# GOES-R Program Status and Update

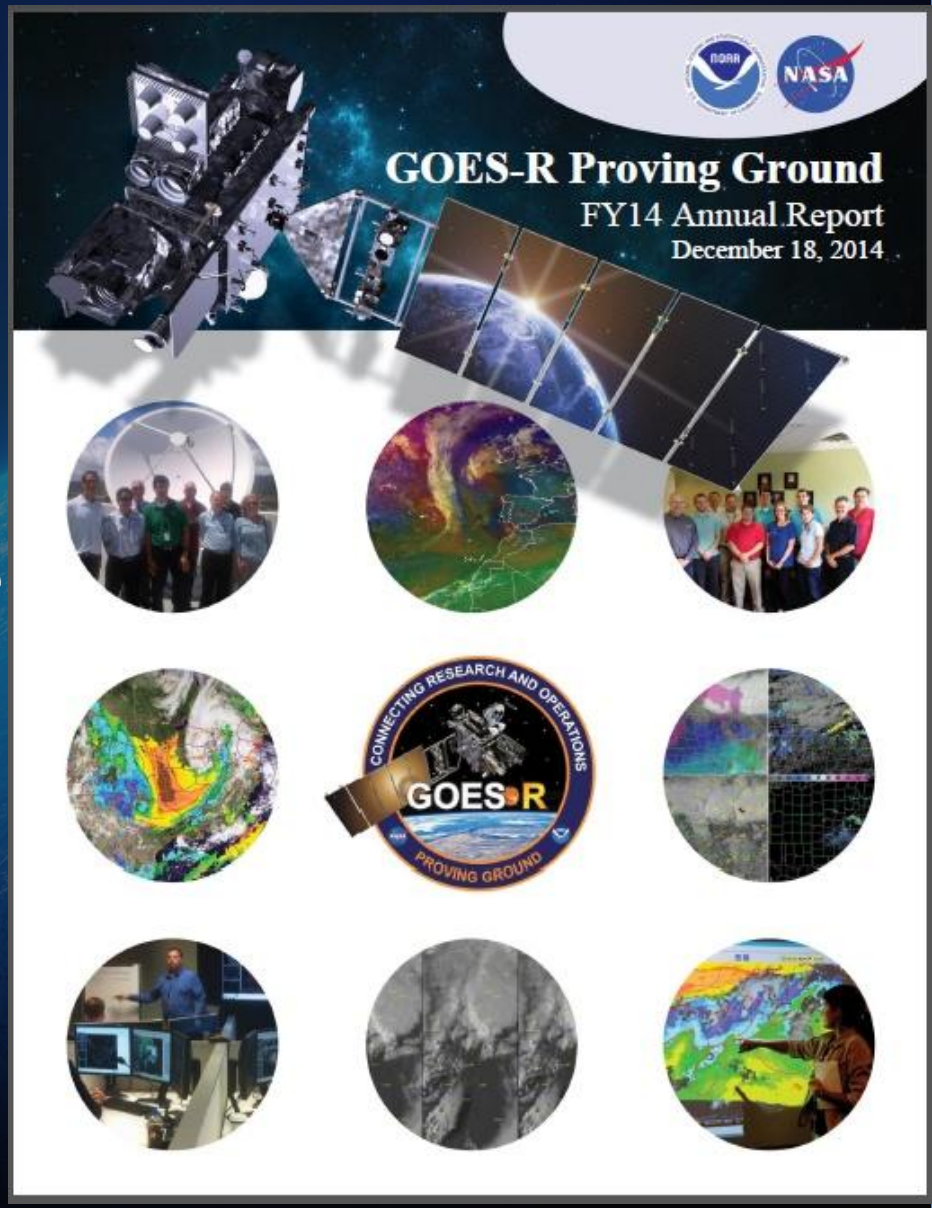
**Steven J. Goodman**
GOES-R Program Chief Scientist
NOAA/NESDIS USA

**NOAA-EUMETSAT Joint Lightning Science Team Meeting**
**Rome, Italy**
**May 27-29, 2015**


GOES-R
launches in
March
2016!

# Outline

- Program Status
- AWG Accomplishments
- Science Program
- NOAA Testbeds & Satellite Proving Ground
- 2015 Super Rapid Scan Experiment
- Summary



# Weather Impacts on Society

Since 1980 the US has experienced 148 weather-related disasters costing at least $1 billion in standardized losses (4.2 disasters per year)

**During 2011-2014 there were 41 $1 billion disasters – more than half were caused by tornadoes & severe thunderstorms**

Hurricanes

Tornadoes

Floods

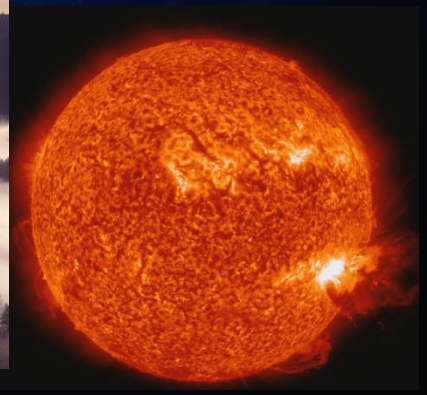
Blizzards

Lightning

Forest Fires

Volcanic Ash

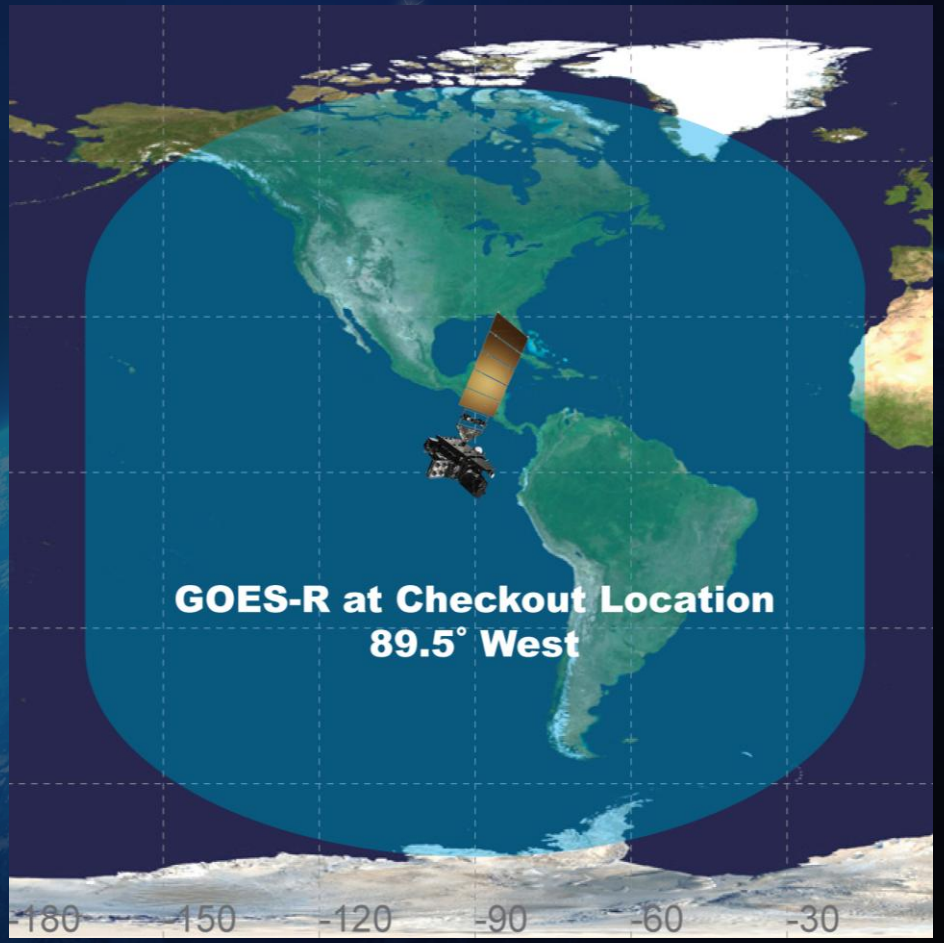
Fog and Low Cloud



Solar storms

# GOES-R Launch and Checkout

- GOES-R launches in March 2016
- Launch and orbit raising: 12 days
- Level 1b products will be validated during Post Launch Test (six months) and will be available through GOES-R Rebroadcast (GRB) service as products are certified
- Level 2+ product certification begins after L1b products and will be distributed on a product-by-product basis as they mature
- GOES-16 extended validation: Sept 2016 – March 2017
- GOES-16 operational: March 2017 at TBD orbit location



# Assembled GOES-R Spacecraft

# Earth-Pointing Instruments

## Advanced Baseline Imager

- Primary instrument in GOES-R series
- 16 channel imager
- Measures radiances in the visible and near-infrared wavelengths
- Improves every product from current GOES Imager and will offer new products for severe weather forecasting, fire and smoke monitoring, volcanic ash advisories, and more
- Improves upon current capabilities in spectral information (3X), spatial coverage (4X), and temporal resolution (5X)

***ABI Integration***

## Geostationary Lightning Mapper

- Detects total lightning activity across the Western Hemisphere
- Provides coverage over oceans and land
- Improved forecaster situational awareness and confidence resulting in more accurate severe storm warnings (improved lead time, reduced false alarms)
- Data latency only 20 sec

***GLM Integration***

# Space Weather Instruments

## Space Environment In Situ Suite (SEISS)

- Array of energetic particle sensors that will monitor the proton, electron and alpha particle fluxes
- Assess radiation hazard to astronauts and satellites
- Warn of high flux events, mitigating damage to radio communications and navigation systems

## Magnetometer

- Measures the magnitude and direction of the Earth's ambient magnetic field
- Provides map of the space environment that controls charged particle dynamics in the outer region of the magnetosphere
- Detection of magnetopause crossings, sudden storm commencements, and substorms

## Extreme Ultraviolet and X-ray Irradiance Sensor (EXIS)


- The X-Ray Sensor (XRS) monitors solar flares that can disrupt communications and degrade navigational accuracy, affecting satellites, astronauts, high latitude airline passengers, and power grid performance.
- Extreme Ultraviolet Sensor (EUVS) monitors solar variations that directly affect satellite drag/tracking and ionospheric changes, which impact communications and navigation operations.

