

The GOES-R Proving Ground 2010 Spring Experiment at NOAA's Hazardous Weather Testbed and Storm Prediction Center

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Many Thanks!

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- And all of last year's participants!



What is the GOES-R Proving Ground?

- Collaborative effort between NESDIS supported cooperative institutes and NOAA testbeds / NCEP national centers / NWS
- Responsible for user readiness testing of GOES-R baseline/option-2 products prior to launch
 - Develop training for users
 - Prepare for display within AWIPS/AWIPS-II/N-AWIPS
- Provide feedback to product developers on experimental day-2 satellite products





GOES-R Proving Ground Partners



81 Total Partners Preparing

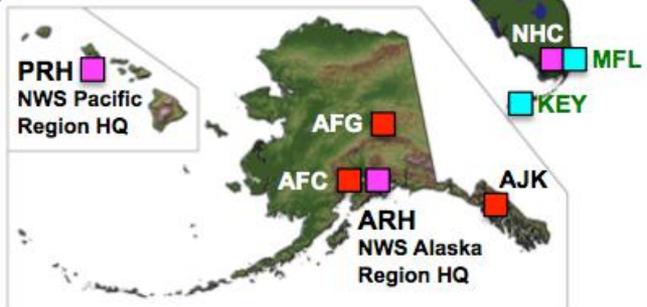
Current as of May 2010



- 10 Weather Forecast Offices served by the Cooperative Institute for Research in the Atmosphere (CIRA)
- 4 Weather Forecast Offices served by the Cooperative Institute for Climate and Satellites (CICS) via SPoRT
- 11 National/Regional Centers
- 15 Weather Forecast Offices served by the NASA Short-term Prediction Research and Transition Center (SPoRT)
- 48 Weather Forecast Offices served by the Cooperative Institute for Meteorological Satellite Studies (CIMSS)

NOAA/NWS Headquarters
 (Silver Spring, MD);
 Center for Satellite Applications and Research;
 Office of Satellite Data Processing and Distribution.

GOES-R Program Office (Greenbelt, MD).



National Weather Center



- Storm Prediction Center (SPC)
- Hazardous Weather Testbed (HWT)
- Norman, OK Weather Forecast Office (OUN)
- National Severe Storms Lab (NSSL)
- Warning Decision Training Branch (WDTB)
- Cooperative Institute for Mesoscale Meteorological Studies (CIMMS)
- Center for Analysis and Prediction of Storms (CAPS)
- Radar Operations Center (ROC)
- OU School of Meteorology
- Private Sector

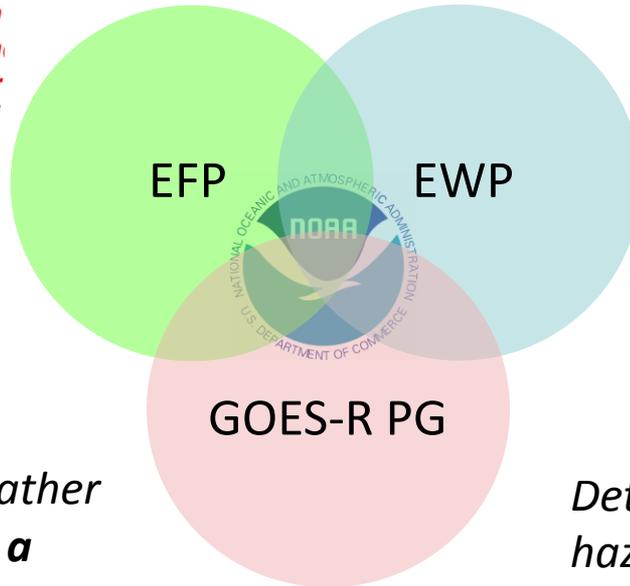


NOAA's Hazardous Weather Testbed



Experimental
Forecast
Program

*Prediction of hazardous weather events from **a few hours to a week in advance***



Experimental
Warning
Program

*Detection and prediction of hazardous weather events **up to several hours in advance***



