GOES-R Proving Ground Update

Greg Mandt, GOES-R System Program Director
Dr. Steve Goodman, GOES-R Program Senior Scientist

As of September 1, 2011

Topics

- Background
- 2011 Product Demonstrations
- Product Examples
  - Baseline
  - Future capabilities
- NOAA's Hazardous Weather Testbed
- User Feedback
- Visiting Scientist Program
- Future Plans: 2012 and Beyond
- Training and Education
- Summary

What Is the GOES-R Proving Ground?

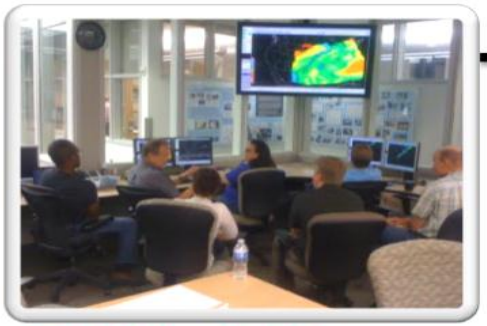
- Collaborative effort between the GOES-R Program Office, selected NOAA Cooperative Institutes, NWS forecast offices, NCEP National Centers, NASA SPoRT, JCSDA, and NOAA Testbeds
- Responsible for user readiness testing of GOES-R baseline products and future capabilities prior to launch
- Where proxy and simulated GOES-R products are tested, evaluated, and integrated into operations before launch to maximize user readiness for GOES-R capabilities
  - Satellite Champions at NWS National Centers
  - Develop training for users
  - Display within AWIPS/N-AWIPS and transition to AWIPS-II
  - Initial focus on High Impact Weather and warning related products requested by NWS
- A key element of GOES-R User Readiness (Risk Mitigation)

GOES-R Proving Ground Accelerates Utility and User Readiness

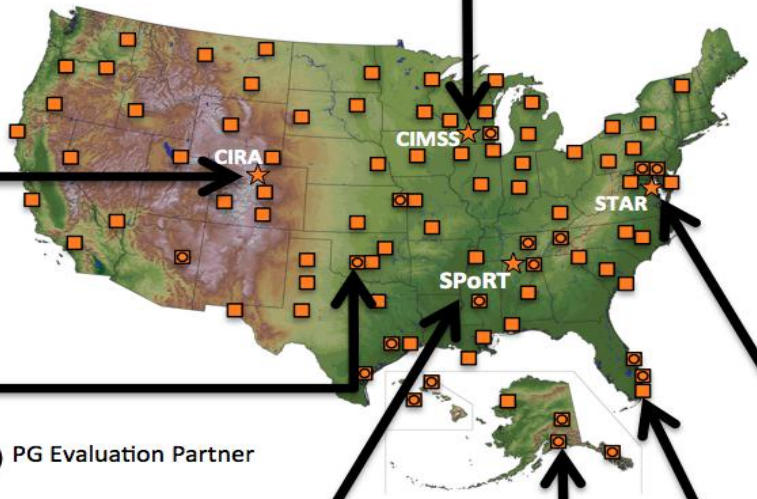
- Utilizing current systems (satellite, terrestrial, or model/synthetic) to emulate future GOES-R capabilities
- Infusing GOES-R products and techniques into NWS operations with emphasis on AWIPS and transitioning to AWIPS-II.
- Engaging in a dialogue to provide feedback to product developers from users
- Close coordination with GOES-R Algorithm Working Group (AWG) and Risk Reduction programs as sources of demonstration products, promoting a smooth transition to operations
- Matching observations/capabilities to forecast problems
- Developing/Assessing solutions in “testbeds” and transition to decision support system
- Conducting training, product assessment, and impact

GOES-R Proving Ground Partners

CIRA - Ft. Collins, CO
ABI Simulated Natural Color



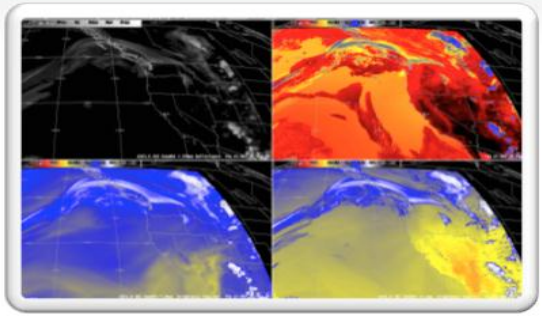
SPC – Oklahoma City, OK
Nearcast Training at the Hazardous Weather Testbed



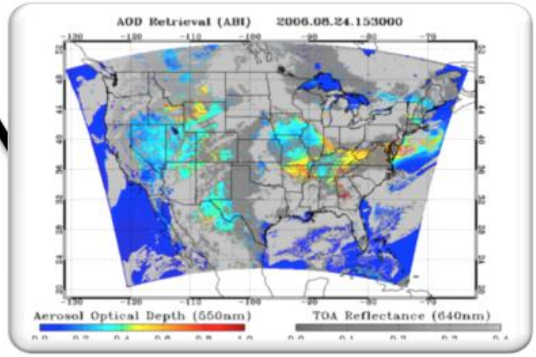
PG Evaluation Partner

PG Product Development Partner

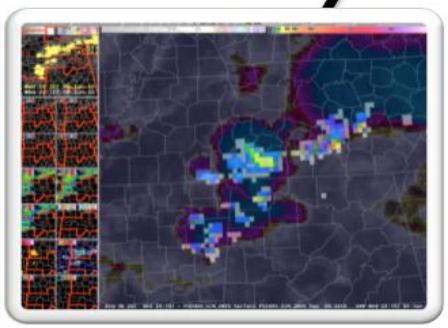
Cooperative Institute



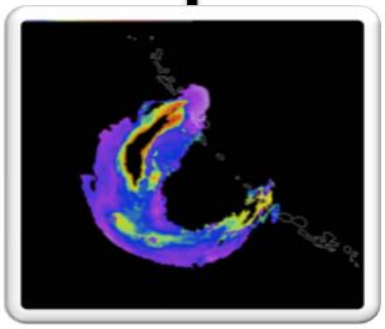
CIMSS – Madison, WI
Simulated ABI Bands



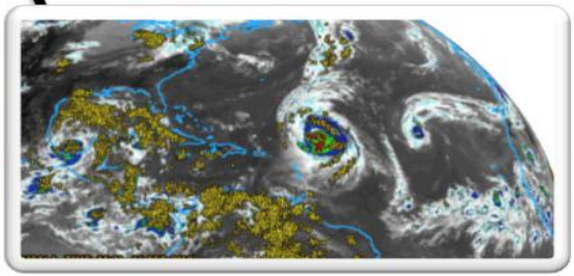
STAR – Camp Springs, MD
Aerosol Optical Depth Product



SPoRT – Huntsville, AL
GLM Lightning Flash Density



AFC – Anchorage, AK
Volcanic Ash Product



NHC – Miami, FL Rapid Intensification Index

July 2011

Proving Ground Product Evaluation

The following products are part of current GOES-R Proving Ground demonstrations:

Baseline Products

- Cloud and Moisture Imagery
- Volcanic Ash: Detection and Height
- Hurricane Intensity
- Lightning Detection: Events, Groups & Flashes
- Rainfall Rate/QPE
- Total Precipitable Water
- Fire/Hot Spot Characterization
- Cloud Top Phase
- Cloud Top Height
- Cloud Top Temperature
- Derived Motion Winds
- Aerosol Detection
- Aerosol Optical Depth

Future Capabilities

- Aircraft Icing Threat
- Convective Initiation
- Enhanced “V”/Overshooting Top Detection
- Low Cloud and Fog
- SO_2 Detection

2011 Product Demonstrations

- Severe Weather: NWS SPC and Hazardous Weather Testbed
  - Improved versions of 2010 products, Cloud and Moisture imagery, Nearcasting
  - 24 forecasters participated from across the country over a 5-week period May-June,
  - 2-week fire weather demonstration in August
- Hurricanes and Tropical Cyclones: NWS NHC Testbed
  - Gain more experience with RGB products
  - Continue evaluation of lightning input
  - Potential new products: Overshooting tops, and product to discriminate thin from thick cirrus over tropical cyclones, true color products
  - Provide RGB products in N-AWIPS format
- Aviation Weather: OCONUS - Pacific and Alaska Regions, Alaska Aviation Weather Unit and NWS AWC (Kansas City)
  - Cloud top height and phase (Alaska only)
  - Fog/low cloud probability
  - Volcanic ash mass loading, height, and particle size
  - SO2 detection and loading
  - Convective initiation
  - Nearcasting (AWC only)

2011 Product Demonstrations

- Oceanic Weather and Precipitation: NWS OPC, HPC, NESDIS SAB Testbed
  - Cloud and moisture imagery
  - Derived stability Indices
  - Lightning detection
  - Convective initiation
  - Enhanced V / Overshooting top detection
  - Cloud top phase, height, temperature
  - RGB air mass product
- Quantitative Precipitation Forecasts: NWS HPC and NESDIS SAB
  - Cloud and moisture imagery
  - Derived motion winds
  - RGB air mass
  - Rainfall Rate QPE