## Solar Ultra-Violet Imager (SUVI)

- Locates coronal holes, flares and coronal mass ejection source regions
- Continuously images the sun in 6 extreme ultraviolet wavelengths to characterize active region complexity
- Will provide an early warning of possible impacts to the Earth environment and enable better forecasting of potentially disruptive events

# AWG Notable Accomplishments

- AWG teams continue execution of GOES-R algorithms on SEVIRI, MODIS, GOES, VIIRS, simulated ABI imagery in support of Level-2 algorithm testing and validation activities.
  - Baseline Level-2 Product Algorithm Enhancements *(beyond 100% algorithm delivery)*
    - Outcome of continuing product validation activities
    - Demonstrate and document algorithm enhancements
    - Carefully manage and document algorithm deltas *(in anticipation of post-launch implementation)*.
    - AIT coordinates, documents, and places all software updates under CM.
  - AWG teams will extend this effort to Himawari-8/AHI imagery
- Development of L2 Product Validation Tools

Refer to Science Week presentation "GOES-R Algorithm Status Update" Jaime Daniels http://www.goes-r.gov/users/2015-NOAA-Sat-Science-Week.html

# GOES-R Science Program

http://www.goes-r.gov/users/risk-reduce/index.html

GOES-R
Geostationary Operational Environmental Satellite R-Series

A collaborative mission between NOAA and NASA

Enter Search Term(s):
Search

Home | Mission | User Information | Education & Outreach | Multimedia | Resources | Organization

User Information
Overview
Conferences & Events
User Systems
– GOES-R Rebroadcast
– HRIT / EMWIN
– Receiver Links
Proving Ground
– Cooperative Institutes
– Demonstrations
– Partners
Risk Reduction
Training

CONNECT WITH US

## GOES-R Risk Reduction - Fiscal Year 2014 New Starts

>> 2015 New Starts

***Towards providing forecasters with better identification and analysis of severe pyroConvection events using GOES-R ABI and GLM Data***
Principal Investigators: Bryan Baum (CIMSS), Scott Bachmeier (CIMSS)
Proposal Abstract | Proposal Summary

***Toward an operational use of stroke level lightning data in severe weather forecasting***
Principal Investigators: Phillip Bitzer and Lawrence Carey (Univ. of Alabama-Huntsville)
Proposal Abstract | Proposal Summary

***Satellite Product Analysis and Distribution Enterprise System (SPADES)***
Principal Investigator: William Denig (NESDIS-NGDC)
Proposal Abstract | Proposal Summary

***Using total lightning data from GLM/GOES-R to improve real-time tropical cyclone genesis and intensity forecasts***
Principal Investigators: Alexander Fierro (CIMMS) and Mark DeMaria (NWS-NHC)
Proposal Abstract | Proposal Summary

***Development of GOES-R ABI Hail Validation and Assessment Products***
Principal Investigators: Kevin Gallo (NESDIS-STAR), Phil Schumacher (NWS-Sioux Falls WFO), Josh Boustead (NWS –Omaha WFO)

### Risk Reduction Vision

Capable, informed users

Flexible, inventive providers

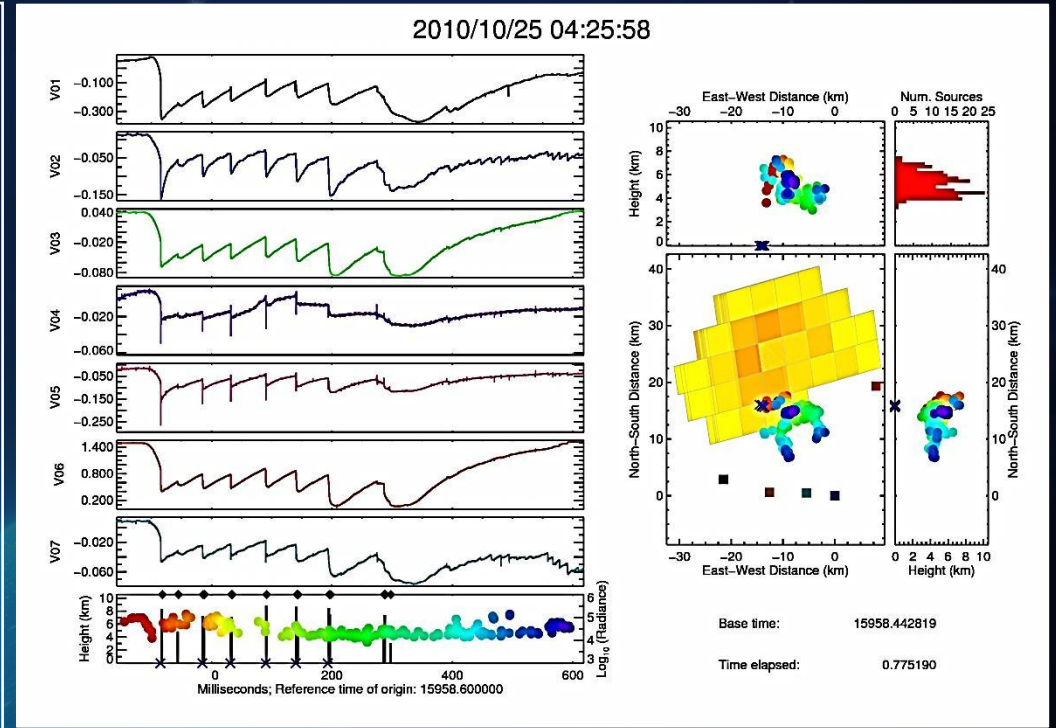
Knowledge brokers that recognize new connections between capabilities and needs

Champions of new opportunities

Science Week, February 23-27, 2015: **http://courses.comet.ucar.edu/course/view.php**

# Toward an Operational Use of Stroke Level Lightning Data in Severe Weather Forecasting

- Ongoing research using lightning data in the context of severe weather forecasting is promising.
- However, only flash level data is used – but not all flashes are equal, energetically.
- GLM will provide data that correspond to strokes (called groups in GLM nomenclature).
- We will use existing LIS data and ground based electric field networks (e.g., HAMMA) to relate optical measurements to strokes, which are more closely related to the electrical energy output of a storm.
- Ultimately, we seek to establish a new paradigm in which GLM data can be better used to relate electrical energy to storm dynamics.



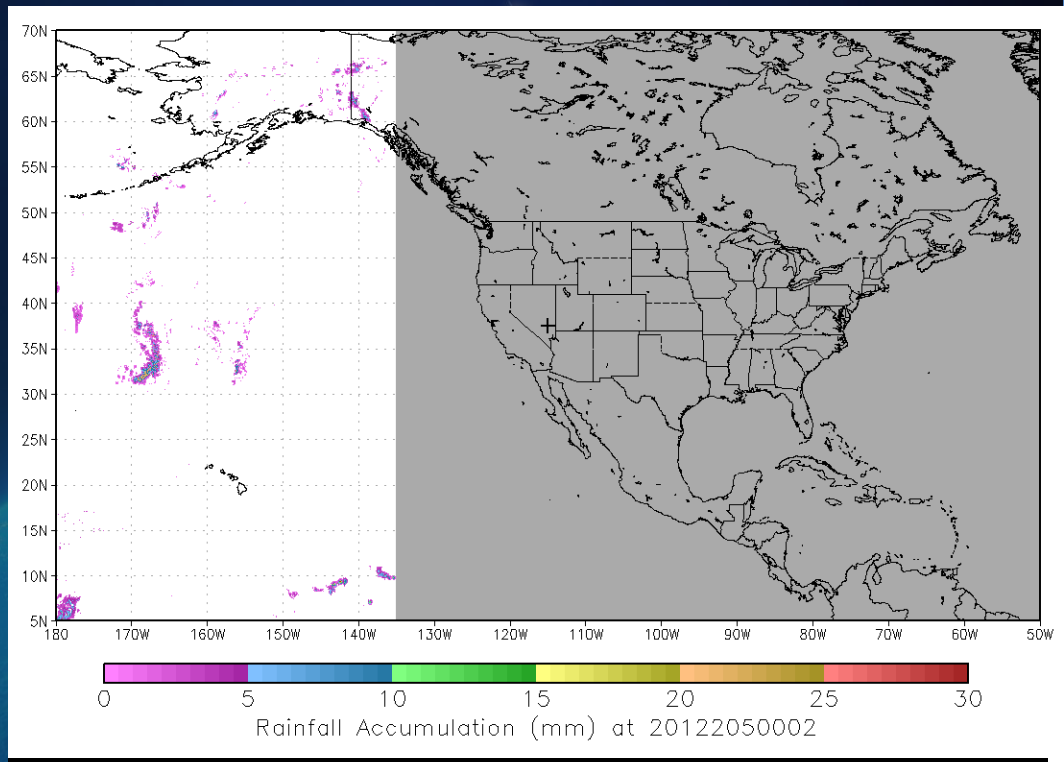

**A single lightning flash observed by HAMMA (colored waveforms) and LIS (gray bars and yellow/red squares). The return strokes are detected by each system – this is the most energetic process in a flash.**