GOES-R 2010 Spring Experiment Overview

- 4-week period (17 May – 18 June) during central plains peak severe weather season
- 20 Visiting Scientists and 15 NWS forecasters invited by the GOES-R Proving Ground
- 8 Proving Ground products demonstrated
 - Cloud and moisture imagery
 - Convective initiation (3 products)
 - Overshooting-top / Enhanced-V detection
 - Total lightning detection (2 products)
 - Severe hail probability
- Real-time forecast and warning exercises using operational decision support tools (N-AWIPS/AWIPS/WDSS-II)
- Warning Event Simulator (WES) cases developed and presented for training purposes of experimental products



Day in the Life of the Experiment

Experimental Forecast Program

- **7:30am-8:15am**
 - Subjective verification and discussion of previous day's forecasts
- **8:15am-10:30am**
 - Morning forecasts issued
- **10:30am-noon**
 - Subjective/objective verification of previous day's model performance
- **Noon-12:30pm**
 - Lunch!
- **12:30pm-2:30pm**
 - Update forecasts
- **2:30pm-3pm**
 - Break! and preparation for briefing
- **3pm-4pm**
 - Daily briefing and discussion of the day's forecasts



Day in the Life of the Experiment

Experimental Warning Program

• Monday

- 1pm-1:30pm
 - New participant orientation
- 1:30pm-2pm
 - Daily briefing
- 2pm-2:15pm
 - Break!
- 2:15pm-5pm
 - Project introduction seminars
- 5pm-6pm
 - Dinner!
- 6pm-9pm
 - Intensive operations period or training/archive playback

• Tues-Thurs

- 1pm-2pm
 - Daily briefing
- 2pm-9pm
 - Intensive operations period or training/archive feedback

• Friday

- 10am-12pm
 - Weekly debrief
- 12pm-1pm
 - Optional brown bag lunch seminars



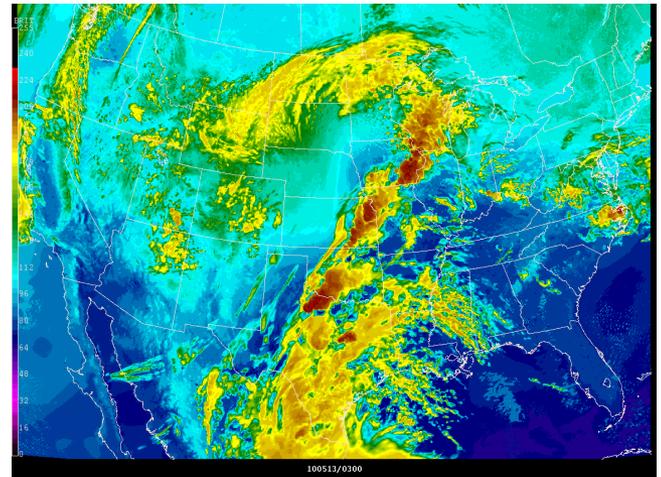
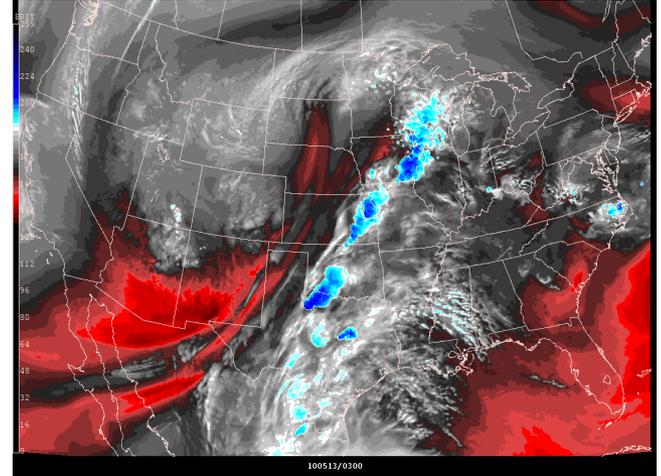
Capturing Feedback

- **Real-time blogging**
<http://goesrhwt.blogspot.com/>
 - During forecast/warning exercises
 - Participants were also encouraged to blog following forecast/warning exercises
- **Web-based surveys**
 - Immediately following forecast/warning operations
- **Daily post-mortem discussions**
 - Between visiting scientists and forecasters

