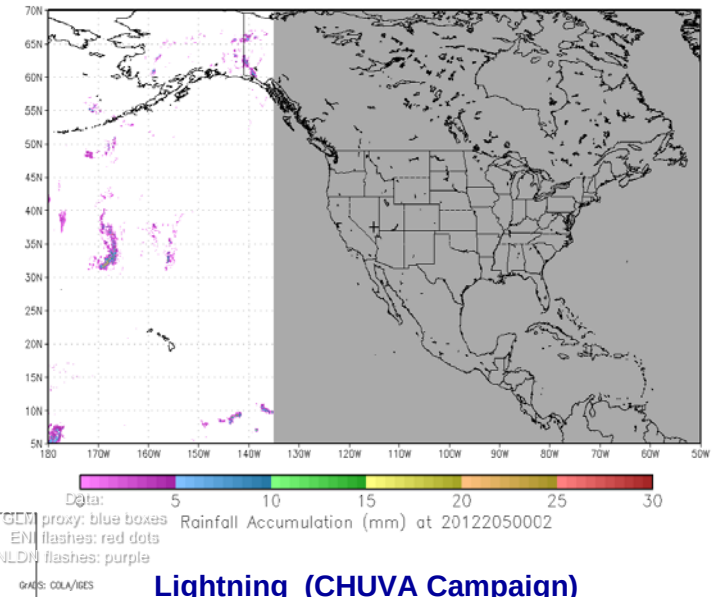
Accomplishment 4

AWG teams continue their demonstration & validation of ABI proxy products

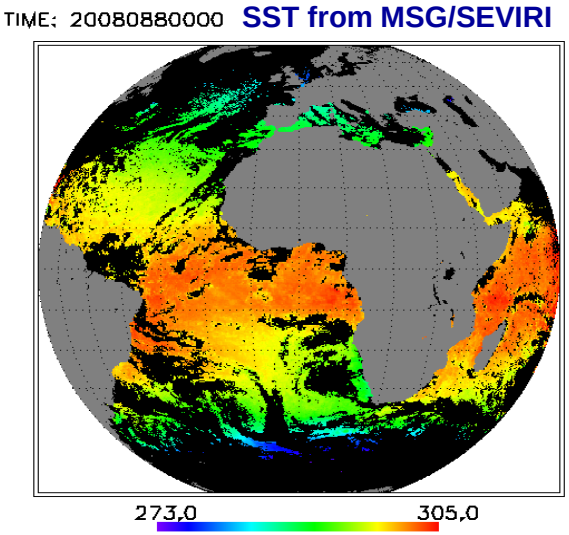
Derived Motion Winds from GOES-13



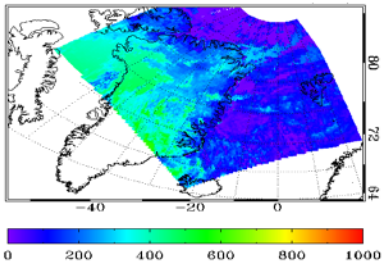
Rainfall Rate from GOES-13 and GOES-15



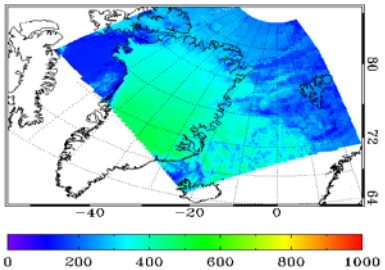
SST from MSG/SEVIRI



Terra MODIS 1500 UTC on 16 May 2006

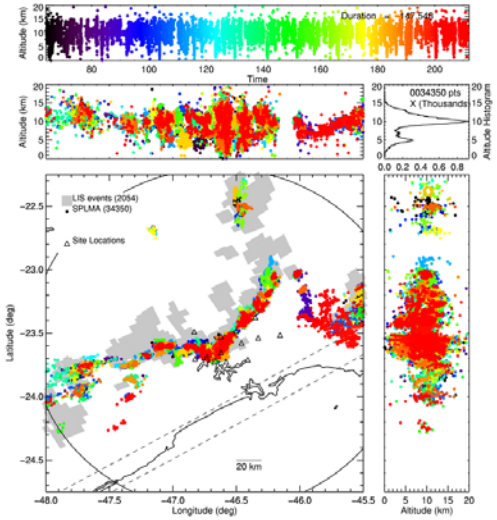


Downward Shortwave Radiation (SFC)

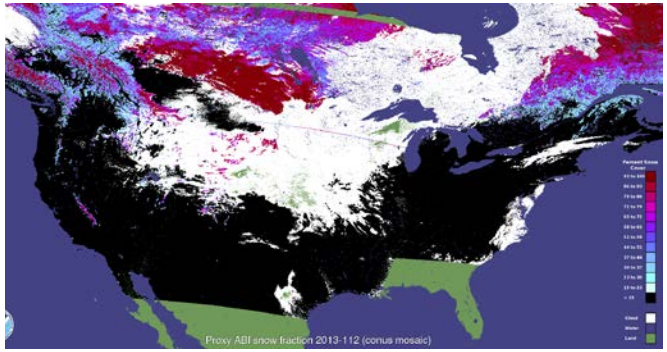


Reflected Shortwave Radiation (TOA)