***Explore how to best use GLM data in relation to storm development***

**Phillip M. Bitzer and Larry Carey, University of Alabama in Huntsville**

# Improving Real-time GOES-R Rainfall Rate Estimates through Infusion of Ground Radar and Gauge Data and Evaluating the Impacts on NWS Flash and River Flood Prediction

- Low-latency, high-resolution quantitative precipitation estimates (QPE) are critical for NWS river and flash flood forecast operations
- Integrating satellite data into the operational QPE data stream will improve coverage, especially OCONUS
- FY 14/15 GOES-R3 project will add radar data to the calibration of the GOES-R Rainfall Rate algorithm (which currently calibrates against microwave rain rates) and optimally merge the satellite QPE with radar and gauges
- Output will be provided to the NWS via the Multi-Radar Multi-Sensor System (MRMS) becoming operational at NCEP Central Operations (NCO)

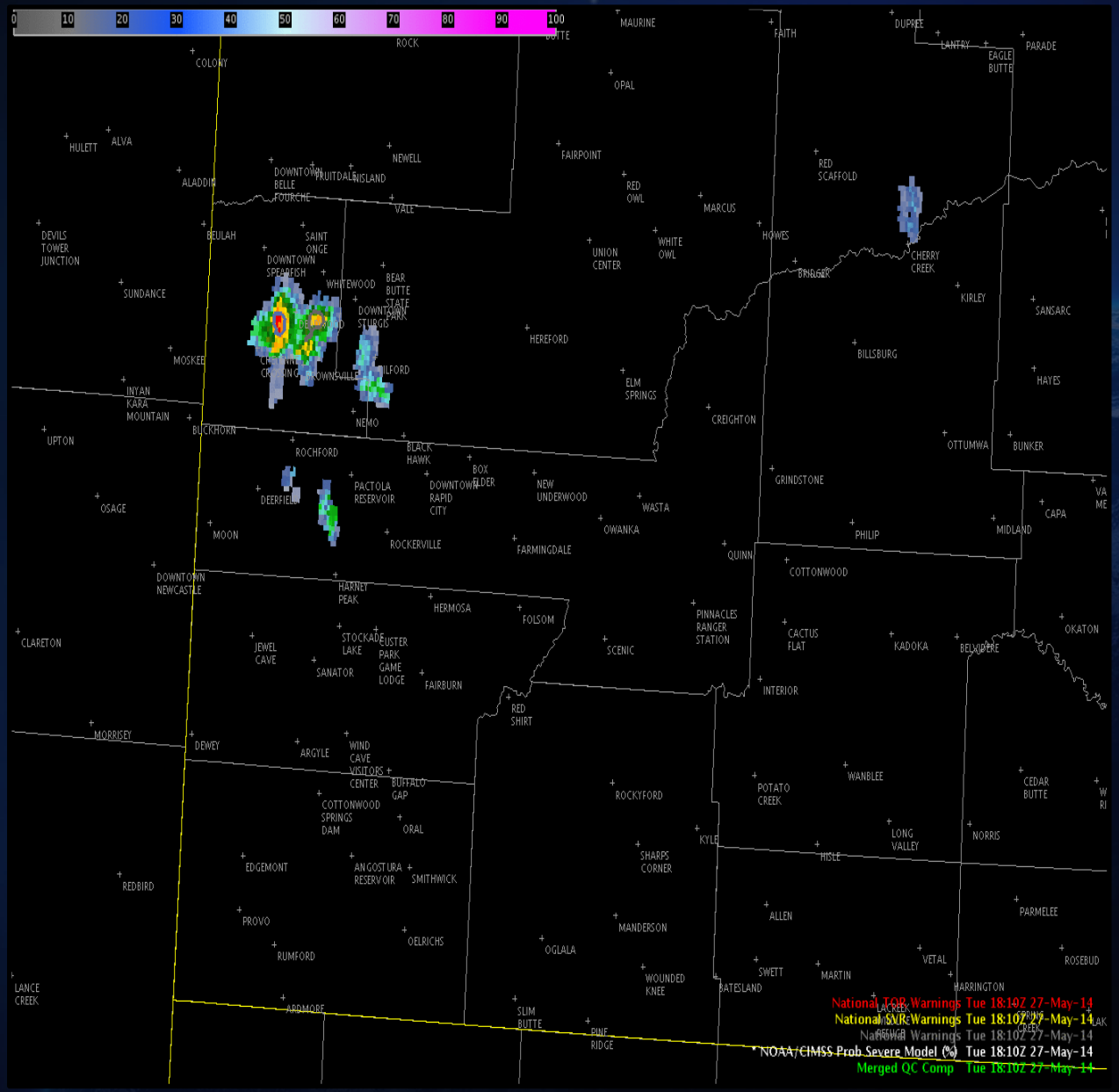



**Current-GOES version of the GOES-R Rainfall Rate algorithm (no radar input; calibrated against MW only)**

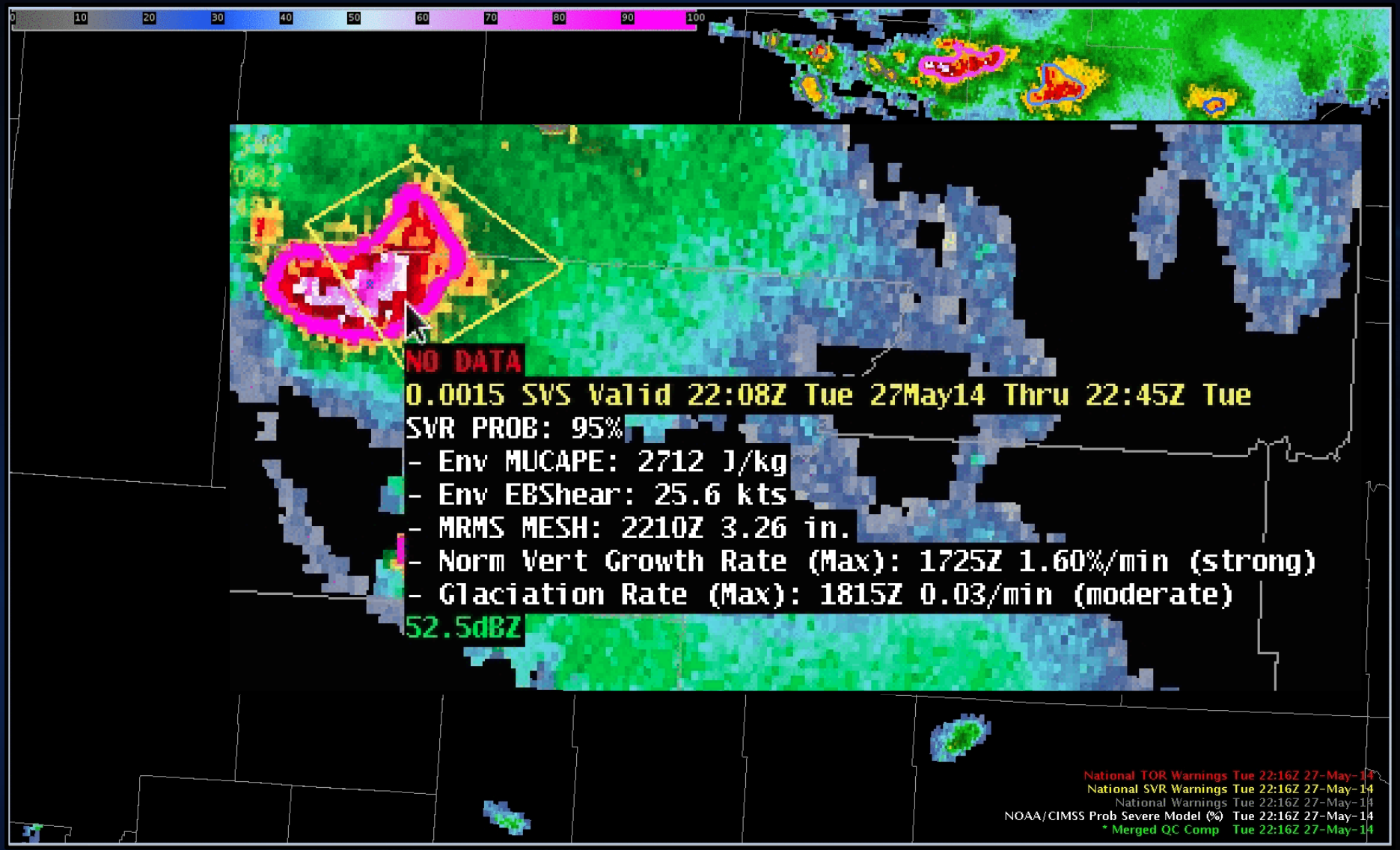
***Low-latency multi-sensor QPE will be provided to NWS field offices for hydrologic forecasting***

**Y. Zhang (NWS/OHD), R. Kuligowski (NESDIS/STAR), and J. J. Gourley (OAR/NSSL)**

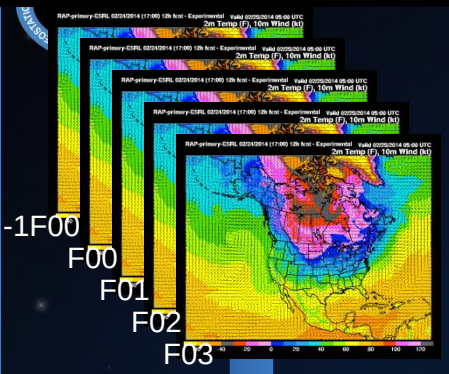
# Probability of Severe Convection



# Probability of Severe Convection



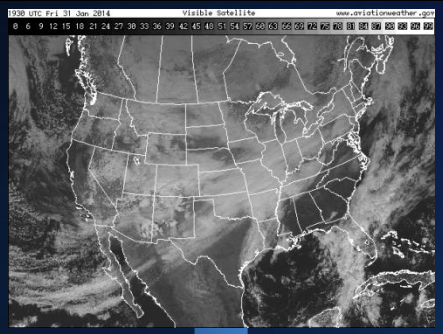
## 1. RAP grib2 (60 min)