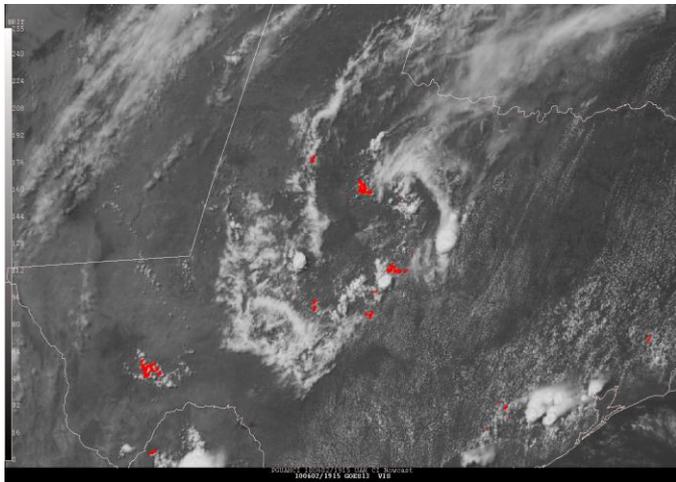
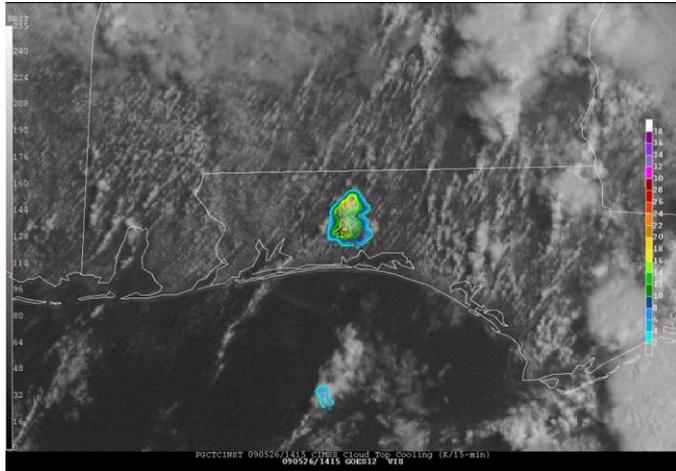


Simulated Satellite Imagery

- Simulated using OZ NSSL-WRF 4-km output
 - 9 non-solar ABI IR bands
 - 24 forecast hours
 - 1-hour time-steps
 - 12 UTC day 1 – 12 UTC day 2
 - Demonstration focused on:
 - 3 water vapor bands
 - Standard window IR band
 - Ability to produce band difference products



Convective Initiation



- **UWCI / Cloud-top Cooling Rate (Sieglaff et al., 2010)**
 - Box-averaged 0-1 hour nowcast of convective initiation and 15-minute cloud-top cooling rates
 - GOES-E/W and nighttime capable
- **SATCAST (Meckalski and Bedka, 2006)**
 - Object-based 0-1 hour nowcast of yes/no convective initiation
 - Utilizes IR BT cooling rates and multi-spectral information
 - GOES-E and daytime only



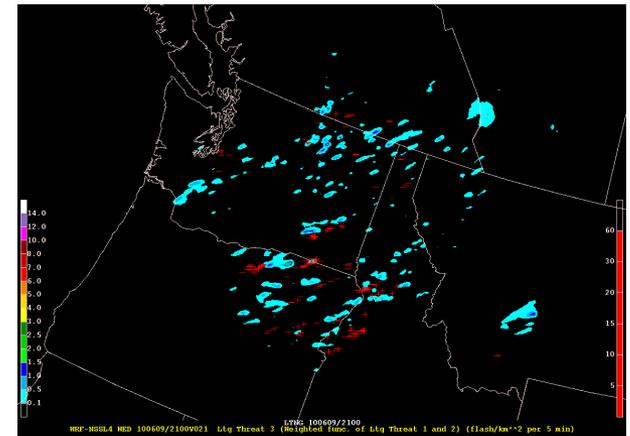
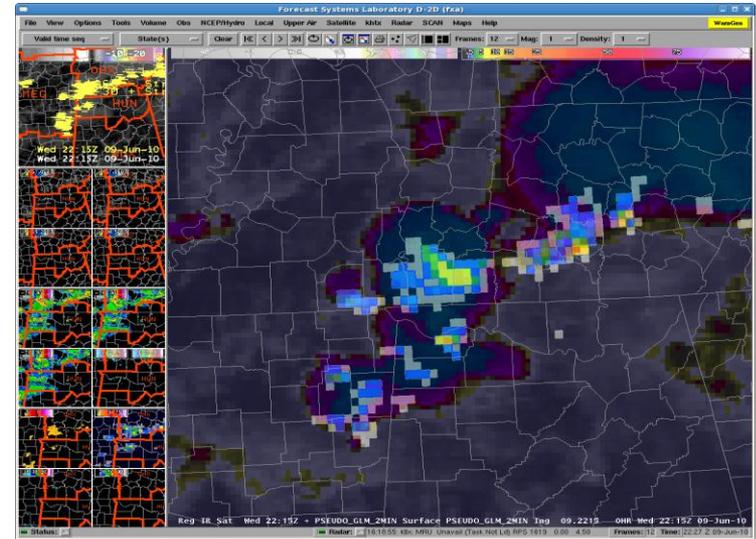
Total Lightning Detection

