



The ingredients for sustaining success in NOAA R2O for GOES-R

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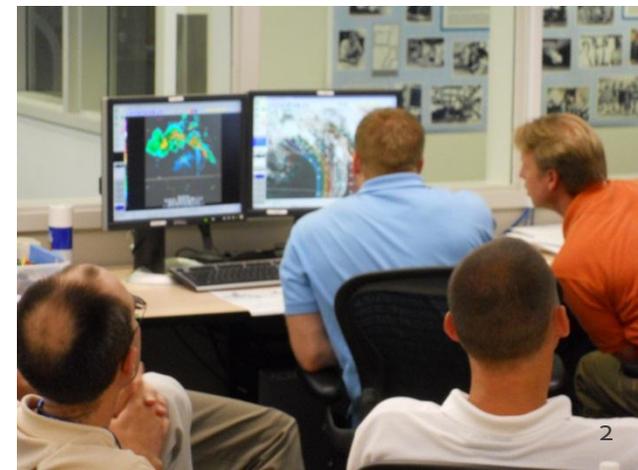
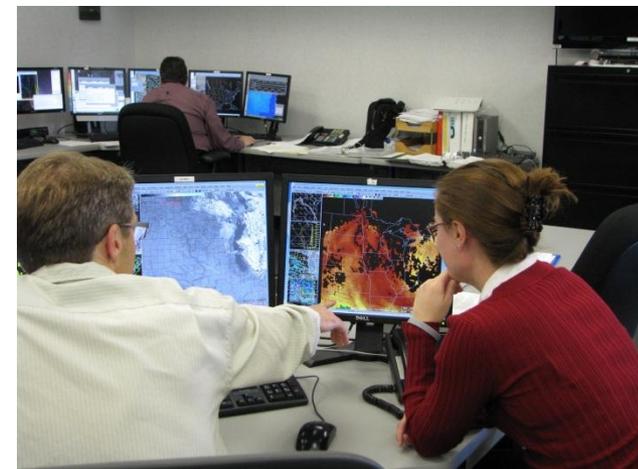
Cooperative Institute for Meteorological Satellite Studies
University of Wisconsin at Madison
10 January 2013

93rd American Meteorological Society Annual Meeting
Ninth Annual Symposium on Future Operational Environmental Satellite Systems
Third Conference on Transition of Research to Operations

Themed Joint Session 4g: Research to Operations Pathway for Satellite Data Retrieval Algorithms

Background

The Cooperative Institute for Meteorological Satellite Studies (CIMSS) has developed a growing program in which new satellite imagery and products are developed for, collaborated in conjunction with, and delivered to National Weather Service (NWS) field weather forecast offices (WFOs) and national centers *without* invoking a formalized process or an operational provider. ***Over half of all WFOs nationwide receive satellite imagery or related products from CIMSS.***



Operations

- To introduce a new product to the NWS, it must be available in their visualization software, the Advanced Weather Interactive Processing System (AWIPS).
- CIMSS has developed the technical expertise to produce, deliver, and display satellite images and products in AWIPS.
- AWIPS is undergoing an upgrade. CIMSS is assisting its NWS partners with the transition process for the imagery and products that it provides.
- CIMSS data is delivered via terrestrial networks.

NRC Report

In 2000, a report from the National Research Council (NRC) read—
“Successful transitions from R&D to operational implementation always require:

- (1) an understanding of the importance (and risks) of the transition,
- (2) development and maintenance of appropriate transition plans,
- (3) adequate resource provision, and
- (4) a continuous feedback (in both directions) between R&D and operational activities.”