**Compute, remap, composite, and merge fields (bash, C, python)**

**NWP PRODUCTS**
(e.g., MUCAPE, effective bulk shear)

## 2. GOES-East area files (5-30 min)



**GEOCAT**

- 6-h GFS
- sfc. emissivity
- sfc. albedo

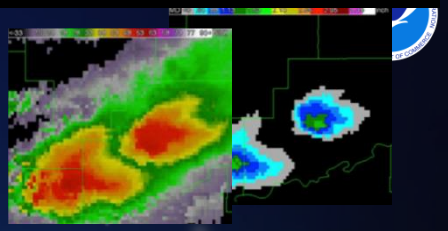
**Remap (C + IDL)**

**SATELLITE PRODUCTS**
(e.g., top-of-troposphere emissivity, cloud-top phase)

**Identification and tracking (WDSS-II + IDL)**

Satellite objects

## 3. MRMS grib2 (2 min)



**Convert grib2 to netCDF (wgrib2, bash, python)**

**RADAR PRODUCTS**
(e.g., MergedReflectivity, MESH)

**Identification and tracking (WDSS-II)**

Radar objects

**Uses latest satellite products and objects**

**Uses latest NWP products**

**EXECUTE ProbSevere (IDL)**
-Executes when radar tracking is complete
-Reads history file (IDL save file)
-Creates ASCII output (IDL)

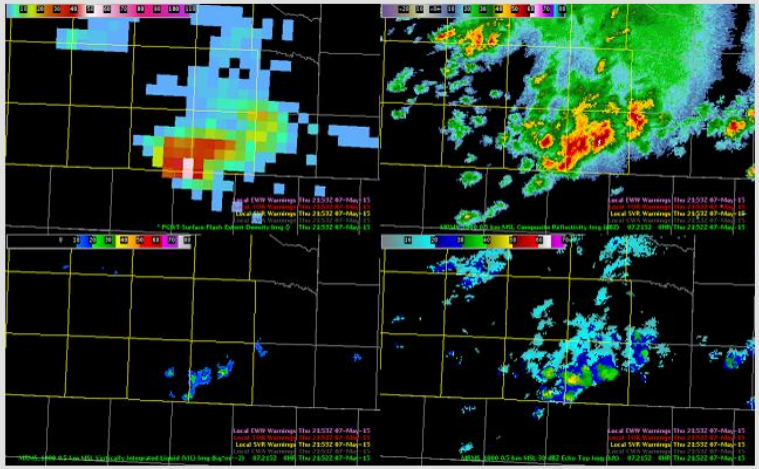
# The 2015 GOES-R Proving Ground at the Hazardous Weather Testbed

## http://goesrhwt.blogspot.com/

## http://hwt.nssl.noaa.gov/spring_experiment/

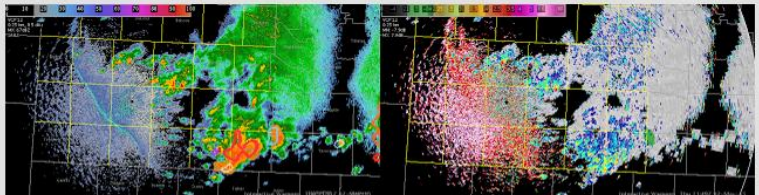
### Lightning Data Prompts SVS

LBB remains a convective mess. Overall storms have been sub-severe. The flash extent density for a cluster of storms in the extreme SE portion of the CWA caught my eye.



The two light pink pixels were around 56-57 (50 being the general minimum for severe storms) at 2153Z.

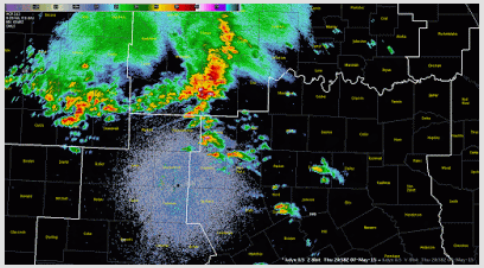
Looking at the other guidance we could use today, there was a 3 sigma lightning jump and a prob severe of 90% at 2149Z.



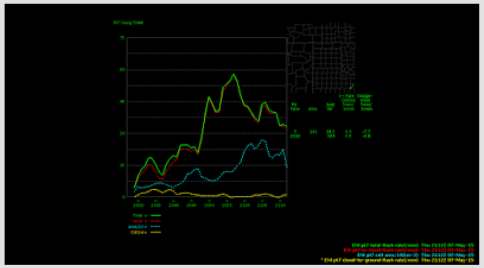


### ENI Time Series and ProbSevere

New convection has been initiating along the nose of stronger instability feeding northward across north centra TX and I have been watching one cell in particular in Young county TX.



The ENI time series has provided a nice trend in the strengthening of the storm and showed a large jump in fl rate just before 2050 UTC. Looking at the base data all tilts at the time of the jump revealed a deep 50 dbz c to almost 40kft and a 70 dbz core to over 21kft.



ENI Time Series

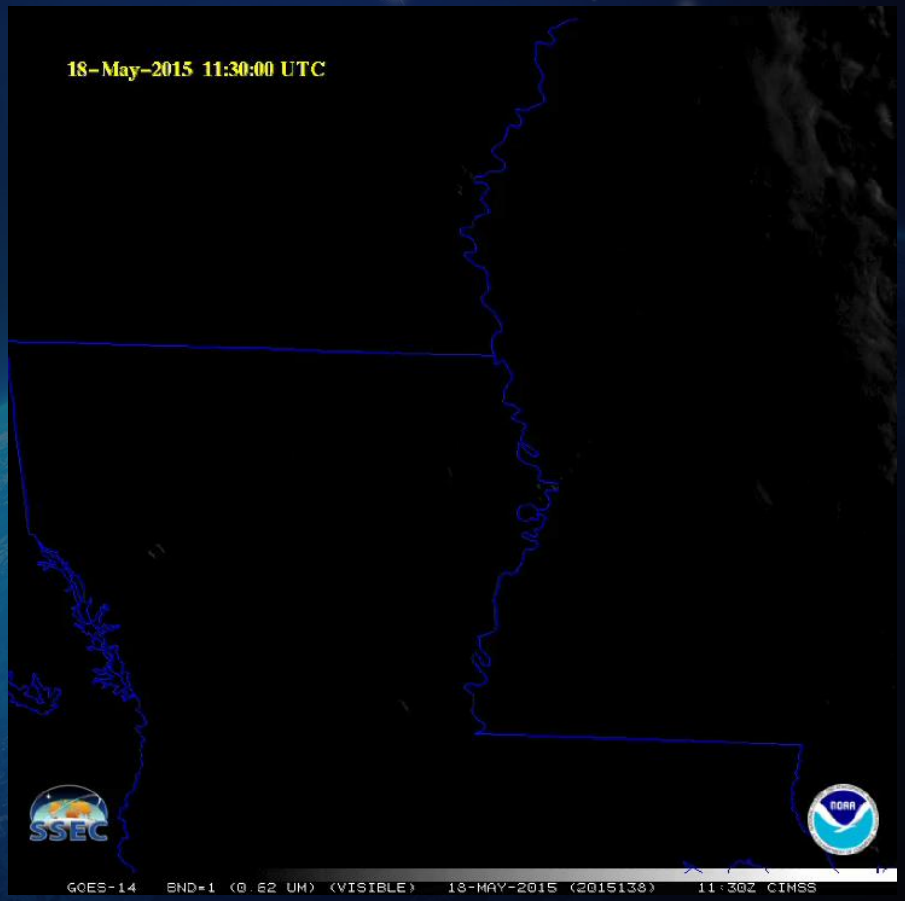
I think this ETN time series data was useful in identifying a rapidly developing updraft. Interesting to note, the ProbSevere model indicated a 74% severe threat at 2024 UTC on this storm which then went to 88% at 2033 UTC and then 98% at 2040 UTC.