- **Pseudo-GLM**

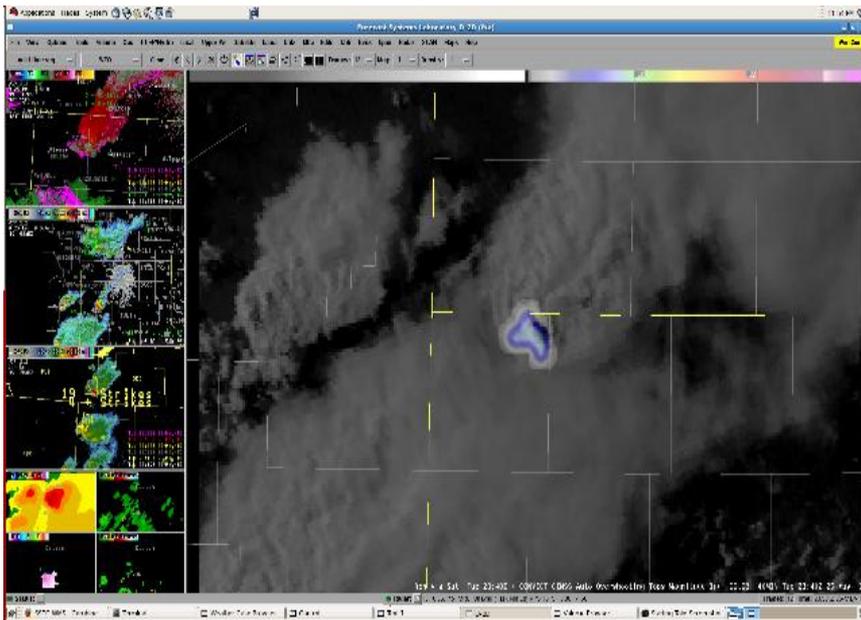
- Data from ground-based total lightning detection networks
 - Huntsville, AL; Washington, DC; Melbourne, FL; and Norman, OK
- Raw data sorted into flashes and interpolated to an 8km grid
- Running 2-minute average

- **Simulated lightning threat**

- Based on NSSL-WRF OZ 4km data
- Estimates total lightning from vertical ice content and flux within cloud objects (see McCaul et al., 2009)