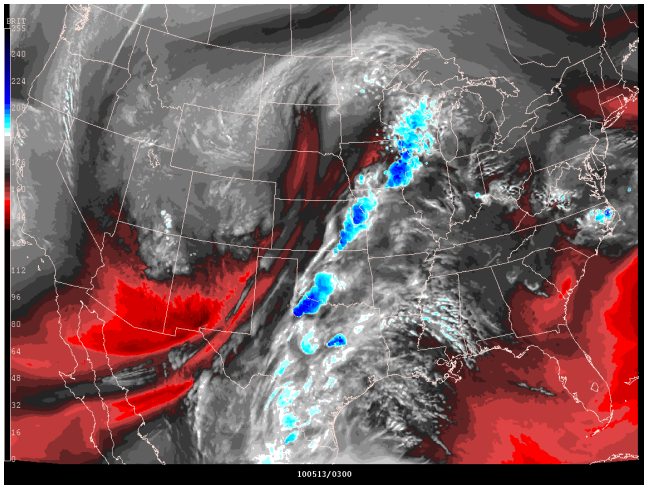
2011 Product Demonstrations

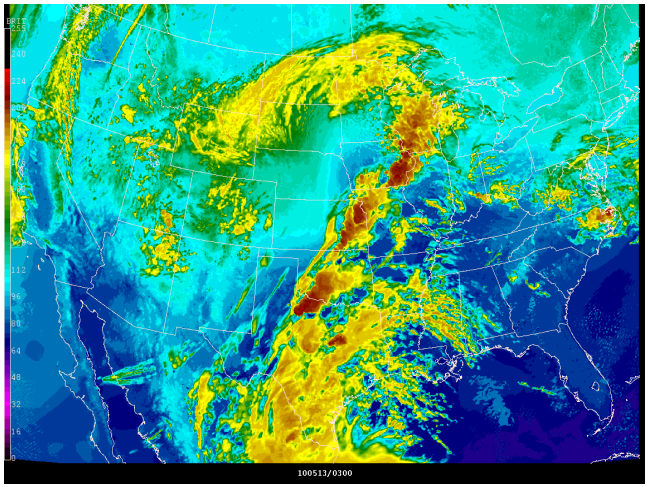
- Hazardous Weather and Rainfall Potential: NESDIS SAB
  - Cloud and moisture imagery
  - Derived stability Indices
  - Lightning detection
  - Convective initiation
  - Enhanced V / Overshooting top detection
  - Cloud top phase, height, temperature
  - RGB air mass product

- Space Weather: NWS SwPC and NESDIS NGDC
  - Planning phase-implementation plan in development
  - Solar thematic maps (SUVI)
  - Products from NASA SDO to approximate GOES-R SUVI
  - Create means to ingest and display GOES-R like Level 2+ products

Baseline Product : Simulated Satellite Imagery (KPPs)

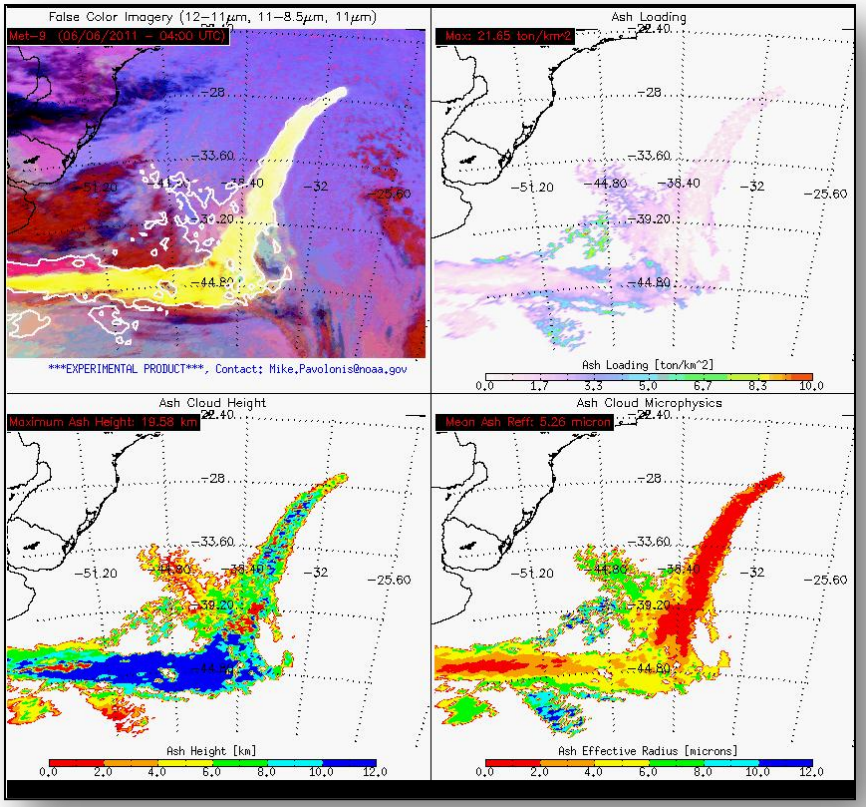
- Simulated using 0Z NSSL-WRF 10-km output
  - 9 non-solar ABI IR bands
  - 24 forecast hours
  - 1-hour time-steps
    - 12 UTC day 1 – 12 UTC day 2
  - Demonstration focused on:
    - 3 water vapor bands
    - Standard window IR band
  - Ability to produce legacy atmospheric profiles and band difference products to compare with model forecasts





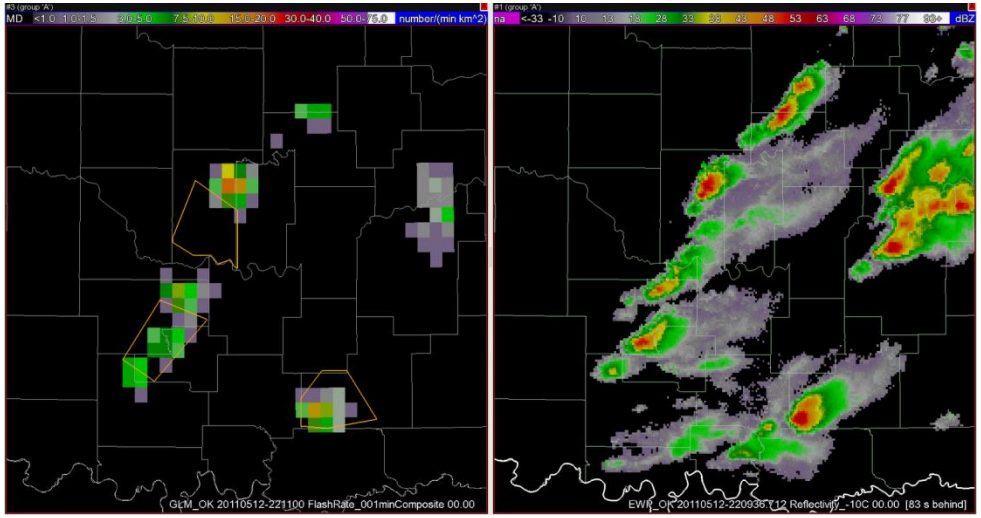
Baseline Product: Volcanic Ash Product Suite

- Chile's Puyehue-Cordón Caulle Volcano erupted on June 4, 2011, forming a tall ash plume above the Andes Mountains
- The GOES-R Proving Ground provides near real-time volcanic ash retrieval products (using Meteosat SEVIRI data as a proxy for the GOES-R Advanced Baseline Imager) to identify a significant volcanic ash plume emerging over the Atlantic Ocean impacting aviation operations with many cancelled flights.
- Similar data was provided by STAR to the London Volcanic Ash Advisory Center (VAAC) during the eruption of Eyjafjallajökull in Iceland in May 2010.



Baseline Product: Lightning Detection with the Geostationary Lightning Mapper (GLM)

- A Pseudo GLM (PGLM) total lightning product assisted in a severe thunderstorm warning at NOAA's Hazardous Weather Testbed on May 12, 2011 in Norman, Oklahoma. A rapid increase of the total lightning rate, along with the forecaster's interrogation of radar data, led to a severe thunderstorm warning, later verified with several severe hail reports.
- Research using total lightning trends to diagnose severe storm intensification indicates the potential to increase warning lead-time to 20 minutes or more
- The PGLM flash extent density was a useful precursor in identifying when the first cloud-to-ground strikes would occur. The PGLM preceded the first cloud-to-ground strike by approximately 30 minutes.
- GLM's ability to detect in-cloud lightning before the first ground strike provides a valuable early warning indicator to enhance lightning safety



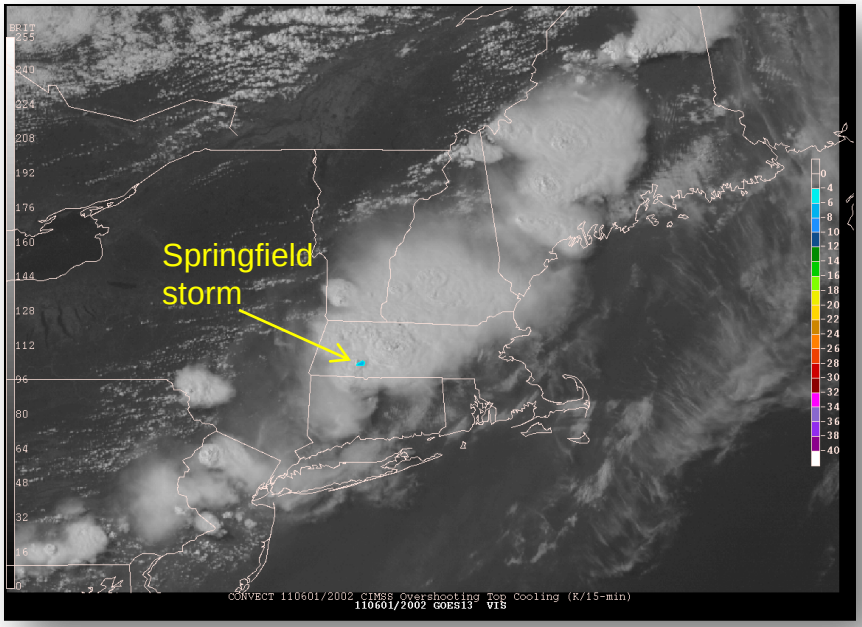
The PGLM flash extent density is on the left with the corresponding radar reflectivity on the right.

Future Capability: Overshooting Top Detection

- The GOES-R Overshooting Top Detection (OTD) algorithm identified an overshooting top at NOAA's Hazardous Weather Testbed with the severe thunderstorm and tornado that in Springfield, MA on June 1, 2011

- The OTD singled out the most intense thunderstorm cell out of a very large storm complex over Southern and Central New England.

- At the HWT Experimental Warning Program and Convective Initiation desk the NWS forecasters were alerted to a developing severe storm with 28 minute lead time before the first tornado report.