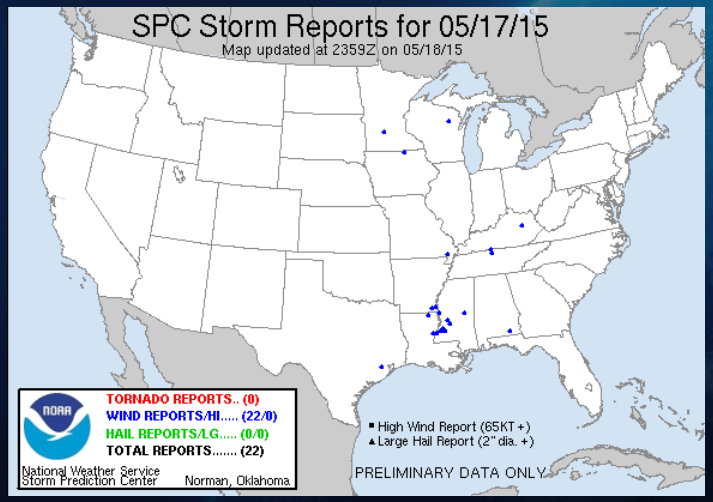
# GOES-14 Super Rapid Scan Operations to Prepare for GOES-R (SRSOR)

SRSOR plans for 2015 : May 18-June 12, and August 10-22:

*http://cimss.ssec.wisc.edu/goes/srsor2015/GOES-14_SRSOR.html*

**GOES-14 provided very unique data and offered a glimpse into the possibilities that will be provided by the ABI on GOES-R in one minute mesoscale imagery**



# Forecaster Demonstration of 1-min Imagery

- Blog posts with SPC examples/comments on Satellite Liaison Blog: http://satelliteliaisonblog.wordpress.com/
  - *"Post-storm initiation, the high-resolution data allowed for careful analysis of overshooting and collapsing tops, the character of the storm anvils (ie. health of the storm) and the identification of convectively generated outflows."* - SPC forecaster
  - *Using cloud character and trends to diagnose boundary locations and motion, and nowcast their potential for either CI or influences on upshear storms to interact therewith."* – SPC Forecaster
  - ***"Satellite imagery at 1-min temporal resolution needs to become the new standard for severe weather operations." – SPC Forecaster***
- Comments from HWT
  - All EWP survey respondents agreed that the 1-minute imagery provided additional value compared to 5- or 15- minute imagery.
  - *"It allowed you to see so much more structure/trends. You could easily see areas of subsidence as cu were squashed or boundaries where things were being enhanced.* – Forecaster in EWP
  - *"Around great lakes looking at advection fog, I wish we had 1 minute updates so we could see how much fog is spreading inland."* – Forecaster in EWP
  - *"Cumulus clouds growing into thunderstorms on the 1 minute imagery definitely provided lead time to when storms might develop, which is great for timing watch issuance's before the storms become severe. This is not easily observed with the 5 minute or longer visible imagery."* - EFP

**HRRR Status**

HRRR Status
HRRR Status (Past 24 hrs)
HRRR Dev1 Status
HRRR Dev1 Status (Past 24 hrs)
HRRR Dev2 Status
HRRR Dev2 Status (Past 24 hrs)
RAP-ESRL (HRRR Parent)
RAP Dev1 (HRRR Dev1 Parent)

**HRRR Convective Probabilities**

HCPF

**Soundings**

Interactive (Java) (beta--restricted)

**Verification**

Composite Reflectivity
Composite Reflectivity Status
24 Hour Precipitation
24 Hour Precipitation Status

**Other Products**

NCEP Model Products (GFS,etc.)

**Organization**

AMB Staff
Sponsors
ESRL/GSD

**Description**

HRRR Changes Apr 2014
HRRR Home Page
NWS Discs Using HRRR
RUC/RR/FIM Pubs
HRRR ChangeLog
HRRRdev ChangeLog

**Other Information**

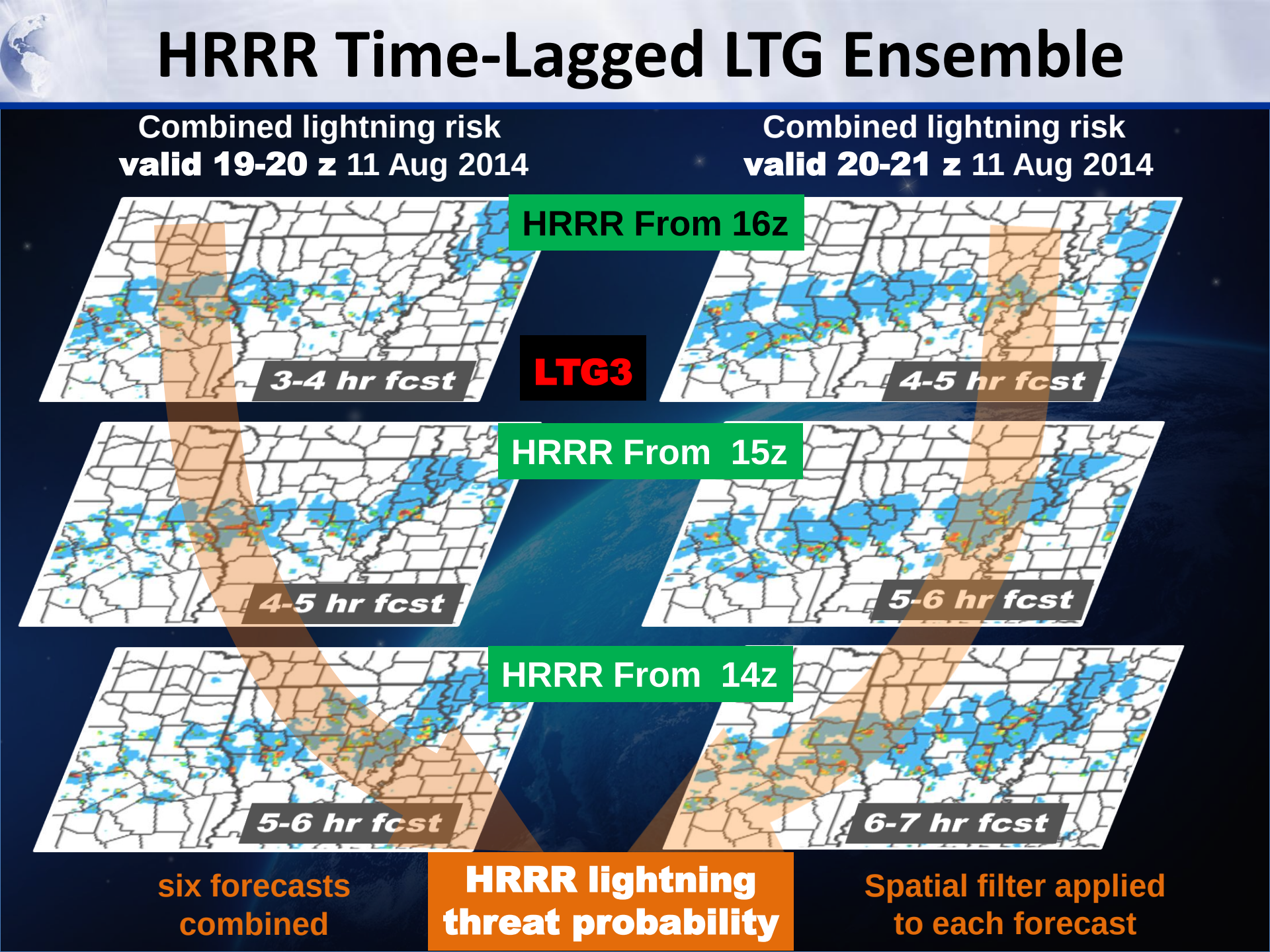
NCEP product status
NCEP obs processing
NCEP status messages

# HRRR Forecast Fields

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| convective activity 2 | | | | | | | | | | | | | | | | | | convective activity 2 |
| convective activity 3 | | | | | | | | | | | | | | | | | | convective activity 3 |
| convective initiation 1 | | | | | | | | | | | | | | | | | | convective initiation 1 |
| convective initiation 2 | | | | | | | | | | | | | | | | | | convective initiation 2 |
| convective initiation 3 | | | | | | | | | | | | | | | | | | convective initiation 3 |
| lightning threat 1 | | | | | | | | | | | | | | | | | | lightning threat 1 |
| lightning threat 2 | | | | | | | | | | | | | | | | | | lightning threat 2 |
| lightning threat 3 | | | | | | | | | | | | | | | | | | lightning threat 3 |
| max vert int graupel | | | | | | | | | | | | | | | | | | max vert int graupel |
| max 10m wind | | | | | | | | | | | | | | | | | | max 10m wind |
| 10m wind | | | | | | | | | | | | | | | | | | 10m wind |
| 10m wind gust | | | | | | | | | | | | | | | | | | 10m wind gust |
| 80m wind | | | | | | | | | | | | | | | | | | 80m wind |
| 1h 80m wind speed change | | | | | | | | | | | | | | | | | | 1h 80m wind speed change |
| ensemble 1h 80m wind speed change | | | | | | | | | | | | | | | | | | ensemble 1h 80m wind speed change |
| skin temp | | | | | | | | | | | | | | | | | | skin temp |
| 2m temp | | | | | | | | | | | | | | | | | | 2m temp |
| 2m potential temp | | | | | | | | | | | | | | | | | | 2m potential temp |
| 2m temp - skin temp | | | | | | | | | | | | | | | | | | 2m temp - skin temp |
| 2m dew point | | | | | | | | | | | | | | | | | | 2m dew point |
| 2m RH | | | | | | | | | | | | | | | | | | 2m RH |
| surface pressure | | | | | | | | | | | | | | | | | | surface pressure |
| 3h pressure change | | | | | | | | | | | | | | | | | | 3h pressure change |
| precipitable water | | | | | | | | | | | | | | | | | | precipitable water |
| snow water equiv | | | | | | | | | | | | | | | | | | snow water equiv |
| max updraft | | | | | | | | | | | | | | | | | | max updraft |
| max downdraft | | | | | | | | | | | | | | | | | | max downdraft |
| 500mb temp | | | | | | | | | | | | | | | | | | 500mb temp |
| 500mb vort | | | | | | | | | | | | | | | | | | 500mb vort |
| 250mb wind | | | | | | | | | | | | | | | | | | 250mb wind |
| visibility | | | | | | | | | | | | | | | | | | visibility |
| total cloud cover | | | | | | | | | | | | | | | | | | total cloud cover |
| low-level cloud cover | | | | | | | | | | | | | | | | | | low-level cloud cover |
| mid-level cloud cover | | | | | | | | | | | | | | | | | | mid-level cloud cover |
| high-level cloud cover | | | | | | | | | | | | | | | | | | high-level cloud cover |
| cloud top height | | | | | | | | | | | | | | | | | | cloud top height |
| ceiling | | | | | | | | | | | | | | | | | | ceiling |
| echotop height | | | | | | | | | | | | | | | | | | echotop height |
| VIL | | | | | | | | | | | | | | | | | | VIL |
| RADAR VIL | | | | | | | | | | | | | | | | | | RADAR VIL |