Overshooting-top / Enhanced-V

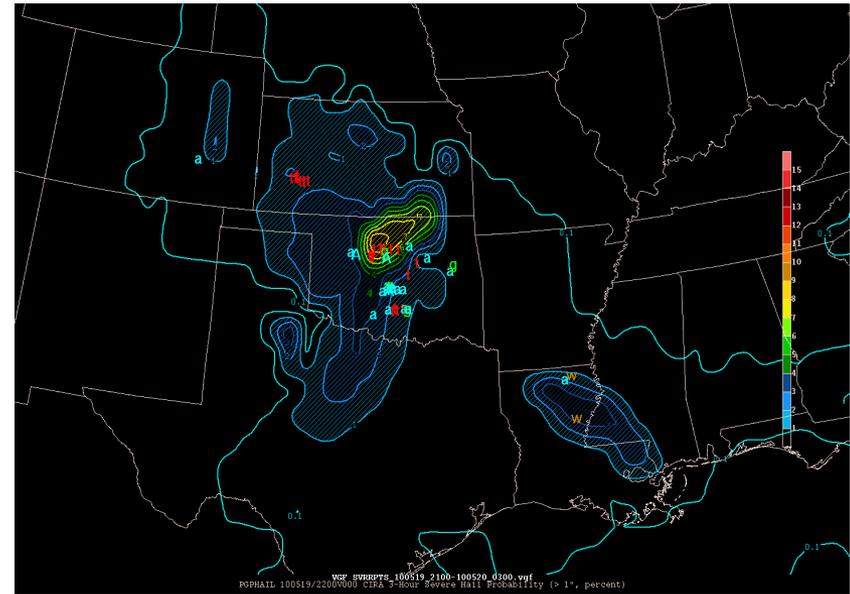


- Based on GOES-13 IR BT spatial testing (see Bedka et al., 2010)
- Detects overshooting-top and thermal couplet features in mature cloud tops
 - Provides detections and relative magnitudes
 - Operates day/night and can operate during rapid scan



Severe Hail Probability

- Based on satellite IR and RUC analysis fields
 - Provides probability of severe hail (> 1") in grid box out to 3 hours
 - 25 x 25 km grid boxes
 - Hourly forecasts update with new satellite data



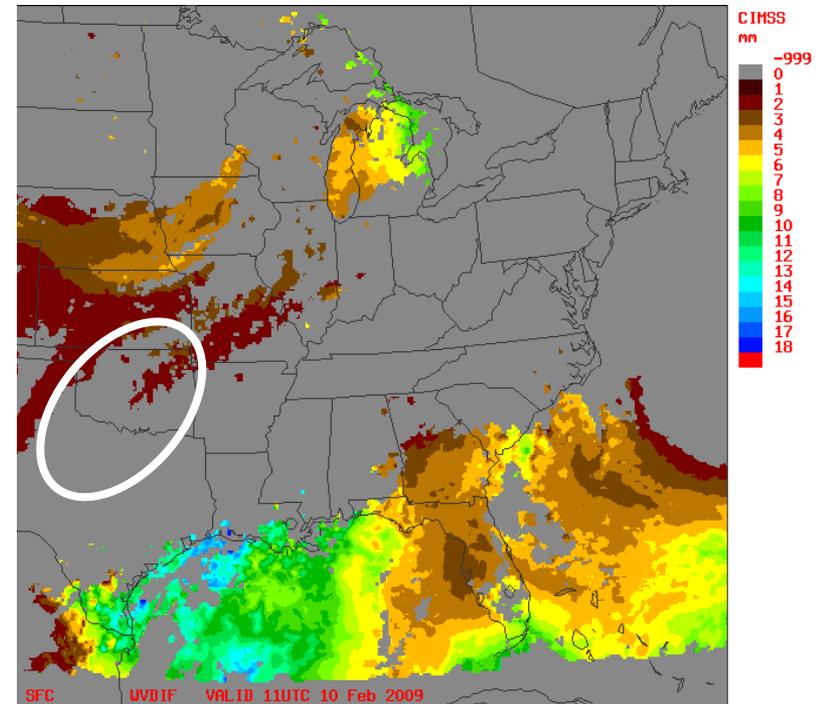
Some Feedback Gathered

- Relating products to forecasters' conceptual model is crucial
- Most products increased short-term situational awareness and forecast/warning confidence
 - Largest detractors: spatial and temporal limitations of current GOES
- Forecasters would like to be provided with products' background fields (ie – cooling rates, cloud mask, etc...)
- First day solely dedicated to training despite interesting weather
 - More case events
- Forecasters would like product tracks for temporal trends
- Additional uses for products discovered (ie – overshooting tops, cooling rates, total lightning, etc...)



What's Happening in 2011?

- 2011 Spring Experiment (mid-May through mid-June)
 - EFP convective initiation desk
 - New products demonstrated
 - 0-6 hour Nearcast Θ_e /PW difference
 - NSSL-WRF simulated GOES-R band differences
 - CAPS ensemble simulated satellite (pending funding)
- Summer Fire Weather Experiment (dates TBD)



References

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Thanks for your attention!

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GOES-R Websites:

<http://www.goes-r.gov/>

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