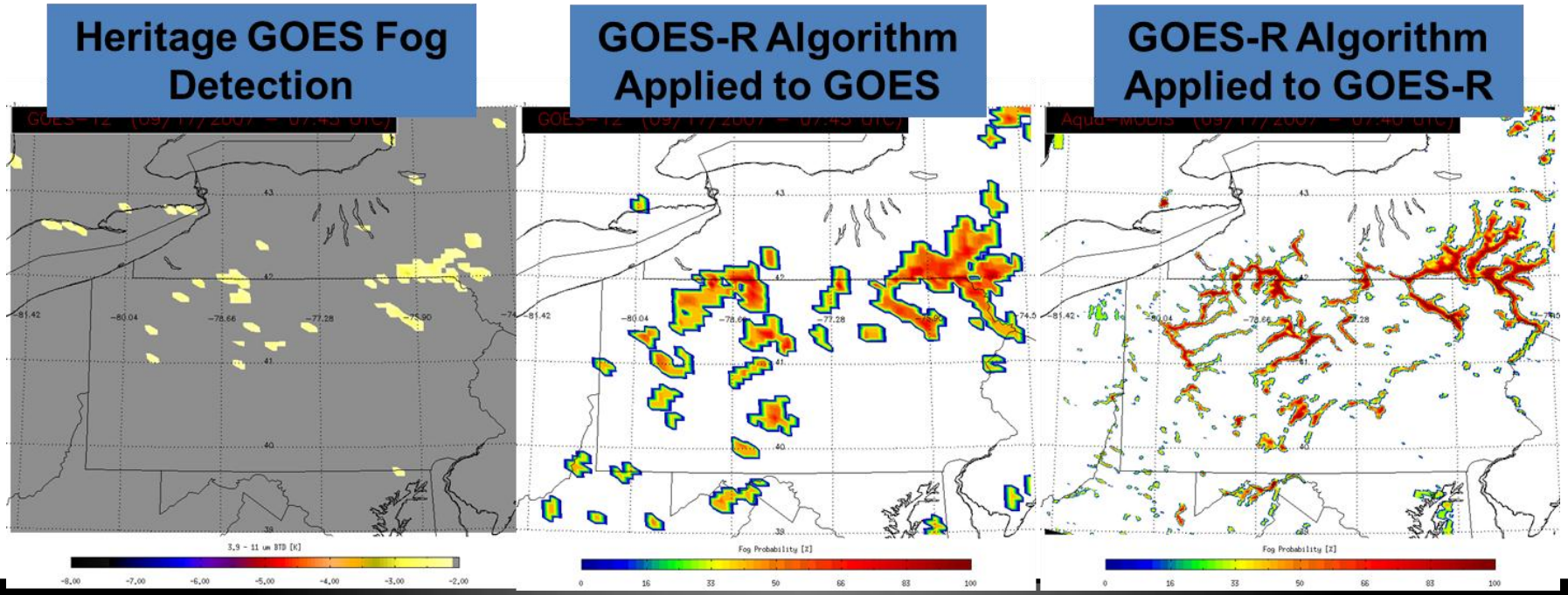


Future Capability: Fog Detection

The GOES-R fog detection product will significantly improve geostationary satellite fog monitoring capabilities because:

- ***Improved algorithm technology*** - the GOES-R algorithm provides quantitative information on fog probability, while heritage GOES fog detection products are more qualitative in nature

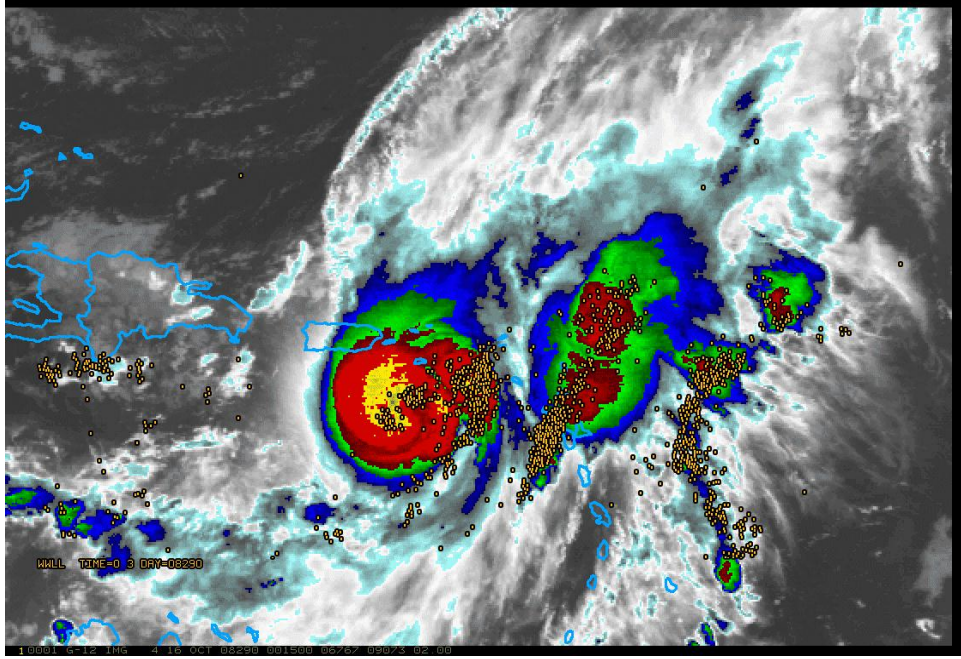
- ***Improved sensor technology*** - the ABI has greatly improved spectral information, spatial resolution, and temporal resolution



Future Capability: TC Rapid Intensification Index

- Inner core and rainband lightning provide predictive information
- Added to other predictors such as SST and vertical shear
- Used to forecast rapid intensification and rapid weakening
- Impact of lightning can be determined quantitatively from product verification

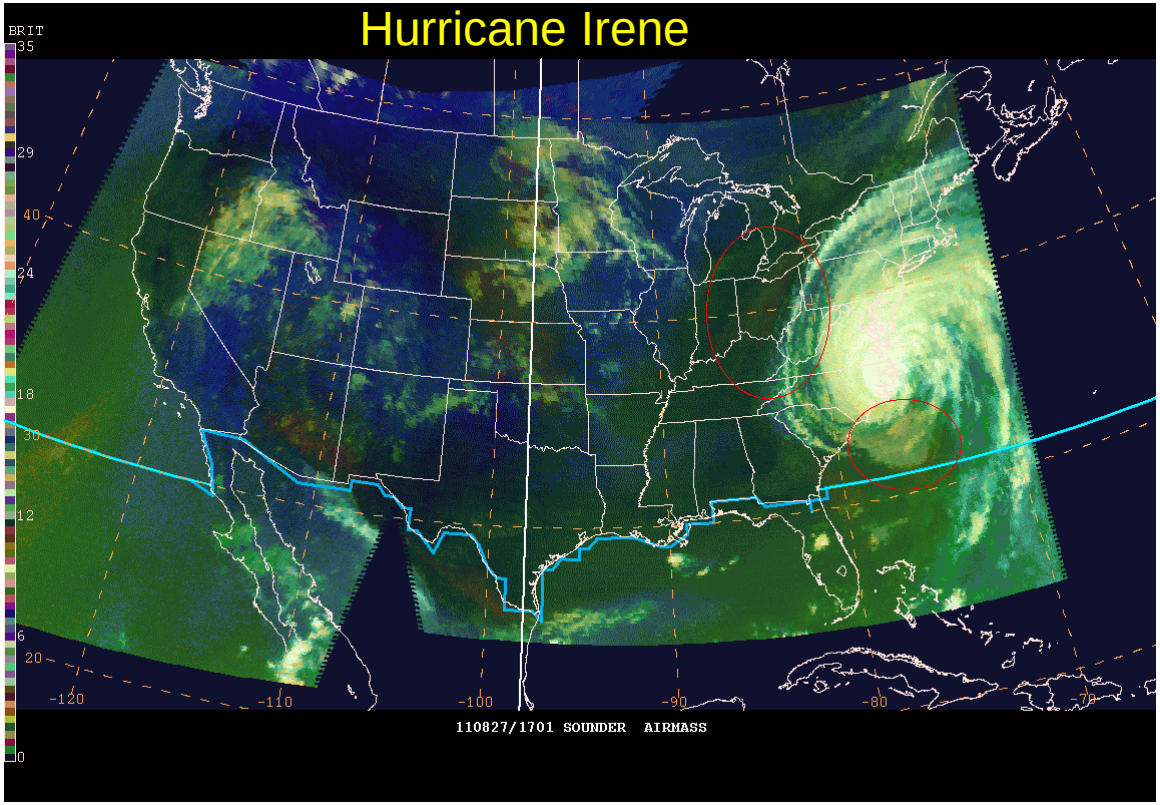
WWLLN lightning locations
Hurricane Omar (2008)



Future Capability: RGB Air Mass Product

"The RGB airmass and dust products were very useful in showing that the pre-Irene disturbance was going to have dry air issues initially. I think this helped us give the system a low chance of development in the early tropical weather outlooks."

Jack Beven, NHC



Caption: As the hurricane is approaching Cape Lookout, NC, the GOES sounder shows evidence of synoptic-scale dry air can be seen on the south-southeast side of the circulation (highlighted with a red ellipse). A second circle to the northwest of the storm shows synoptic-scale dry air on the periphery of the storm. This dry air is caught in the southwest inflow channel, effectively cutting off convective development by introducing stably stratified air.