Lightning Threat 3 used for Prob LTG forecast out to 9 hours

# HRRR Time-Lagged LTG Ensemble



# NCAR MMM 10-member Ensemble

http://ensemble.ucar.edu

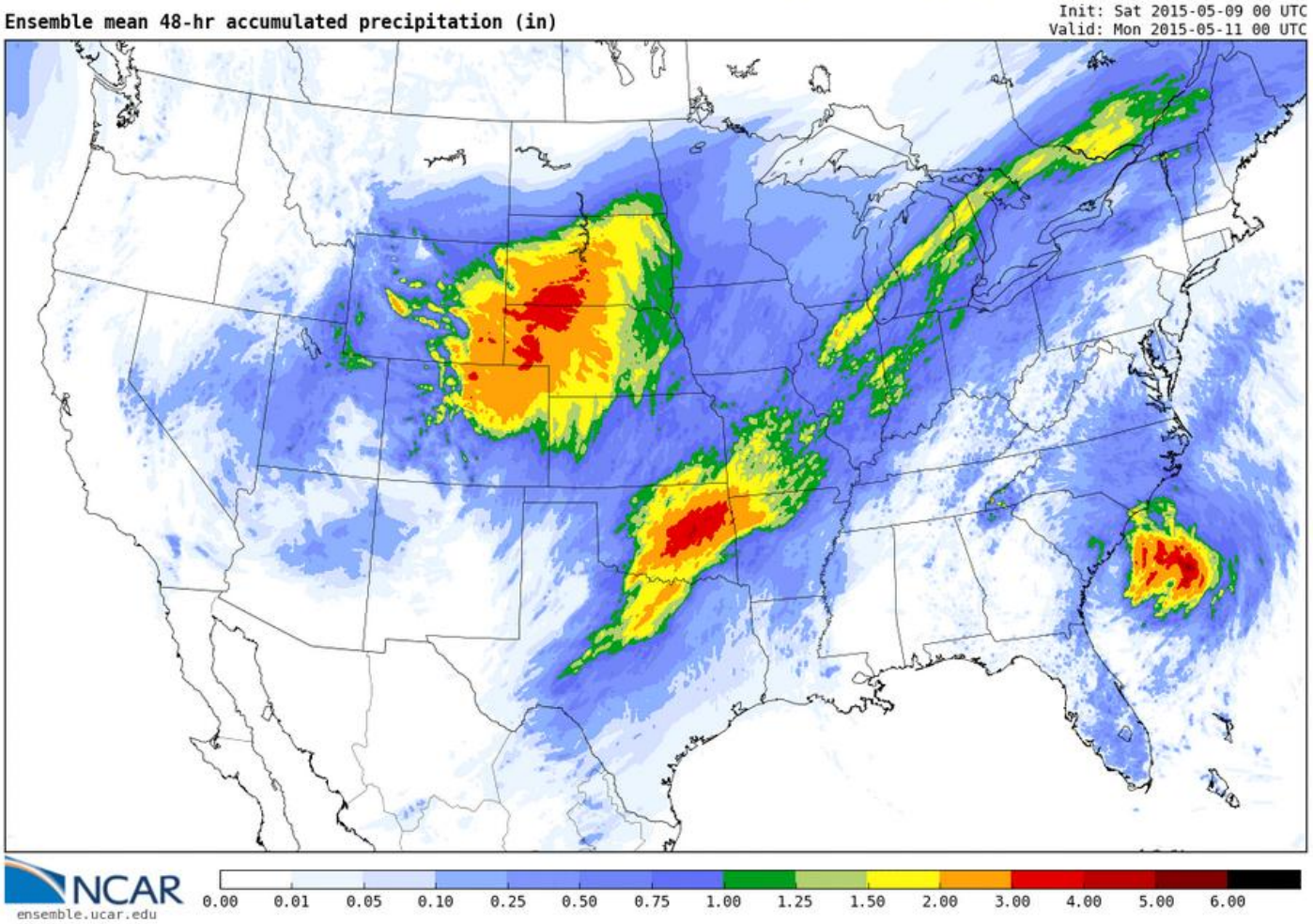
**NCAR Ensemble Forecasts**

Initialized: **00 UTC Sat 09 May 2015**

Surface/Precip | Upper-Air | Severe | Hourly-Max | Domains

Choose a field from the menus above or click the calendar to view a forecast from the archive. Learn more about these forecasts here.

Quick View Rollovers: **Accumulated Precip** | Cumulative Ensemble Max: **Updraft Helicity** | **Updraft Speed** | **Surface Wind**