FROM RESEARCH TO OPERATIONS IN
WEATHER SATELLITES
AND
**NUMERICAL WEATHER
PREDICTION**

CROSSING THE VALLEY OF DEATH

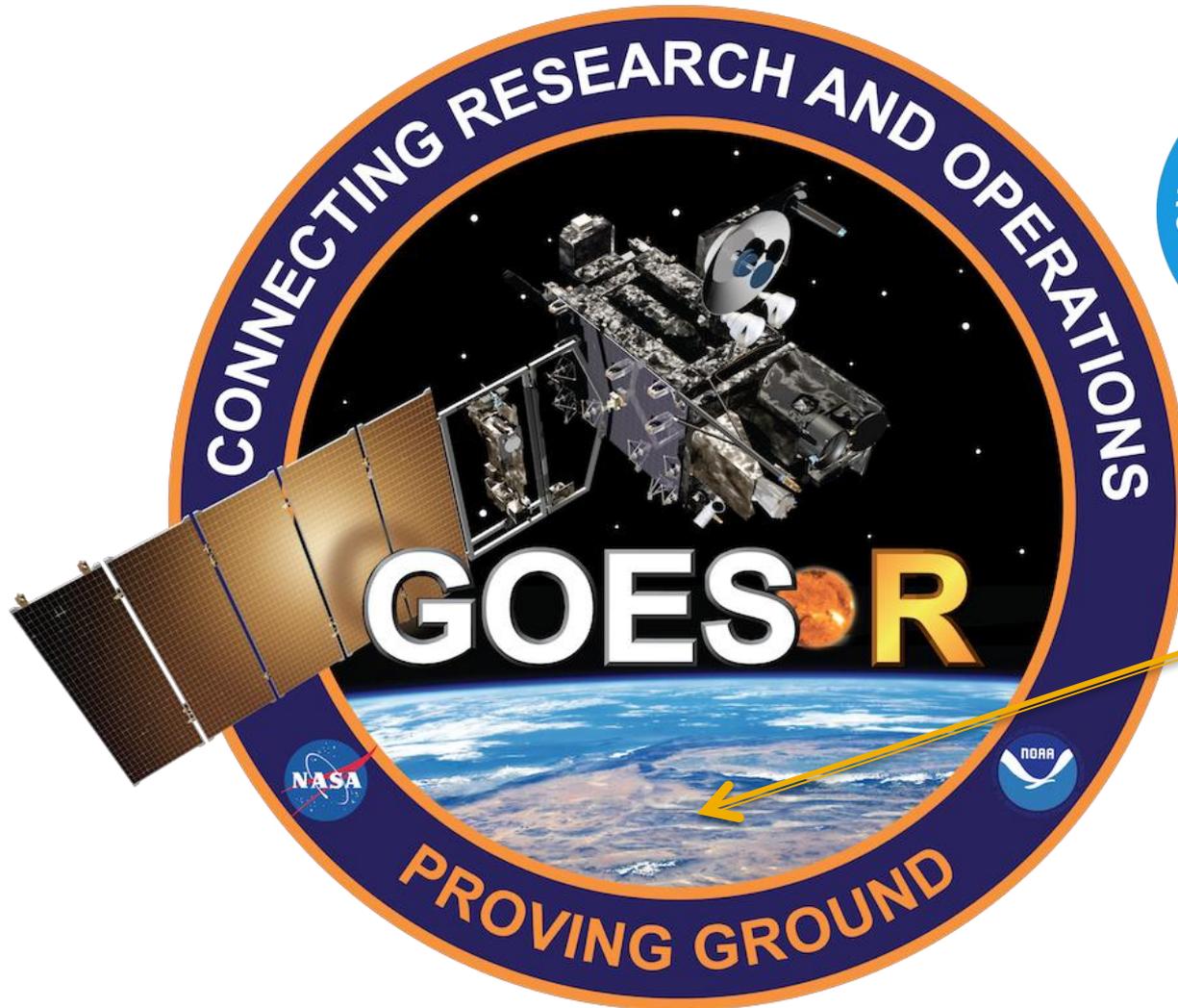
Board on Atmospheric Sciences and Climate

Commission on Geosciences, Environment, and Resources

National Research Council

NATIONAL ACADEMY PRESS
Washington, D.C.

GOES-R Proving Ground



The valley of death

GOES-R Proving Ground

- A proving ground is designed to showcase future capabilities and identify possible gaps as a forward-thinking exercise to prepare the end user for upcoming science and technology and assure that the capabilities meet user requirements.
- The GOES-R Proving Ground (GRPG) is a collective effort between many NOAA and NOAA-supported agencies and universities.
- The primary customer is the National Weather Service.
- The GRPG leverages existing testbeds staffed by “satellite champions”, and implements new demonstrations where they do not exist.

SPSRB

- The NESDIS Satellite Products and Services Review Board (SPSRB) manages the life cycle of a product from research into operations, and once operational, through enhancements to retirement. All new satellite products must obtain approval through the SPSRB process, which contains six primary steps:
 - (1) User Request,
 - (2) Assessment,
 - (3) Analysis of Alternatives,
 - (4) Initial Project Plan,
 - (5) Operational Decision, and
 - (6) Product Divestiture or Retirement.



Comparison

	SPSRB	PG
Management	NOAA (NESDIS STAR and OSO Directors)	NOAA (GOES-R, STAR, NWS, and OAR)
Initiating action	User request, science improvement, or project manager development	Formal NOAA testbeds, local area demonstrations, grassroots efforts
Initiating source	NOAA only, excluding contractors and associates	NOAA, particularly NWS, and non-federal scientists and subject-matter experts
Operations	Represented by NOAA managers, particularly from NESDIS	Represented by NWS regional science chiefs
Research	Conducted prior to initiation	Ongoing as part of project
Process	Exhaustive, lengthy	Not articulated, short
Cost	Funds required, NOAA responsible	Covered largely via NOAA support to Cooperative Institutes

Improving the SPSRB and PG

- The SPSRB could use:
 - An initiating mechanism from the PG, where a NOAA user, such as the NWS, could support a request to transition an experimental product to operations developed by a NOAA funded or affiliated entity
 - An interface for reporting issues with operational products, or suggesting products suitable for divestiture
 - Shorter transition/change period