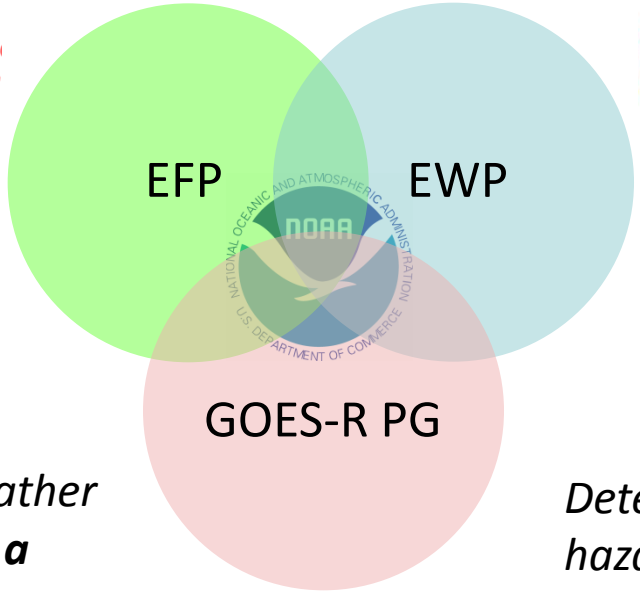
From NASA SPoRT and Michael Folmer (CICS Satellite Champion at HPC/OHC/SAB)

NOAA's Hazardous Weather Testbed

Storm Prediction Center
Norman, Oklahoma

Experimental
Forecast
Program

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



NATIONAL SEVERE STORMS LABORATORY

Experimental
Warning
Program

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

HWT 2011 Spring Experiment

Evaluating Products with greatest operational value

- Nearcasting products
  - Routinely used at all the desks in both the EFP and EWP
  - Did a good job showing where convection is likely and just as important… where it can be ruled out in the next 1-6 hours
  - SPC deputy director plans to make products available to operational forecasters this summer for evaluation
  - HPC representative requested a one week visit by CIMSS Visiting Scientists to introduce the products to forecasters
- Lightning Detection
  - Ground-based VHF Lightning Mapping Array provides pseudo GLM products
  - Routinely used in the EWP
  - Numerous examples of operational value in generating forecasts of lightning threat and severe weather warnings
  - Provides early indication of when 1st cloud to ground flash will occur
- Simulated Cloud and Moisture Imagery from NSSL WRF
  - Part of daily routine at the CI desk for model performance evaluation
  - Used for tracking model forecasts vs observations

Capturing User 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

HWT Forecaster Feedback

Lightning Detection: “We saw several instances where the total lightning was picking up on storms before the AWIPS lightning [NLDN] program picked up on them. One could see the utility of this in the future, bringing with it a potential for lighting statements and potentially lightning based warnings.”

“The total lightning data is an excellent tool for monitoring convection, I see much promise for such data in the future…”

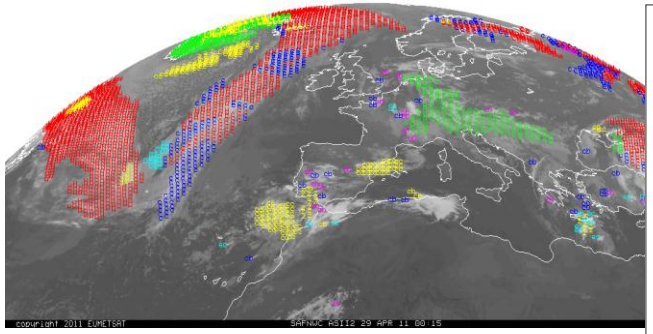
WRF Band Difference (KPPs): “The band difference has a lot of potential... you can get a head start by looking at the trends in the data that help you anticipate what's going to happen.”

Nearcast (Legacy Atmospheric Profiles): “A lot of the time to increase my lead time in the morning, I like to take a look at PW and WV... so I found that this was a nice utility because it was indicative of finding areas of greatly deep instability, or moisture source regions.”

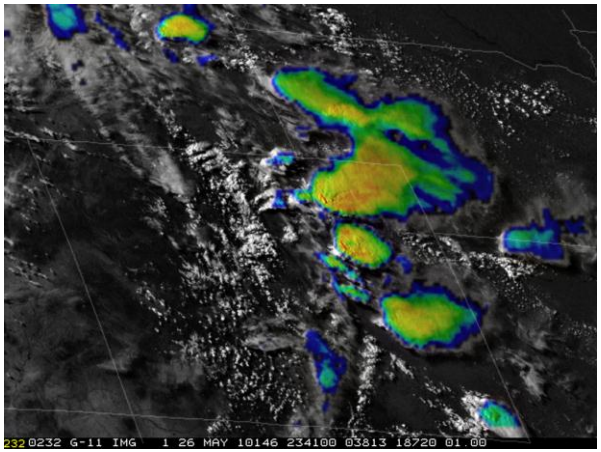
NOAA-EUMETSAT Cooperation: GOES-R Visiting Scientist Program

- Ama Ba (NWS MDL): *Automatic Satellite Image Interpretation Product*: "first-hand information about the use and benefits of the NWC SAF products for a potential use in NWS operations."

- Dan Lindsey (NESDIS STAR): "Dr. Setvak introduced the *Sandwich Product*. This product allows one to easily co-locate various cloud-top features (overshooting tops, plumes, gravity waves, etc.) with the associated brightness temperature features, such as cold and warm portions of a storm top, or BT minima…The higher resolution data available with GOES-R will greatly improve this product."



Symbol:		Conceptual Model:
SAT + NWP:		
w	(red)	warm front
c	(blue)	cold front
c	(red)	cold front in warm air advection
~	(magenta)	wave
~	(red)	developing wave
~	(green)	upper wave
o	(green)	occlusion
DI	(cyan)	dry intrusion
ec	(cyan)	enhanced cumulus
m,cb, ●	(blue)	MCS, Cb (decaying stage, ● = embedded)
m,cb, ●	(yellow)	MCS, Cb (mature stage, ● = embedded)
m,cb, ●	(magenta)	MCS, Cb (mature stage, ● = embedded)
co	(yellow)	comma cloudiness
L	(yellow)	lee cloudiness
ji	(yellow)	front intensification in left exit region of a Jet Streak
ul	(yellow)	upper level low
z	(yellow)	cold air cloudiness
F	(yellow)	fibre



Example of a "sandwich" product, in which a GOES-11 color-enhanced 10.7 µm image is blended with the corresponding visible image, from 26 May 2010 over Colorado. A number of supercell thunderstorms are active at this time. The warmer colors (red, orange) represent colder brightness temps.

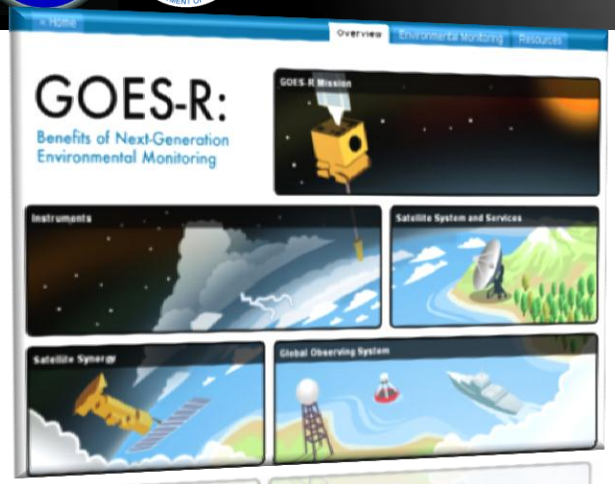
Visiting Scientists: Satellite Champions

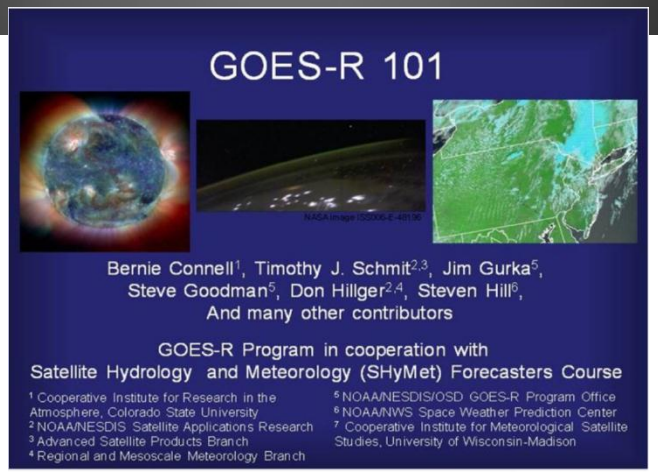
NWS Centers	Visiting Scientist/PI	CI	NOAA Host
SPC/HWT	C. Siewert, K. Kuhlman	OU-CIMMS	Russ Schneider
OPC, HPC, SAB	M. Follmer, S. Rudlosky	CICS	J. Sienkiewicz, E. Danaher, J. Kibler
AWC	new hire	UW-CIMSS	David Bright
NWS Training Center	new hire	UW-CIMSS	John Ogren
Pac Region	S. Businger /new hire	UH-JIMAR	Bill Ward
AK Region	T. Heinrichs	UAF-CIFAR	Gary Hufford
Multiple	R. Brummer	STAR/CSU-CIRA	Various
Multiple	W. Feltz	STAR/UW-CIMSS	Various
Multiple	G. Jedlovec	NASA-SPoRT	Various
SwPC	W. Denig	NGDC/CIRES	Rodney Viereck
NWS HQS	A. Huff/ S. Kondragunta/R. Hoff	STAR/UMBC	Ivanka Stajner

Future Plans: 2012 And Beyond

- Demonstrate products and decision aids in NOAA Testbeds, NCEP Centers, WFOs, and the NWS Proving Ground Training Center
- Transition from demonstrating Warning Related Products to demonstrating the remaining GOES-R Baseline Products, Day 2 Future Capability Products, Decision Aids, and Fused Decision Support
- Continue to develop, demonstrate, and test fused decision support services
- Enhanced JPSS collaboration (integrated products, VIIRS as a proxy for ABI)

Training and Education





Online training modules

- http://meted.ucar.edu/goes_r/envmon/
- http://cimss.ssec.wisc.edu/satmet/
- http://rammb.cira.colostate.edu/visit/video/goesr101/player.html
- http://rammb.cira.colostate.edu/training/shymet/forecaster_intro.asp

• **COMET Summer Faculty Course:** "Integrating Satellite Data and Products into Geoscience Courses with Emphasis on Advances in Geostationary Satellite System," Aug. 8-12, 2011.

• **Outreach Projects (with NWSFOs):** COMET will reach out to the GOES-R Proving Ground Partners and connect them with university faculty to use current and prototype data products for the purpose of building a bridge from products that are currently available to those that will become available when GOES-R is launched.