Lightning (CHUVA Campaign)



Fractional Snow Cover from MODIS



Outline

- AWG Scope of Activities
- Notable Accomplishments
- **AWG Priorities Moving Forward**

AWG Priorities Moving Forward

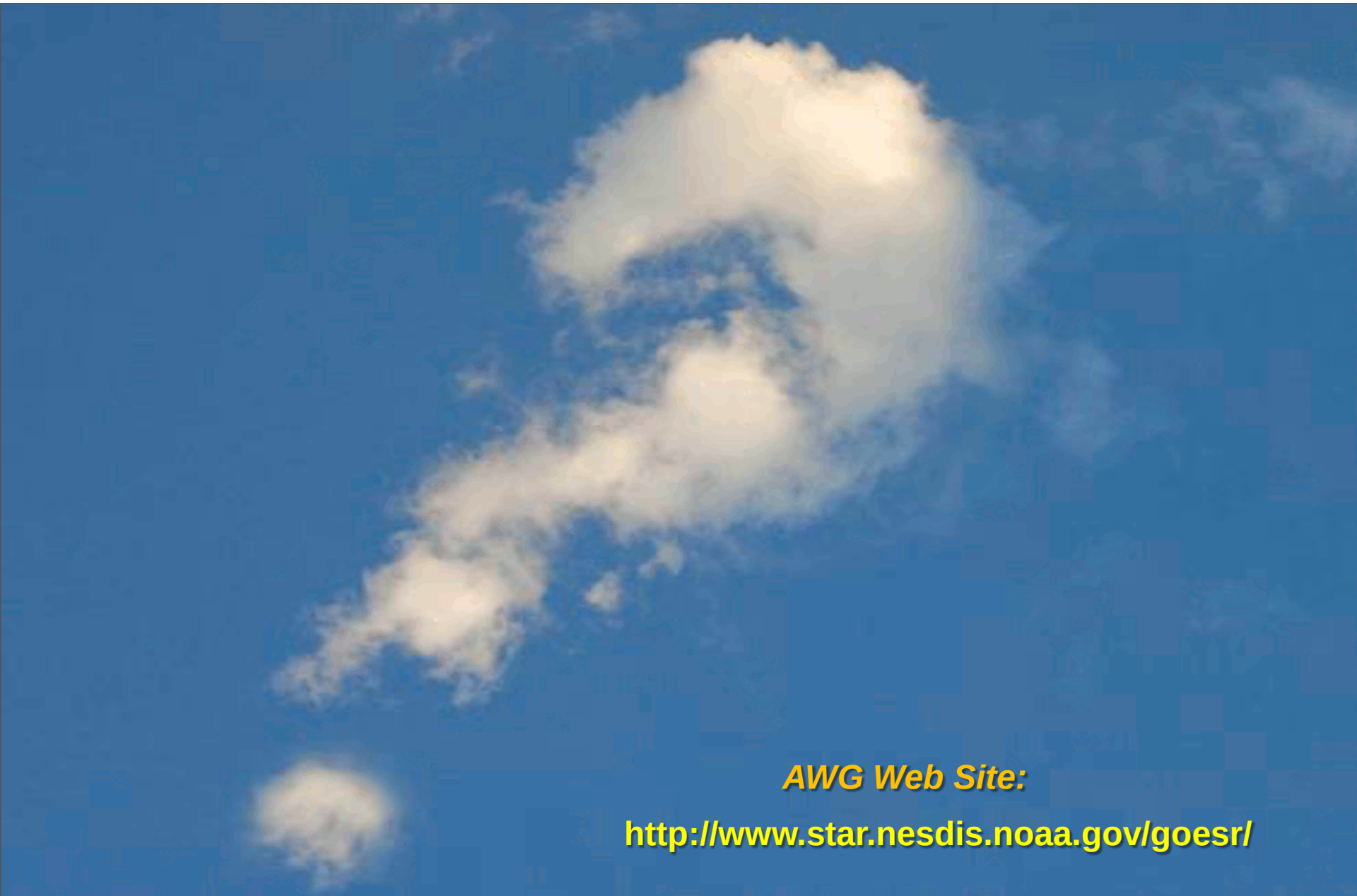
- **Support the GOES-R Ground Segment Project (GSP) with the verification of Harris product output from its various builds, intermediate releases, and final release of the L2 product generation software**

- **Generation of simulated datasets that will support**
  - Proving Ground (PG) demonstrations
  - System Verification to be done by the GOES-R System Integration and Test (GSIT) team
  - System Validation to be done by the Data Operations Support Team (DOST)
  - Harris activities

- **Generation and validation of Level-2 product datasets using available ABI proxy/simulated data**

- **Preparations for Post-Launch Readiness**
  - Learning the Harris system and the L2 product algorithm software
  - Can we integrate Harris L2 product software into the AWG framework?
  - Complete development of L2 product validation tools needed for PLT and long-term monitoring
  - Continue efforts for the Generation/Demonstration/Validation of L2 products from available proxy/simulated data
  - Increase user engagement and readiness activities
  - Support to and participation in Product Operations and Science Support Team (POSST), PWG, and DOST planning activities
  - Ability to develop, test, and transition algorithm updates

Questions



AWG Web Site:

http://www.star.nesdis.noaa.gov/goesr/