Improving the SPSRB and PG

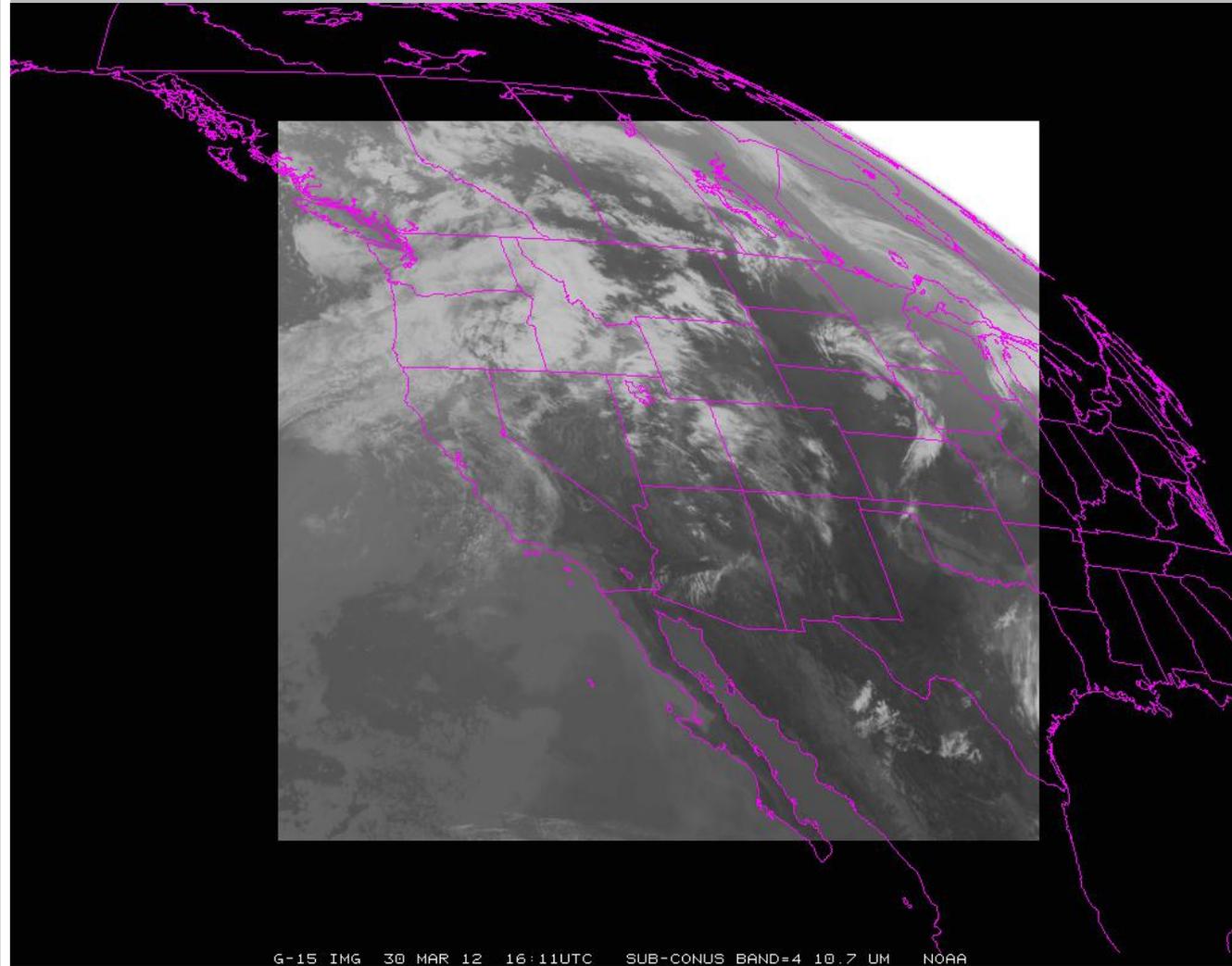
- The PG could use:
 - A broader scope, with participation from all space-based observing system missions
 - An articulated process for evaluating demonstrations and the utility of PG products
 - A method for sustaining successful interactions beyond the scope of the PG projects
 - Increased NWS personnel strictly dedicated to monitoring the PG activities and providing technical support, particularly at NWS regions

GOES-15 Example

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This is the GOES-West sub-CONUS sector that is currently scheduled and observed.