Summary

- GOES-R Proving Ground provides mechanism to:
  - Involve CIs, AWG, National Centers, NOAA Testbeds and WFOs in user readiness
  - Get prototype GOES-R products in hands of forecasters
  - Keep lines of communication open between developers and forecasters
  - Allow end user to have say in final product, how it is displayed and integrated into operations
- Proving Ground continues to grow and plans are in place for 2011 and beyond.
- For GOES-R to be a success, forecasters must be able to use GOES-R products on Day 1!

Backup

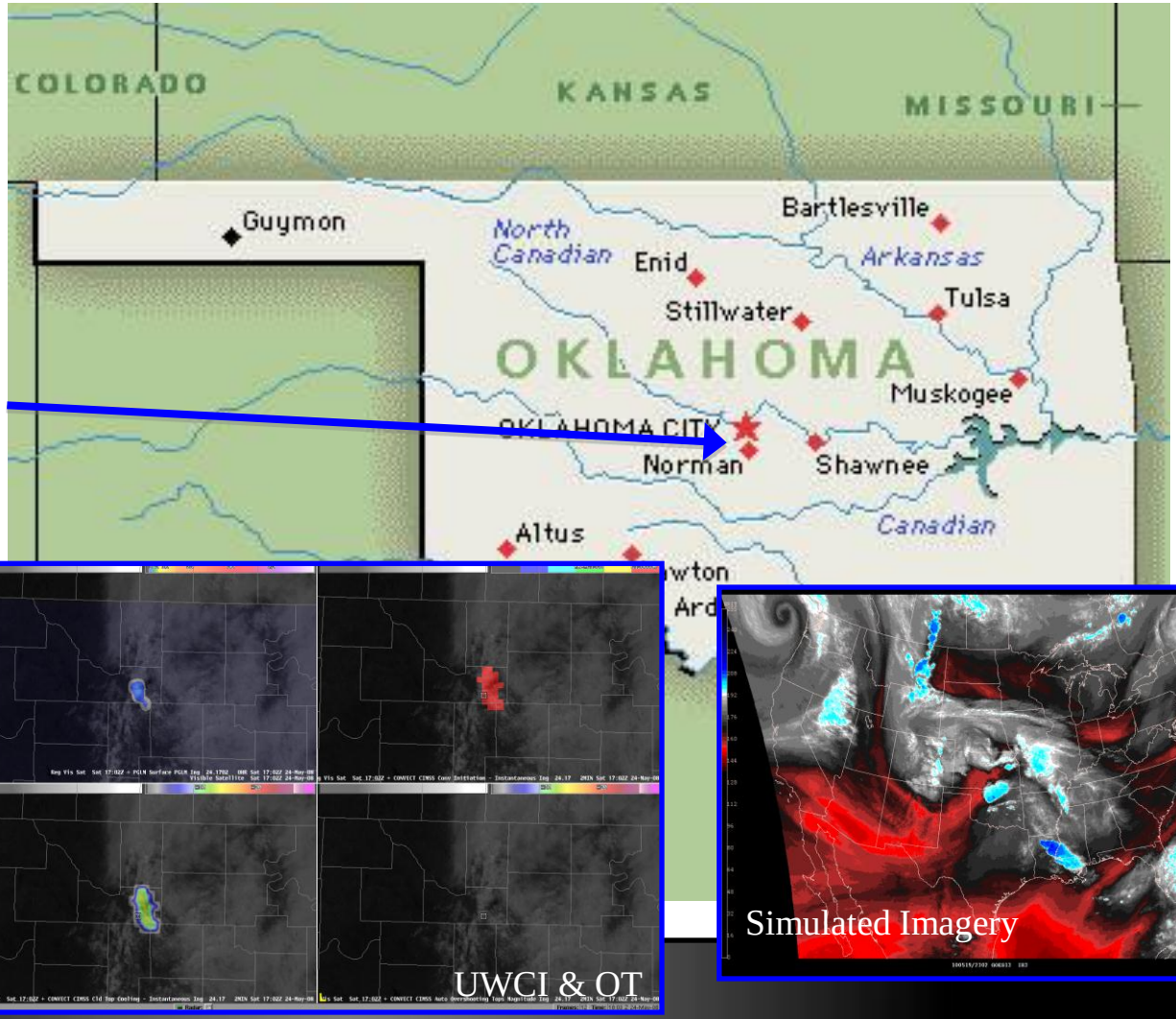
Proving Ground Organization

Executive Board:
Steve Goodman (Chair)- NESDIS/GOES-R Program Senior Scientist
Jim Gurka- NESDIS/GOES-R Ground Segment Project Scientist
Jaime Daniels-NESDIS/STAR/GOES-R AWG
Mark DeMaria-NESDIS/STAR/ GOES-R Risk Reduction
Tim Schmit-NESDIS/STAR/ASPB
Tom Renkevens-NESDIS OSPO
Mike W. Johnson, NWS/OST/Programs & Planning
Kevin Schrab- NWS/OCCWS
Gary Jedlovec-NASA SPoRT

Advisory Team:
Tony Mostek-NWS/COMET
Russ Schneider- NWS/NCEP/SPC
Gary Hufford- NWS Alaska Region
Shanna Pitter- PPI
Cecilia Miner- NWS
Steve Miller- CIRA
Wayne Feltz-CIMSS
Shobha Kondragunta-NESDIS/STAR AQ IPT

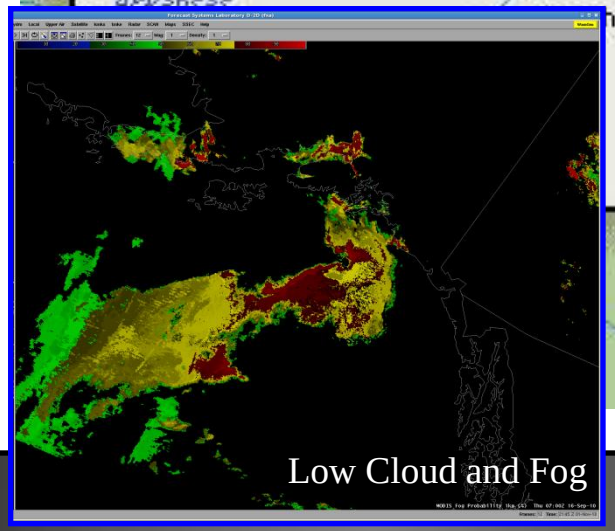
Ongoing Demonstrations 2011
HWT/SPC Spring Experiment

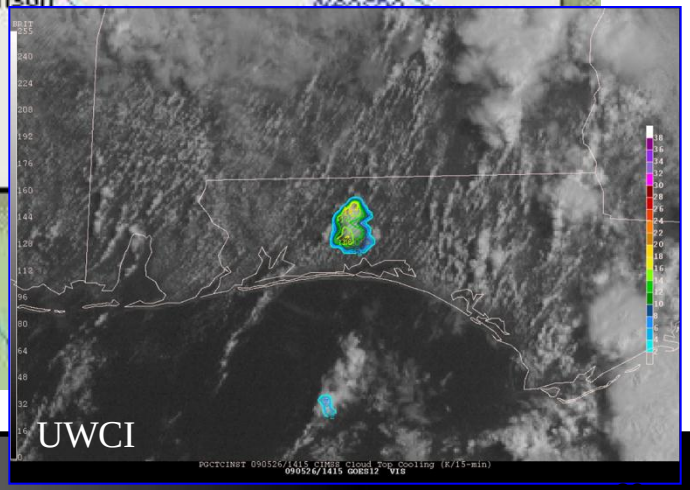
Location
-Hazardous Weather Testbed/Storm Prediction Center, Norman, OK
Focus
-Convection
Products
-Cloud and moisture imagery
-Convective initiation
  - 3 products
-Overshooting-top / Enhanced-V detection
-Total lightning detection
  - 2 products
-Severe hail probability
Duration
-17 May – 18 June 2011



Ongoing Demonstrations 2011
Aviation Weather Experiment

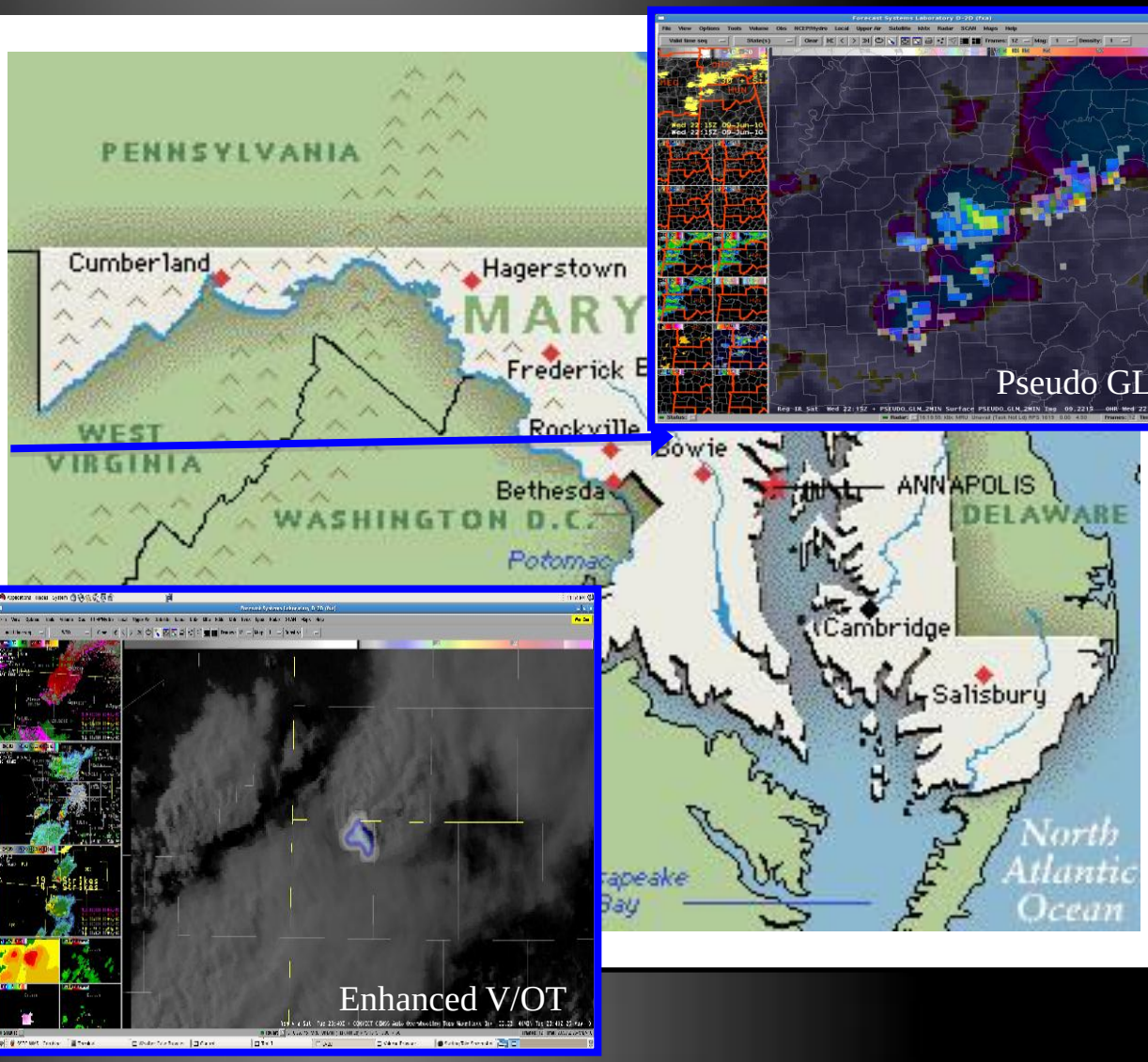
Location
-Aviation Weather Center, Kansas City, KS
Focus
-Aviation
Products
-Low Cloud and Fog
-SO2 Detection
-Volcanic Ash Detection and Height
-Aircraft Icing Threat
-UW Convective Initiation
-Nearcasting Model
Duration
-1 Jun – 31 Oct (TBD) 2011