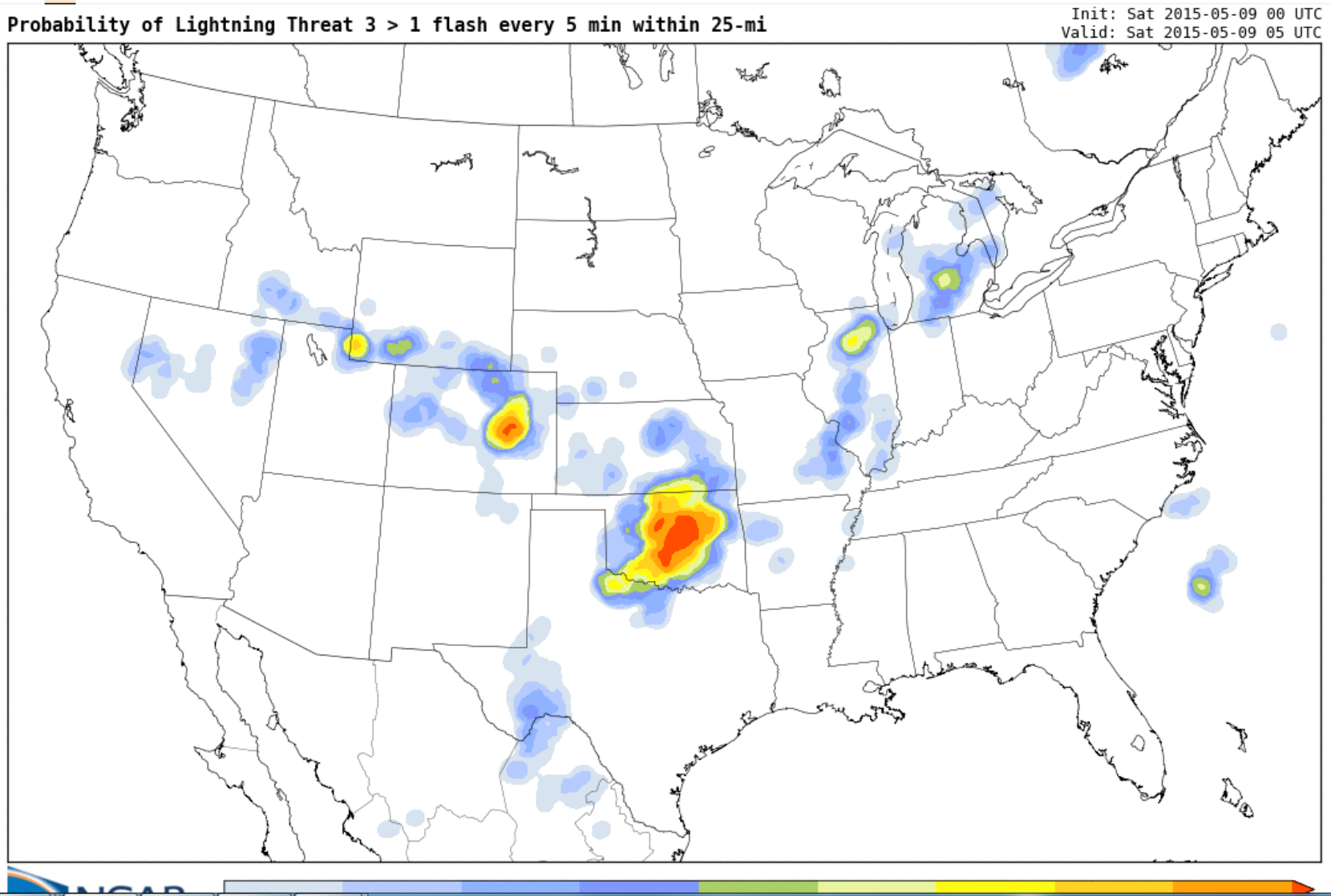
# Lightning Threat Forecast

**NCAR Ensemble Forecasts**

Initialized: 00 UTC Sat 09 May 2015

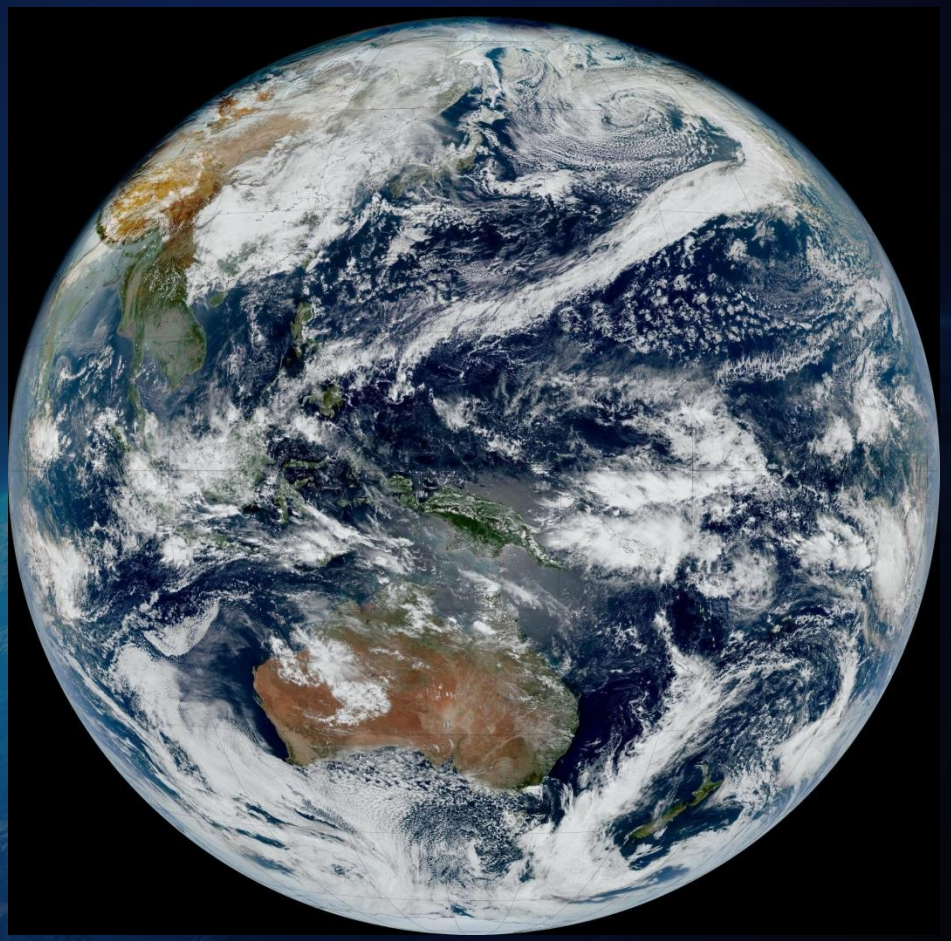
Surface/Precip | Upper-Air | Severe | Hourly-Max | Domains

01 02 03 04 **05** 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48



# FY15 Plans- Himawari 8

- Japan Meteorological Agency (JMA)
  - Information exchange and collaborative research on volcanic ash and cloud analysis science
  - Algorithm and Calibration Working Group and team member visits
  - Access to full resolution HIMAWARI imagery for AWG testing and Proving Ground demonstrations

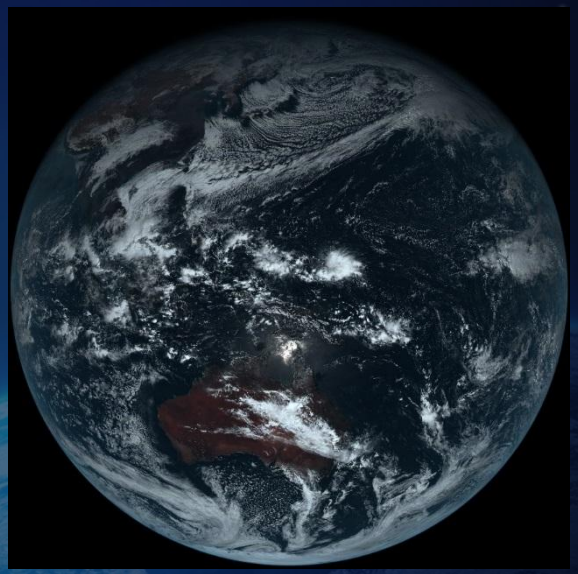


*Blue Marble, Himawari 8 True Color Composite*
25-January-2015 02:30 UTC
S. Miller (CIRA) - GOES-R AWG Imagery Team

*http://www.data.jma.go.jp/mscweb/en/himawari89/index.html*

# International Collaboration

- Japan Meteorological Agency (JMA)
  - Information exchange and collaborative research on volcanic ash and cloud analysis science
  - Algorithm Working Group team member visits
  - Access to full resolution HIMAWARI imagery for Proving Ground demonstrations
- European Organization for the Exploitation of Meteorological Satellites (EUMETSAT)
  - Collaboration in cal/val, research and applications through the MTG LI-MAG, Convection Working Group and the Satellite Application Facilities
- World Meteorological Organization (WMO)
  - Development of training materials through the WMO Virtual Laboratory SATellite User Readiness Navigator (SATURN), Calibration through GSICS, research demonstration and capacity building projects through World Weather Research Program (WWRP)



*Himawari 8 True Color Composite from December 18, 2014*


*2014 EUMETSAT Convection Working Group workshop, Zagreb, Croatia.*

# ABI Bands Quick Information Guides

## GOES-R ABI Fact Sheet Band 1 ("Blue" visible)

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

*Above: Simulated image of ABI band 1 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)*

**In a nutshell**

GOES-R ABI Band 1 (0.47 µm central, 0.45 µm to 0.49 µm)

Also Himawari-8/9 AHI Band 1, Suomi NPP VIIRS Band M2

New for GOES-R Series, not available on current GOES

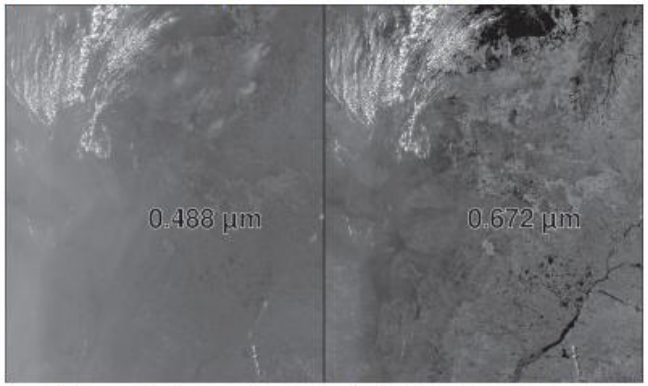
**Nickname:**
"Blue" visible band

**Availability:**
Daytime only

**Primary purpose:**
Aerosols

**Uses similar to:**
GOES-R ABI Band 2

The 0.47 µm, or "blue" band, one of the two visible bands on the ABI, will provide data for monitoring aerosols. Included on NASA's MODIS and Suomi NPP VIIRS instruments, there have been a number of well-established benefits with this band. The geostationary 0.47 µm band will provide nearly continuous daytime observations of dust, haze, smoke and clouds. Measurements of aerosol optical depths (AOD) will help air quality monitoring and tracking. This blue band, combined with a green band (which will be simulated from other bands and/or sensors) and a red band (0.64 µm), can provide "simulated natural color" imagery of the Earth. Measurements in the blue band may provide estimates of visibility. The 0.47 µm band will also be useful for air pollution studies and improve numerous products that rely on clear-sky radiances (such as land and sea surface products). Other potential uses are related to solar insolation estimates. This band is essential for a natural 'true color' RGB. *Source: Schmit et al., 2005 in BAMS and the ABI Weather Event Simulator (WES) Guide by CIMSS.*




*Suomi NPP images of similar 'blue' (left-hand side) and 'red' (right-hand side) visible bands. Note how the smoke is more apparent in the 0.488 micrometer band. The image is over part of South America (August 23, 2014). Image from CIMSS.*

**Did You Know?** There are two baseline scan modes from the ABI. The first is the 'flex' mode that consists of a full disk scan every 15 minutes, a continental U.S. (CONUS) image every 5 minutes, and two mesoscale (nominally 1,000 km by 1,000 km) images every minute. The second mode, Continuous Full Disk (CFD), consists of only a sequential Full Disk scan every 5 minutes.

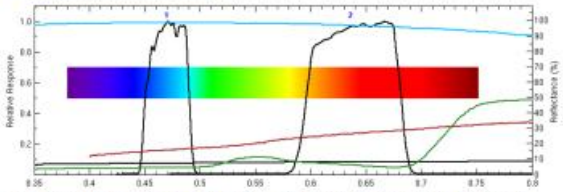
**Baseline Products by Band**

| Wavelength Micrometers | 0.47 |
|---|---|
| Band number | 1 |
| Baseline Products | |
| Aerosol Detection | √ |
| Aerosol Optical Depth | √ |
| Clear Sky Masks | |
| Cloud & Moisture Imagery | √ |
| Cloud Optical Depth | |
| Cloud Particle Size Distribution | |
| Cloud Top Phase | |
| Cloud Top Height | |
| Cloud Top Pressure | |
| Cloud Top Temperature | |
| Hurricane Intensity | |
| Rainfall Rate/QPE | |
| Legacy Vertical Moisture Profile | |
| Legacy Vertical Temp Profile | |
| Derived Stability Indices | |
| Total Precipitable Water | |
| Downward Shortwave Radiation: Surface | √ |
| Reflected Shortwave Radiation: TOA | √ |
| Derived Motion Winds | |
| Fire Hot Spot Characterization | |
| Land Surface Temperature | |
| Snow Cover | √ |
| Sea Surface Temperature | |
| Volcanic Ash: Detection/Height | |
| Radiances | √ |

### Carven's Corner

Visible imagery has long been a staple for the operational forecaster. GOES-R has two visible bands. Forecasters will find that the 0.47 µm "blue" band is better for identifying aerosols, such as smoke and dust, giving us unprecedented ability to characterize these particulates spatially and temporally that can significantly reduce visibility and be a hazard to aviation. Fortunately we don't need to wait until the launch of the ABI to gain experience with a 0.47µm in geostationary orbit as the AHI (Advanced Himawari Imager) will have a very similar band. The AHI was built by the same company (Exelis) as the ABI.