Image source: Tim Schmit



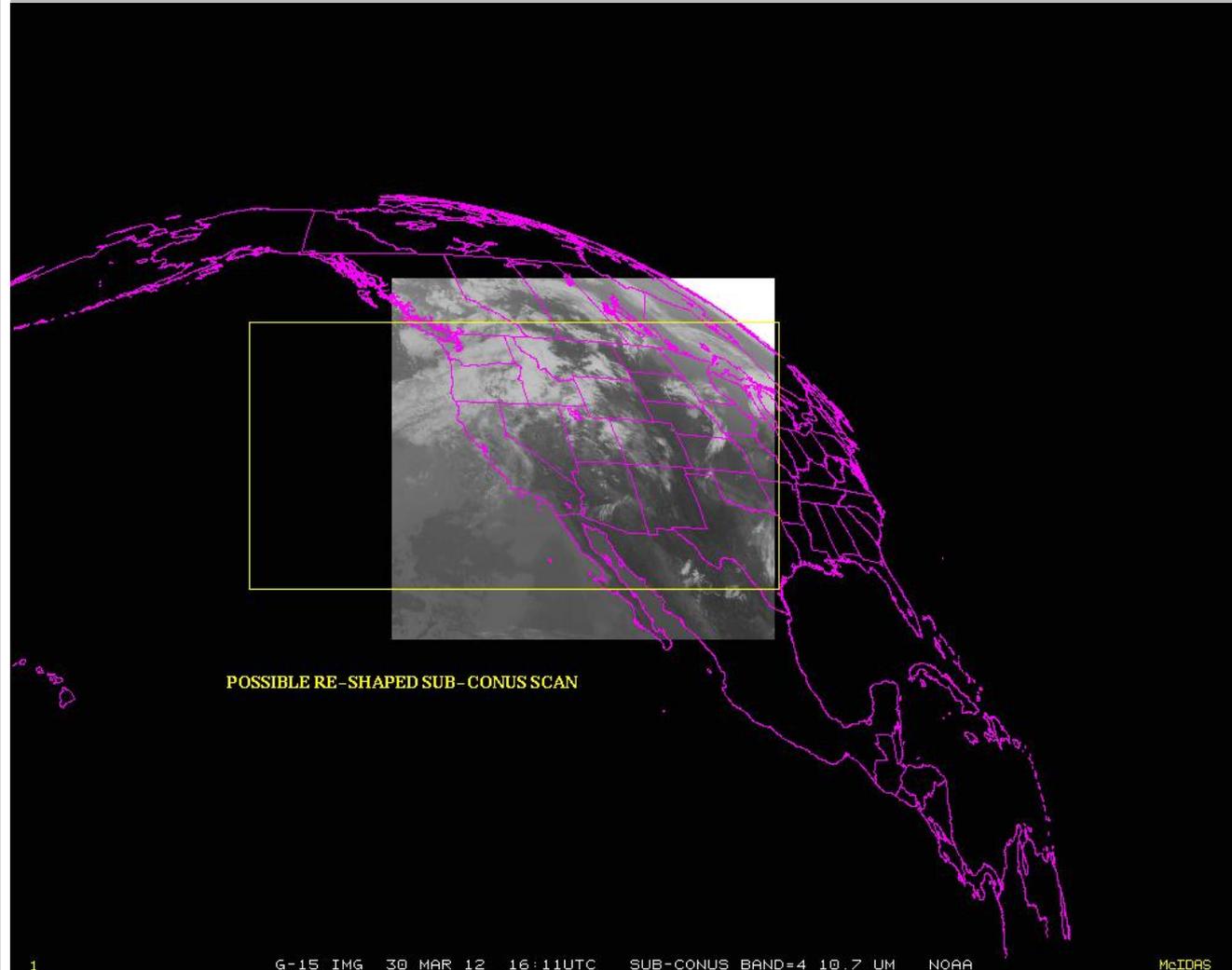
G-15 IMG 30 MAR 12 16:11UTC SUB-CONUS BAND=4 10.7 UM NOAA

GOES-15 Example

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The NWS would prefer a sub-CONUS sector that extends further out into the Pacific Ocean than what is currently observed.

Image source: Tim Schmit



Definitions

- Product
 - Any data captured by observing system, output produced by algorithm or model, or combination thereof
- Research
 - Organizations which develop science products to better meet their mission or the mission of another organization
- Operations
 - Organizations with operational components
- Operations *Floor*
 - Users within the organization that require products to support the organizational mission, often in a time-critical manner (e.g., NWS field offices)