Low Cloud and Fog

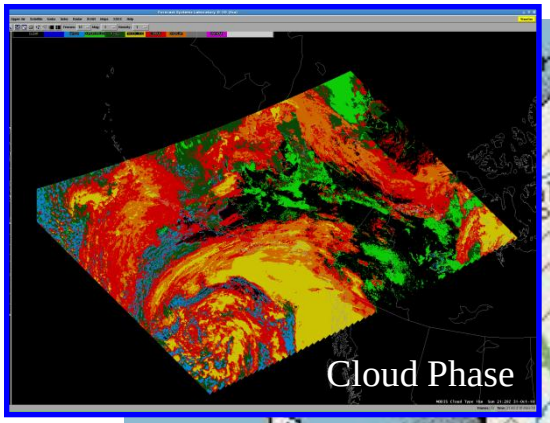

UWCI

Ongoing Demonstrations 2011
OPC and SAB Demonstration

Location
-Ocean Prediction Center, Camp Springs, MD
-NESDIS Satellite Analysis Branch, Camp Springs, MD
Focus
-Offshore T-Storms
Products
-Cloud/Moisture Imagery
-Convective Initiation
-Cloud Top Phase
-Cloud Top Height
-Cloud Top Temperature
-Enhanced "V"/Overshooting Top Detection
-Lightning Detection
Duration
-Approx. June – Sept 2011



Ongoing Demonstrations 2011
High Latitude and Arctic Experiment



Location

-Alaska Region

- GINA
- WFO Fairbanks
- WFO Anchorage
- WFO Juneau
- AAWU

Focus

-Snow/Cloud/Ash/Aviation

Products

-Cloud Mask
-Cloud Phase
-Low Cloud and Fog
-SO2 Detection
-Volcanic Ash Detection and Height

Duration

- 6 Dec 2010 – 31 Aug 2011

Future Demonstrations 2011
Hurricane Season Experiment

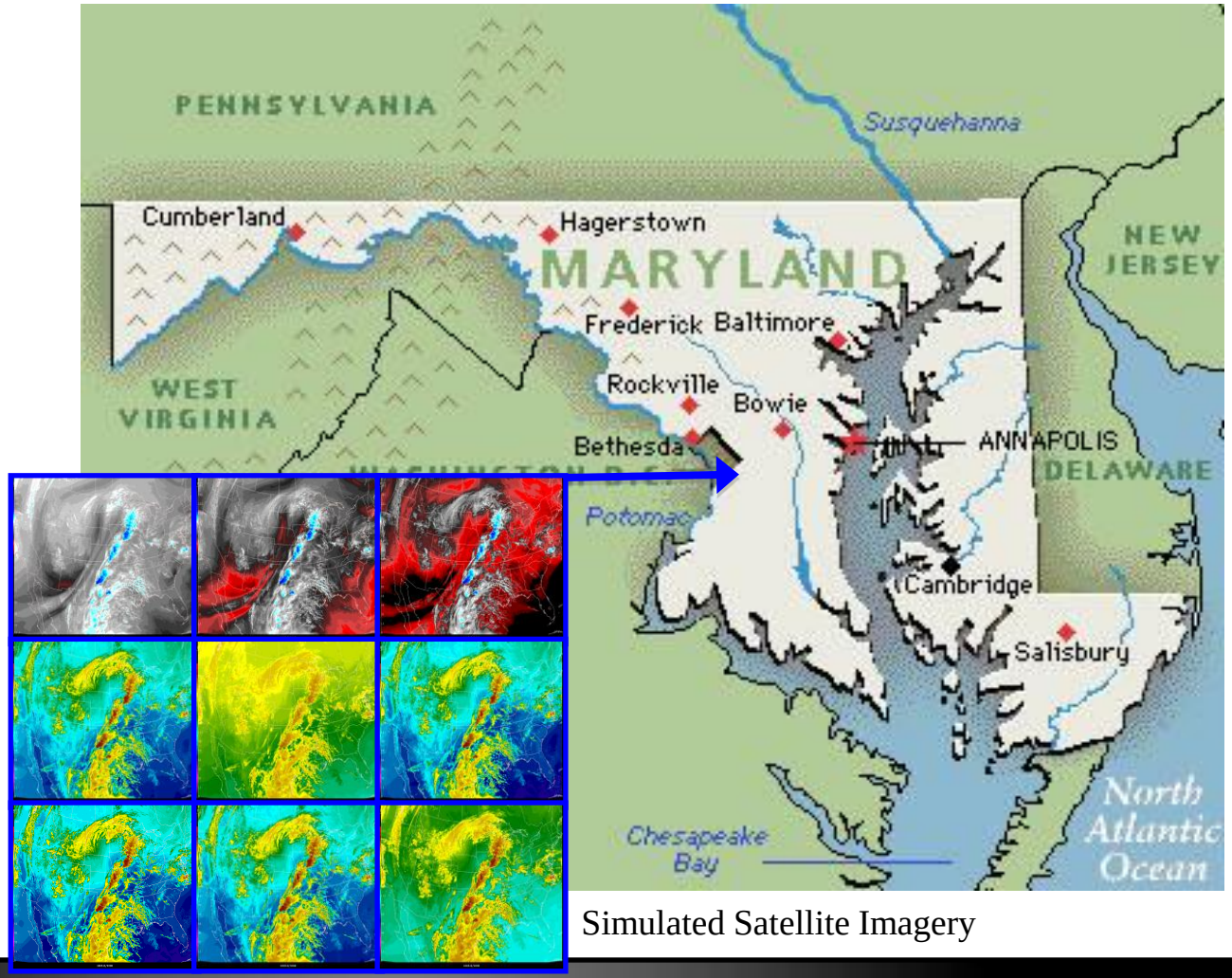
Location
-National Hurricane Center, Miami, FL
Focus
-Tropical Weather
Products
-Hurricane Intensity Estimate
-Enhanced "V"/Overshooting Tops
-Super Rapid Scan Imagery
-False color imagery product
-GOES-R natural color imagery product
-Rapid Intensity Index
-RGB Aerosol/Dust Product
-RGB Airmass Product
-Saharan Air Layer Product
Duration
-1 Aug – 30 Nov 2011

NHC 2010

RGB Airmass

Future Demonstrations 2011
HPC and SAB Demonstration

Location
-Hydrometeorological Prediction Center, Camp Springs, MD
-NESDIS Satellite Analysis Branch, Camp Springs, MD
Focus
-Precipitation/QPF
Products
-Cloud/Moisture Imagery
-Derived Motion Winds
-RGB Airmass
-Rainfall Rate/QPE
Duration
-Approx. July – Oct 2011

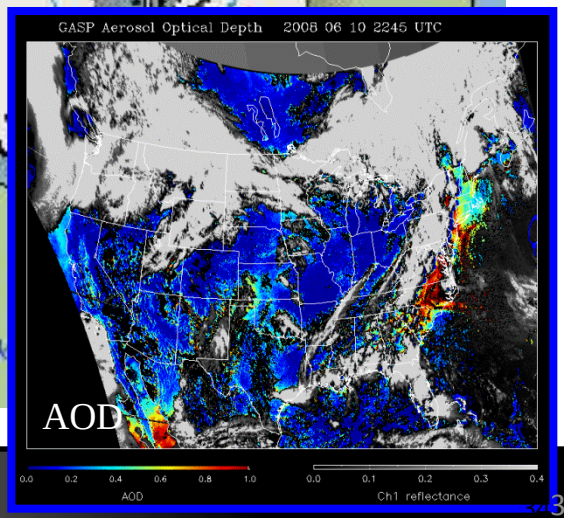


Simulated Satellite Imagery

Future Demonstrations 2011 Air Quality Experiment

Location
-UMBC
-EPA Region III
Focus
-Air Quality
Products
-Aerosol Optical Depth
-Aerosol Detection (Smoke/Dust)
-Fire/Emissions
-RGB Imagery
Duration
-Approx. 11 July – 24 2011
Notes
-Coincides with the DISCOVER-AQ experiment