**Carven Scott** is the ESSD Chief in NWS Alaska Region and a former SOO.



*ABI visible and near-infrared spectral bands (blue shaded areas) and spectral plots for a number of surfaces (snow—light blue; grass—green; dirt—brown; asphalt—black). Higher reflectance is generally "whiter" when enhanced. (Credit: CIMSS and ASTER spectral library)*

### Tim's Topic

The "blue" band on the ABI was first proposed by Fred Mosher, then head of the AWC (Aviation Weather Center) for use in estimating slant-wise visibility. This was at a GOES Users' Conference in 2001. One of the heritage instruments for this band is NASA's MODIS, although it was also on the geostationary ATS (Applications Technology Satellite), that was launched in 1967! Today, you can find this band on Suomi NPP's VIIRS. In the late 1990s, the ABI was first envisioned to be only 8 spectral bands, but based on the long list of stated requirements, it was suggested that the ABI should offer 18 spectral bands, of which 16 were approved for implementation.

**Tim Schmit** is a research meteorologist with NESDIS in Madison, Wisconsin.

*ATS-III (1967) was the first geostationary satellite to provide true natural color imagery. (Credit: NASA and SSEC)*

| ABI Band | Approximate Central Wavelength (µm) | Band "Nickname" | Type | Nominal sub satellite pixel spacing (km) |
|---|---|---|---|---|
| 1 | 0.47 | "Blue" visible band | Visible | 1 |
| 2 | 0.64 | "Red" visible band | Visible | 0.5 |

**Further reading**

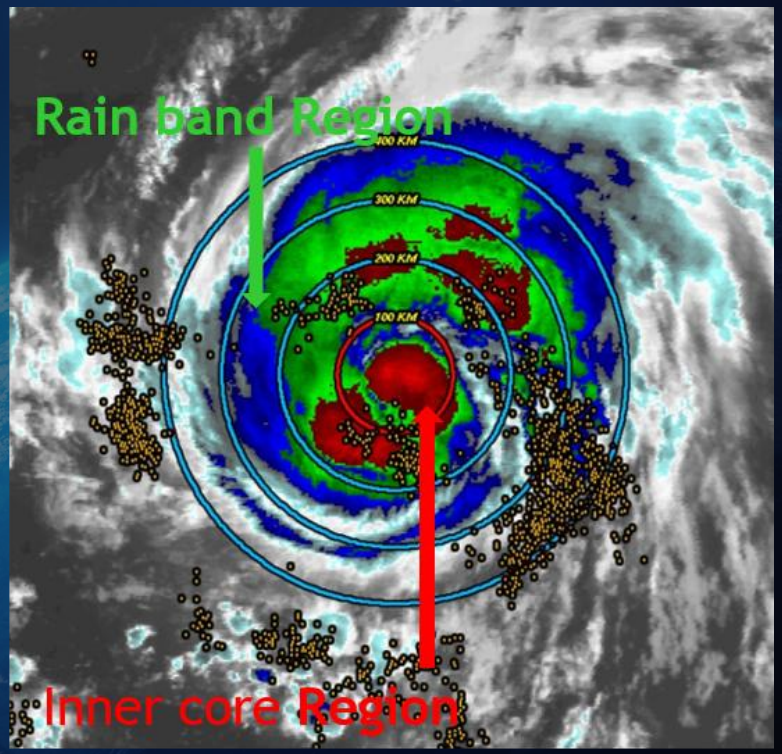
GOES-R overview: http://www.goes-r.gov
Imagery fact sheet: http://www.goes-r.gov/education/docs/fs_imagery.pdf
Aerosols fact sheet: http://www.goes-r.gov/education/docs/fs_aerosols.pdf
Visibility product description: http://www.goes-r.gov/products/visibility_pd.html
CIMSS blog: http://cimss.ssec.wisc.edu/goes/blog/archives/category/air-quality
ABI BAMS article: http://dx.doi.org/10.1175/BAMS-86-8-1079
GOES-R acronyms: http://www.goes-r.gov/resources/acronyms.html

October 2014

# GOES-R Science Seminars

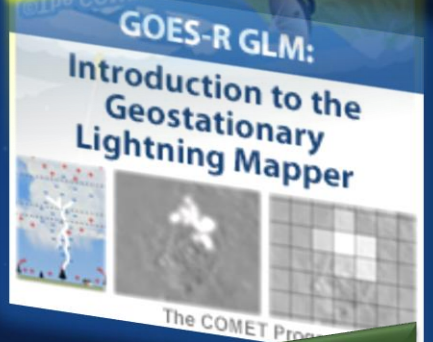
- Promote more frequent communication with the user community about GOES-R science and demonstration activities
  - Semi-monthly virtual science seminars
  - Allow scientists to highlight their work to the rest of the community
  - http://www.goes-r.gov/users/sci-sem/index.html
  - *Email janel.thomas@noaa.gov to be added to science seminar mailing list*

Lightning-based Rapid Intensification Index




*From March 31, 2015 Science Seminar on Forecast Applications of GOES-R and JPSS at the National Hurricane Center. Andrea Schumacher, CIRA*

# Training and User Education Materials



## Online Training Modules

- Cooperative Program for Operational Meteorology, Education, and Training (COMET): https://www.meted.ucar.edu/
- Satellite Hydrology and Meteorology for Forecasters (SHyMet): http://rammb.cira.colostate.edu/training/shymet/
- Short-term Prediction Research and Transition Center (SPoRT) product training modules: http://weather.msfc.nasa.gov/sport/training/
- Virtual Institute for Satellite Integration Training (VISIT) Training Resources: http://rammb.cira.colostate.edu/training/visit/



## Printed Materials

- ABI Bands Quick Information Guides
- GOES-R Fact Sheets (18)
- User Readiness Plan
- GRB Downlink Specifications and Product Users' Guide
- Proving Ground Demonstration Final Reports and Annual Reports

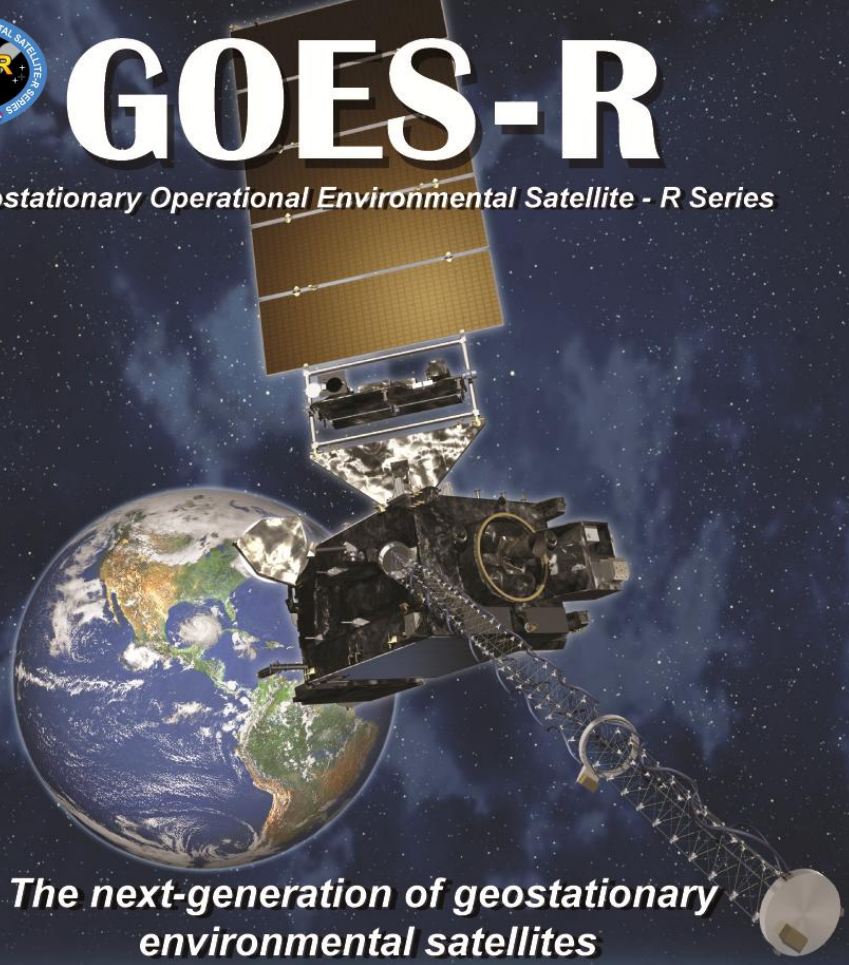

*Education and Training: Session 4.1 – Th, 8:50 AM*

# Summary

- GOES-R  is coming - Launch early 2016
- New sensors, products, and services will help improve forecasts and increase lead times for warnings and decision makers
- Presents Challenges and Opportunities for model assimilation,  data fusion and tools, Warn on Forecast/PHI, ensemble NWP
- Product testing as soon as 2 months post-launch, also available to users for science assessment
- User preparation is essential to take advantage of the advanced capabilities to support Weather Ready Nations

# GOES-R

*Geostationary Operational Environmental Satellite - R Series*



*The next-generation of geostationary environmental satellites*

**Advanced imaging for accurate forecasts**

**Real-time mapping of lightning activity**

**Improved monitoring of solar activity**

Spacecraft image courtesy of Lockheed Martin

# Thank you!

## For more information visit www.goes-r.gov

CONNECT WITH US !

www.facebook.com/GOESRsatellite

https://www.youtube.com/user/NOAASatellites

https://twitter.com/NOAASatellites

https://www.flickr.com/photos/noaasatellites/