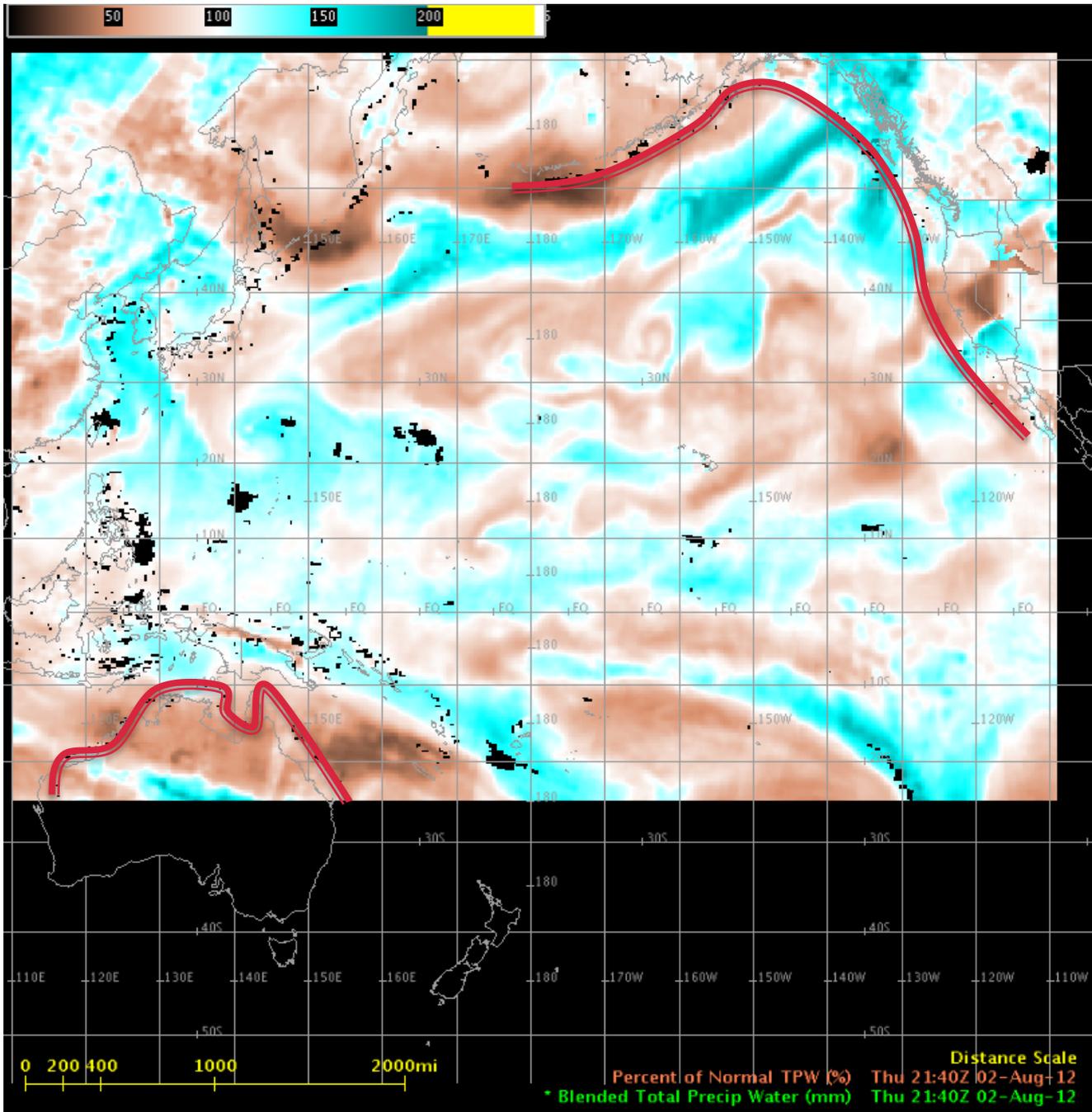
R2O2?

- Research
 - Initial product improvement based on feedback from operations
- Maintenance
 - A transition to a *different* version of the operational product based on *changes* to the observing capability or product inputs
- Improvement
 - A transition to a *better* version of the operational product based on an *enhancement* to the observing capability or product inputs
- Supersession/Retirement
 - A transition out of operations due to lack of applicability because of other products or change in mission
- Community
 - A transition to widespread use beyond source organization, including general public or scientific community

R2O2? Challenges

- Research
 - The operations *floor* may be disconnected from the researcher
 - Funds may not be available to support further research
- Maintenance
 - Requires comprehensive knowledge of observing systems and inputs
- Improvement
 - Requires comprehensive knowledge of observing systems and inputs, as well as an understanding of how enhancements impact a product
- Supersession/Retirement
 - Requires intimate knowledge of the operations *floor*
- Community
 - Communicating changes to a product once made available to a broader community are difficult