HMS Fire and Smoke Product



Future Demonstrations 2011 Pacific Region Demonstration

Location
-Pacific Region
Focus
-Tropical Cyclone
-Heavy Rainfall
-Aviation
Products (List is under Review)
-Tropical Cyclone Intensity
-Lightning Detection
-Volcanic Ash Detection and Height
-SO2 Detection
-Aerosol Detection
-Rainfall Rate/QPE
-Oragraphic Rain Index
-Total Precipitable Water
-Atmospheric Rivers
-UW Convective Initiation
Start Date
-TBD

Inter-office / Inter-agency Collaboration

Use of SPoRT Data in EVTT / EVCM

ROSES A.18 AWIPS II Visualization & Collaboration NWS, FEMA, NASA

Integrate NASA Observations/Data products & AWIPS II Data products into EVTT for Enhanced Decision Making

ROSES A.28 Prototype DSS for GOMA with Texas Governor's Division of Emergency Management (GDEM)

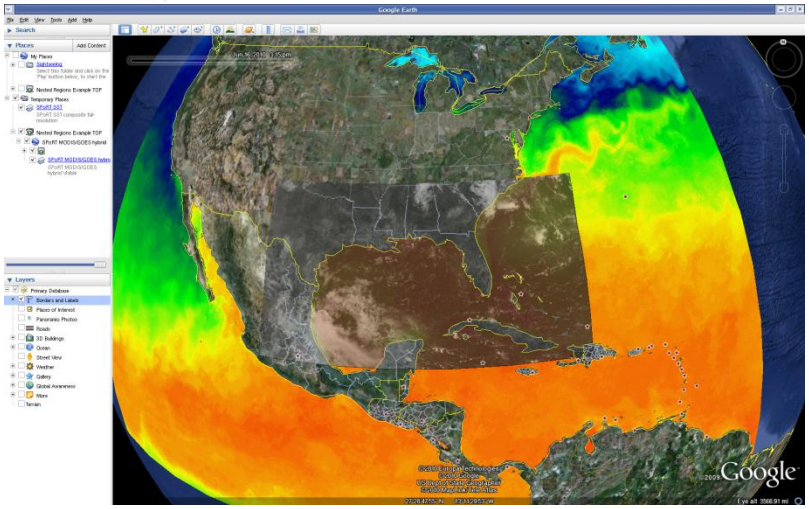
Integrate NASA Observations/Data & AWIPS II Data into EVTT for Enhanced Decision Making

Enabling Federal agencies to collaborate ((A.18) NOAA, NWS & FEMA) and extend that collaboration to the State of Texas and Gulf managers (A.28) to integrate critical storm surge, localized sea level rise and subsidence information from NASA as a pilot DSS for the rest of the GOMA

Partner with Dave Jones of Storm Center Communications in NASA / ROSES activity to integrate SPoRT data and products into the into the EnviroVision Touch Table (EVTT) collaboration environment and EnVirocast Collaboration Module (EVCM)

- natural disaster preparedness and warning
- Gulf of Mexico Alliance (GOMA) partners and Texas Governors Division of Environmental Management
- FEMA / NWS SR

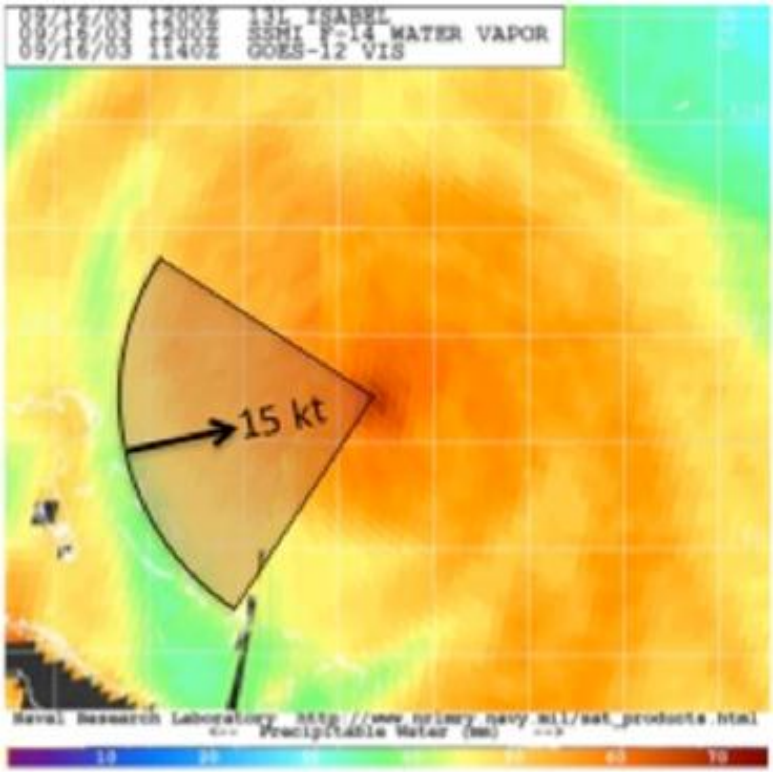
New collaboration with Alaska to bring EVCM capability and SPoRT data to the region



Wrappers for GoogleEarth displays of NASA data

Example of Future Capability: Tropical Cyclone Intensification

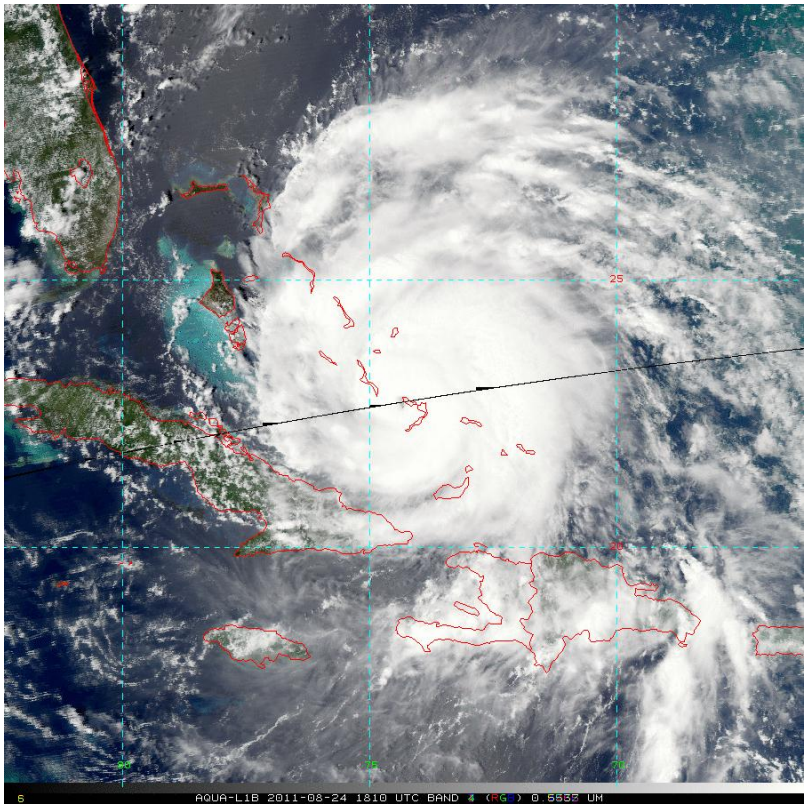
- Combining ABI, GLM and polar data to improve intensity forecasting
  - Being tested in NHC Proving Ground
- Developing RGB applications for tropical cyclone forecasting
- Applications to tropical cyclone genesis and wind structure



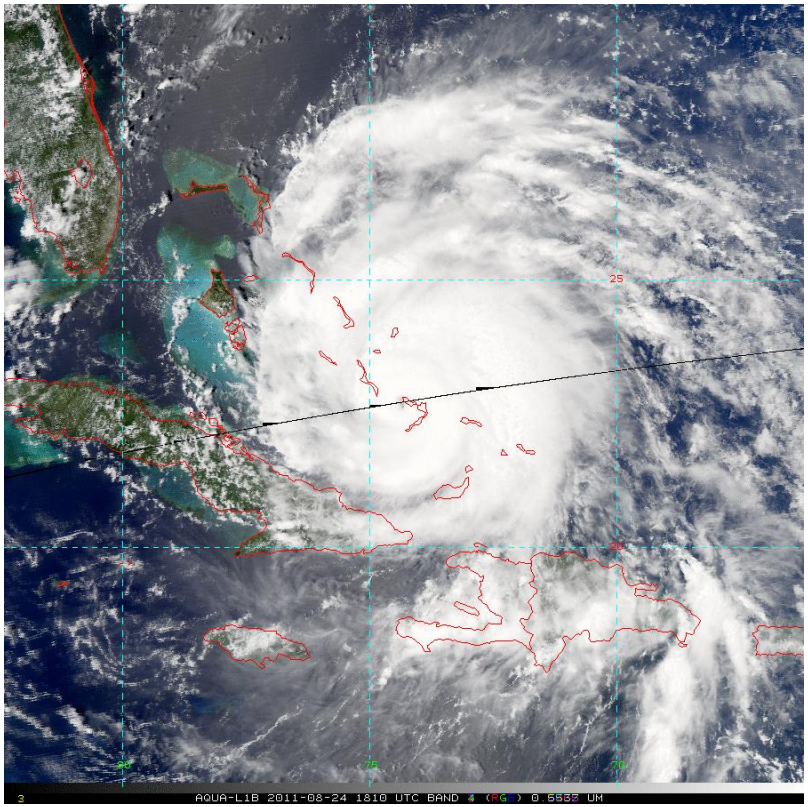
Example of a predictor from TPW analyses being added to the RII (upshear TPW) in combination with GLM and other data.