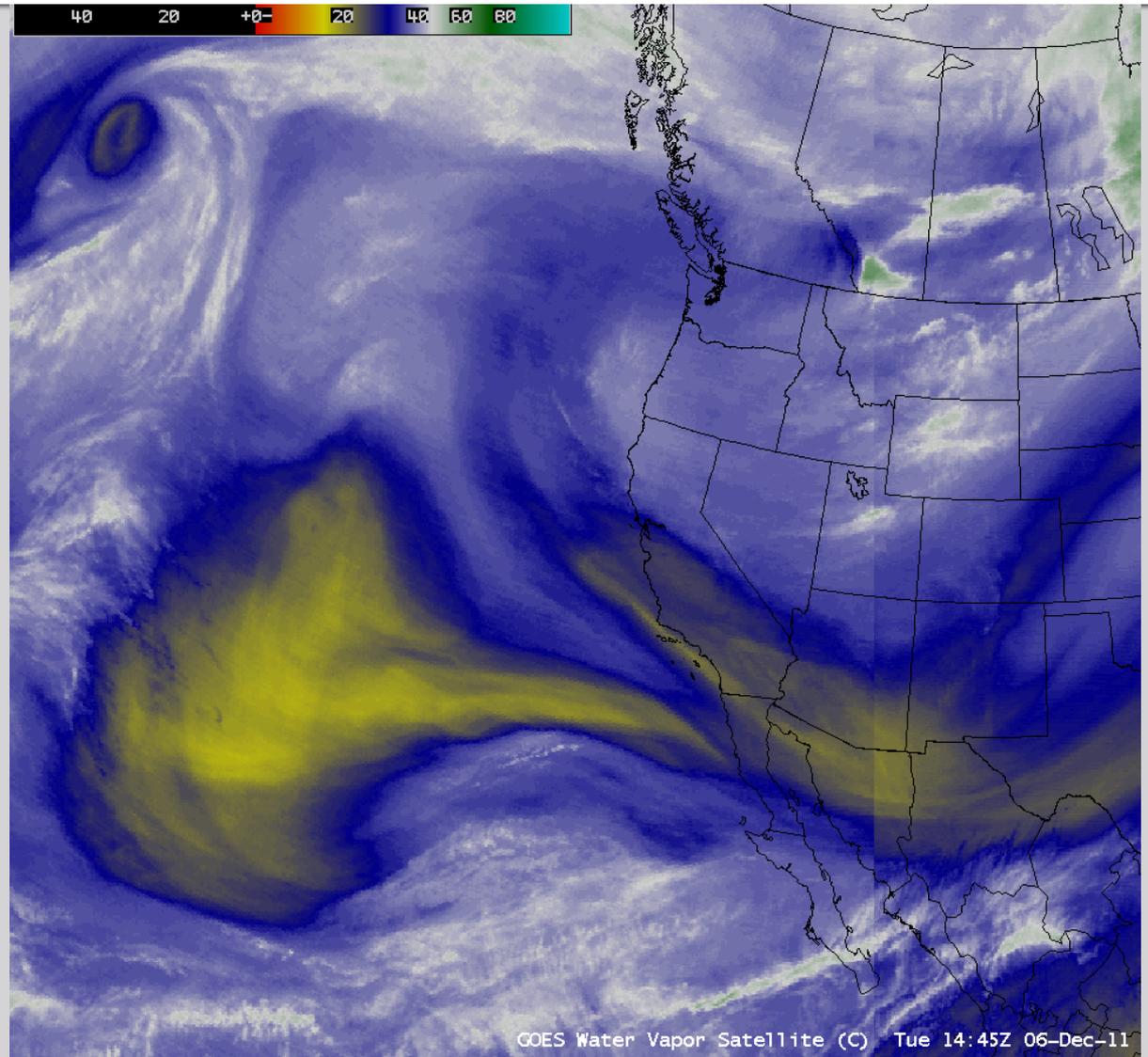
Example: Maintenance



Example: Improvement

When GOES-11 was replaced by GOES-15 as the operational GOES-West satellite, users should have experienced an improved water vapor channel (Imager channel 3).

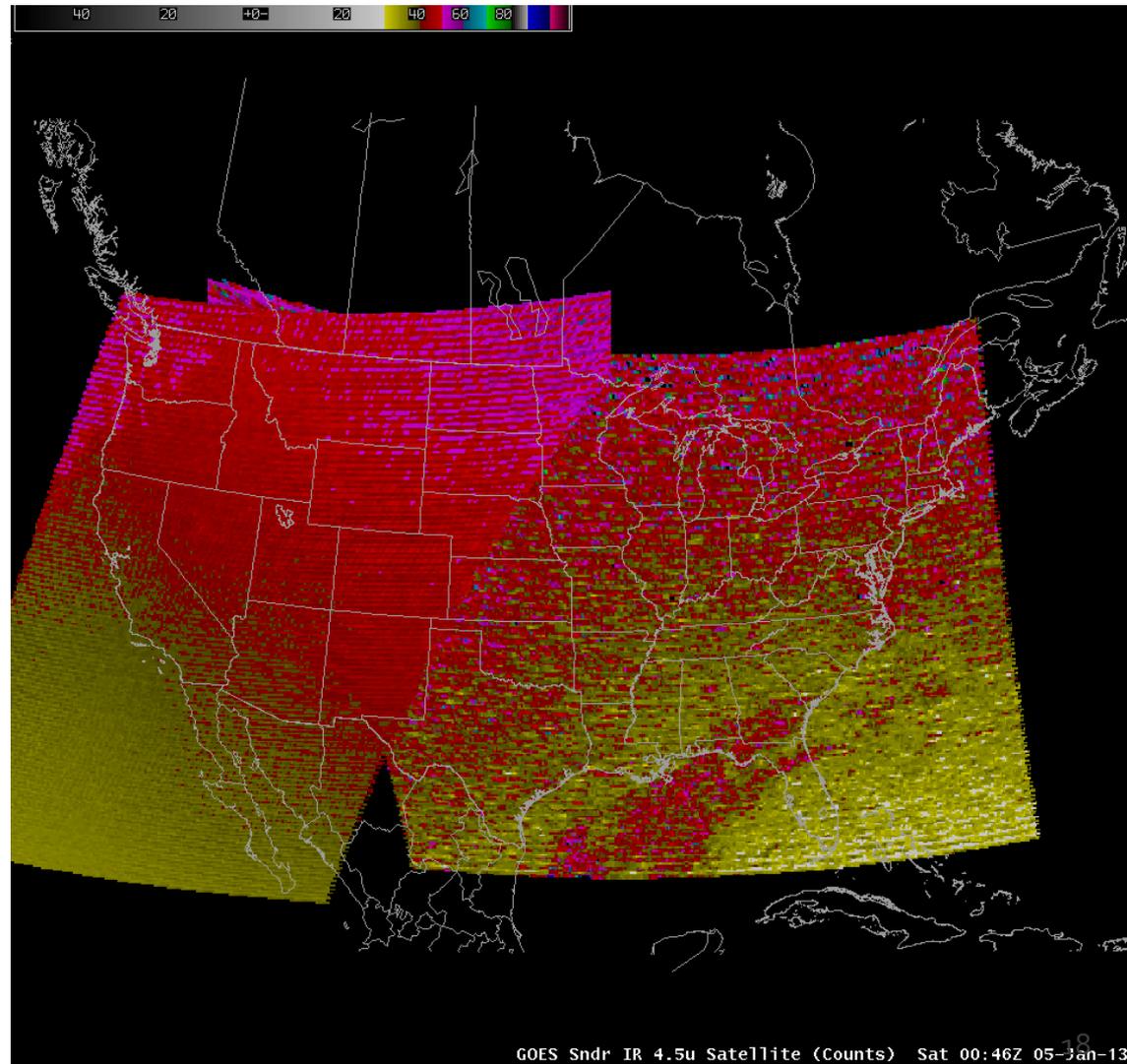
*Image source: CIMSS Satellite Blog,
Scott Bachmeier*