Courtesy M. DeMaria RAMMB/NOAA-STAR

Future Capability: Natural Color Imagery from MODIS



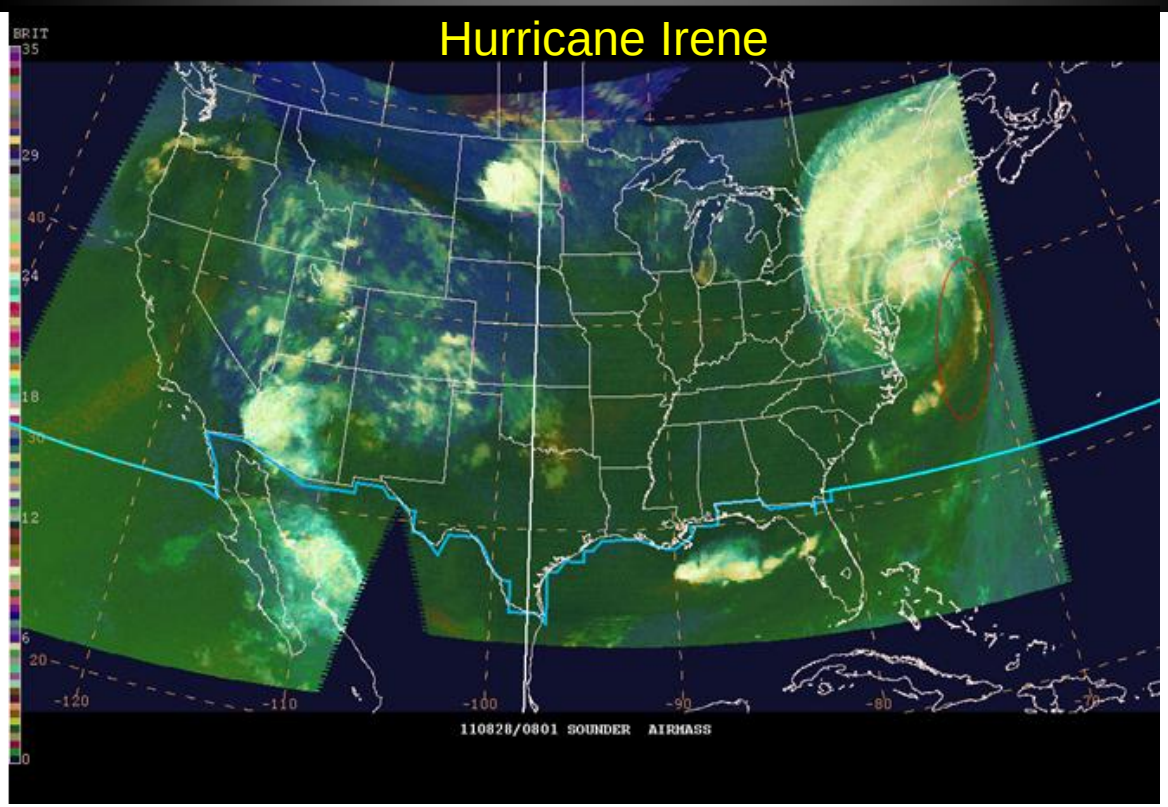
Simulated Green



Observed Green

Caption: GOES-R natural color (left) and true color (right) from MODIS. Storm was close to center of MODIS pass, so limb eff
Less obvious. Shows shallow water regions in western Bahamas.

Future Capability: RGB Air Mass Product



Caption: This GOES sounder image is prior to the second landfall in Little Egg Harbor, NJ as a category 1 hurricane. At this point, the dry air is continuing to distort the circulation with all of the deep convective growth on the northeastern portion of the circulation. The synoptic-scale dry air has wrapped fully around the storm and is seen rotating around the eastern side of the cloud shield (red ellipse). This is when the storm has begun the process of becoming extratropical as there is a good mix of tropical (green coloring) and continental (red and blue coloring) airmasses rotating in and around Irene's core.

From NASA SPoRT and Michael Folmer (CICS Satellite Champion at HPC/OHC/SAB)

HWT 2009 Spring Experiment

- In 2009 experiment…primary focus was on Convective Initiation Product.
- In 2009 experiment…LMA data used to generate 10-km source density product from three sites:
  - Norman OK
  - Huntsville AL
  - Washington D.C.

Lessons Learned at SPC (2009): Future Capability Product

- **Convective Initiation (CI)/Cloud Top Cooling (CTC)**
  - CTC is valuable product in itself
  - Diagnostic tool rather than prognostic over SE warm sector environments
  - Masked where thick cirrus present
  - Thin cirrus over land/water/water clouds and expanding edge false alarms
  - Avg. lead time ~15 minutes over radar (for successful nowcasts)
  - Full disk 30 min. scan limitations (false alarms/missed nowcasts)
  - Cloud detection limitations due to poor spatial/spectral resolution
  - Instantaneous fields more useful to forecasters than accumulated fields
  - Overlay on visible/IR essential to forecasters
  - Continue CTC after CI occurs (storm severity) interest from forecasters
  - Effective for terrain/dryline convection
  - CI misses some CTC signals
  - Works well in rapid scan operations

2010 Spring Experiment

Products evaluated and user feedback:

- Simulated Satellite Imagery
  - Much enthusiasm for simulated satellite imagery along side traditional model fields
  - Strong push for simulating additional GOES-R channel differences and products as decision aids
  - The simulated imagery can provide more realistic view of GOES-R capabilities in a weather event simulator (WES) case.
- Simulated Lightning Threat
  - Due to time constraints and sub-par performance of the NSSL-WRF…only limited demonstration
  - Expected to provide valuable tool within operations and future experiments including the 2011 Spring severe weather and summer fire weather experiments.
- 0-3 Hour Severe Hail Probability
  - Product performed well in forecasting severe hail 1-2 hours in advance
  - 3 hour forecast only limited value due to reliance on observations
  - May be most useful in combination with other datasets…such as stability indices

2010 Spring Experiment

Products evaluated and user feedback:

- University of Wisconsin Convective Initiation (USCI)
  - Useful tool for situational awareness prior to warning operations
  - Lead time generally 5-30 min. over radar
  - Forecaster frustration with temporal refresh rate of GOES-13
- Satellite-based convective analysis and tracking (SATCAST)
  - Proxy for the AWG version of the CI algorithm
  - Day-only cloud typing but will be expanded to day and night
  - Data latency an issue (arrived 12-13 post image stamp time)
- Overshooting-top and Thermal Couplet Detection (OTTC)
  - Forecasters liked concept of product but spatial resolution and temporal refresh on GOES-13 provided limited value
- Pseudo Geostationary Lightning Mapper (PGLM)
  - Utilizes total lightning data from 3 LMA networks and KSC LDAR
  - Provided strong support tool for warn/ no-warn decision
  - Most viewed future GLM as a “great tool” for situational awareness
  - PGLM particularly useful when blended with other products

2010 NHC Experiment

Products evaluated and user feedback:

- Hurricane Intensity Estimate (HIE)
  - Generally comparable to ADT, but min SLP can be unrealistically low at times
  - Adjusted applied to HIE pressure estimate
- RGB Air Mass Product
  - Useful complement to the dust product
  - In some ways better separates the dry from moist air masses
  - At times product indicates polar air at very low latitudes
  - There are limb effects that could be corrected as a f(zenith angle)
- SAL Product
  - Animated version: improvement over static images
  - May be contamination near stratocumulus fields
- SRSO data
  - Large number of excellent cases obtained due to GOES-15 science test coinciding with the peak of the hurricane season
- Lightning based RII
  - Post season preliminary results show lightning reduces false alarms of rapid intensity forecasts
  - Additional testing needed to increase sample size

2010 NHC Proving Ground

- Ground-based WWLLN data used as a proxy for GLM in tropical cyclone studies
  - Adjustment to account for the low detection rate of WWLLN and conversion of C-G to total lightning using OTD/LIS climatology
- Storm-centered lightning density calculated and related to changes in tropical cyclone intensity
  - Lightning density in the rain bands is related to subsequent intensity changes (if vertical shear accounted for)
- Algorithm used lightning data in combination with global model fields to predict rapid intensity change
- Tested in real time in 2010 using Vaisala GLD-360 data

Acronyms

ABI	Advanced Baseline Imager
AWC	Aviation Weather Center
AWG	Algorithm Working Group
AWIPS	Advanced Weather Interactive Processing System
CI	Convective Initiation
CI	Cooperative Institute
CICS	Cooperative Institute for Climate Studies
CIFAR	Cooperative Institute for Alaska Research
CIMMS	Cooperative Institute for Meteorological Satellite Studies
CIRA	Cooperative Institute for Research in the Atmosphere
CIRES	Cooperative Institute for Research in Environmental Sciences
COMET	Cooperative Program for Operational Meteorology, Education, and Training
CTC	Cloud Top Cooling
EFP	Experimental Forecast Program
EPA	Environmental Protection Agency
EWP	Experimental Warning Program
GLM	Geostationary Lightning Mapper
HIE	Hurricane Intensity Estimate
HPC	Hydrometeorological Prediction Center
HWT	Hazardous Weather Testbed
JCSDA	Joint Center for Satellite Data Assimilation
JIMAR	Joint Institute for Marine and Atmospheric Research
JPSS	Joint Polar Satellite System
KPP	Key Performance Parameter
LMA	Lightning Mapping Array
NASA	National Aeronautics and Space Administration
NCEP	National Center for Environmental Prediction
NESDIS	National Environmental Satellite, Data, and Information Service
NGDC	National Geophysical Data Center
NHC	National Hurricane Center
NOAA	National Oceanic and Atmospheric Administration
NSSL	National Severe Storms Laboratory
NWS	National Weather Service
OPC	Ocean Prediction Center
OTD	Overshooting Top Detection
OTTC	Overshooting-top and Thermal Couplet Detection
PG	Proving Ground
PGLM	Pseudo Geostationary Lightning Mapper
QPE	Quantitative Precipitation Estimate
QPF	Quantitative Precipitation Forecast
RGB	red, green, blue
RII	Rapid Intensification Index
SAB	Satellite Analysis Branch
SATCAST	Satellite-based Convective Analysis and Tracking
SEVIRI	Spinning Enhanced Visible and Infrared Imager
SPC	Storm Prediction Center
SPoRT	Short-term Prediction Research and Transition Center
SST	Sea Surface Temperature
STAR	Center for Satellite Applications and Research
SwPC	Space Weather Prediction Center
TPW	Total Precipitable Water
UMBC	University of Maryland Baltimore County
USCI	University of Wisconsin Convective Initiation
VAAC	Volcanic Ash Advisory Center
WES	Weather Event Simulator
WFO	Weather Forecast Office
WRF	Weather Research and Forecasting
WWLLN	Word Wide Lightning Location Network