Example: Supersession/Retirement

This is the combined GOES Sounder 4.5 μm band as it is presented in AWIPS. Ideally, this channel would provide forecasters information about mid-tropospheric horizontal temperature gradients. Not only is the GOES-13 data noisy, but the default color scheme makes the information difficult to interpret.

The implementation into AWIPS is an important component of completing the R2O chain.

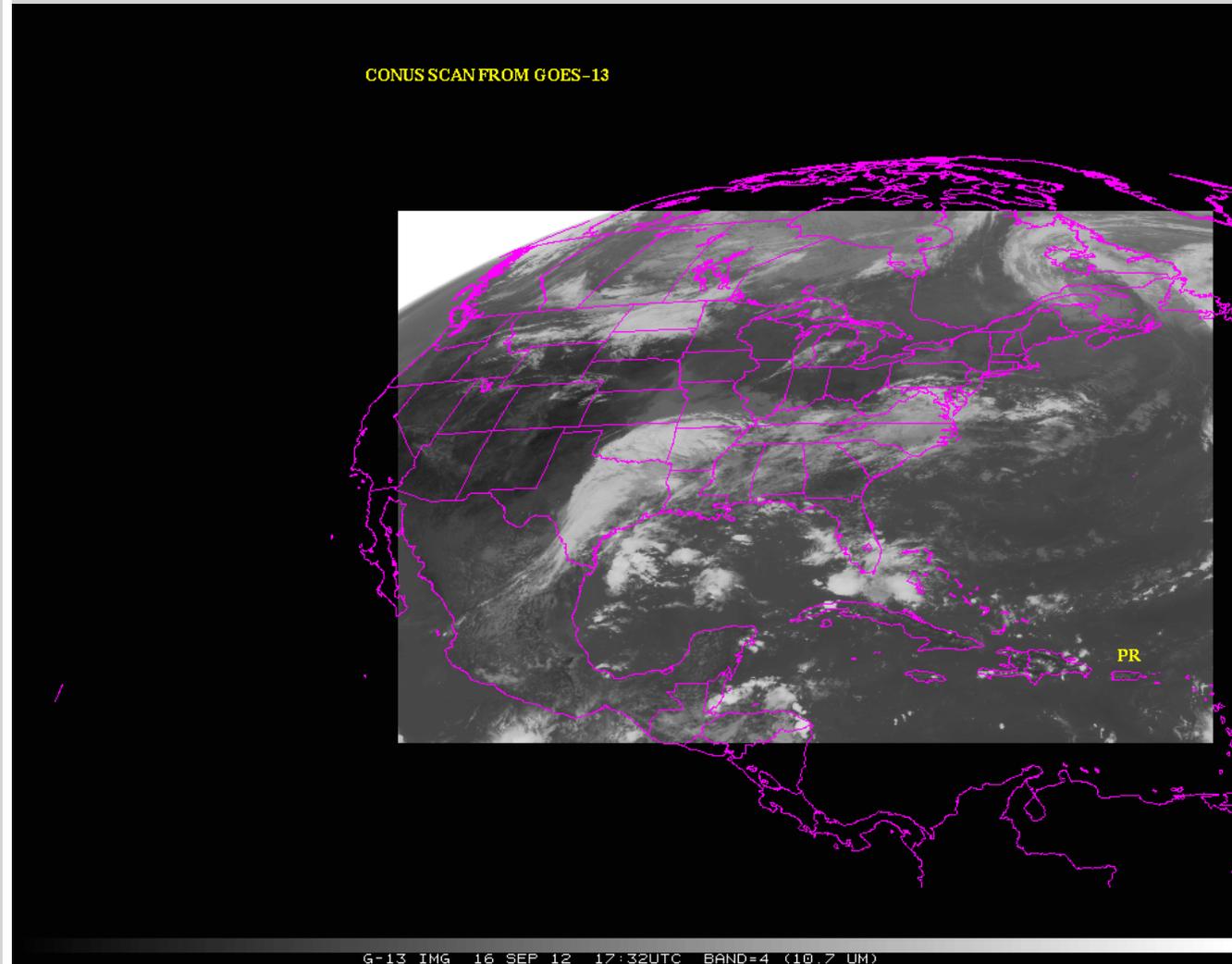


Example: Community

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This is the GOES-East
CONUS sector from
GOES-13.

Image source: Tim Schmit



Satellite Services Division Special Bulletin

Topic: GOES-East RSO is scheduled for September 27, 2012

Date/Time Issued: September 27, 2012 1850 UTC

Product(s) or Data Impacted: GOES-East Imager Data and Products

Details/Specifics of Change: Requested by WFO Miami

Reason: WFO Puerto Rico issues - Miami backing them up - No radar.

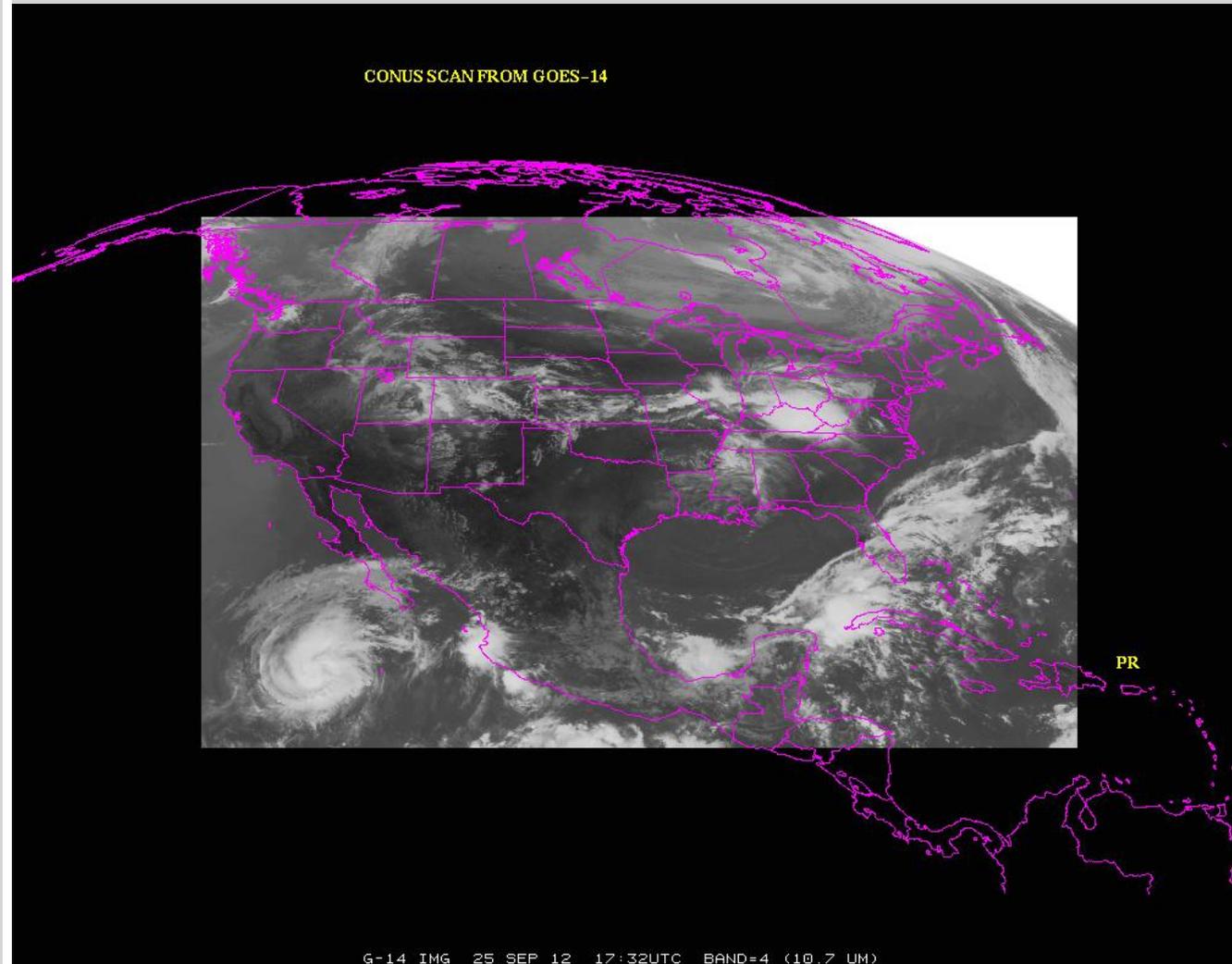
There will be an increased number of GOES-East Rapid Sectors, with decreased coverage for the Southern Hemisphere and smaller Northern Hemisphere scans.

Example: Community

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The problem was that GOES-14 was GOES-East and the CONUS sector did not cover Puerto Rico.

Image source: Tim Schmit



Popular Excuses (R2NO)

- Why do R2O activities fall short?
 - Limited Bandwidth
 - To disseminate new products operationally
 - Decreasing Budgets
 - Necessitates prioritization
 - Bureaucracy
 - Impedes progress and agility
 - Too Few People
 - May not be in a position to identify points of failure
 - Who is the process owner?
 - Overbearing IT Security
 - Freezes R2O cold



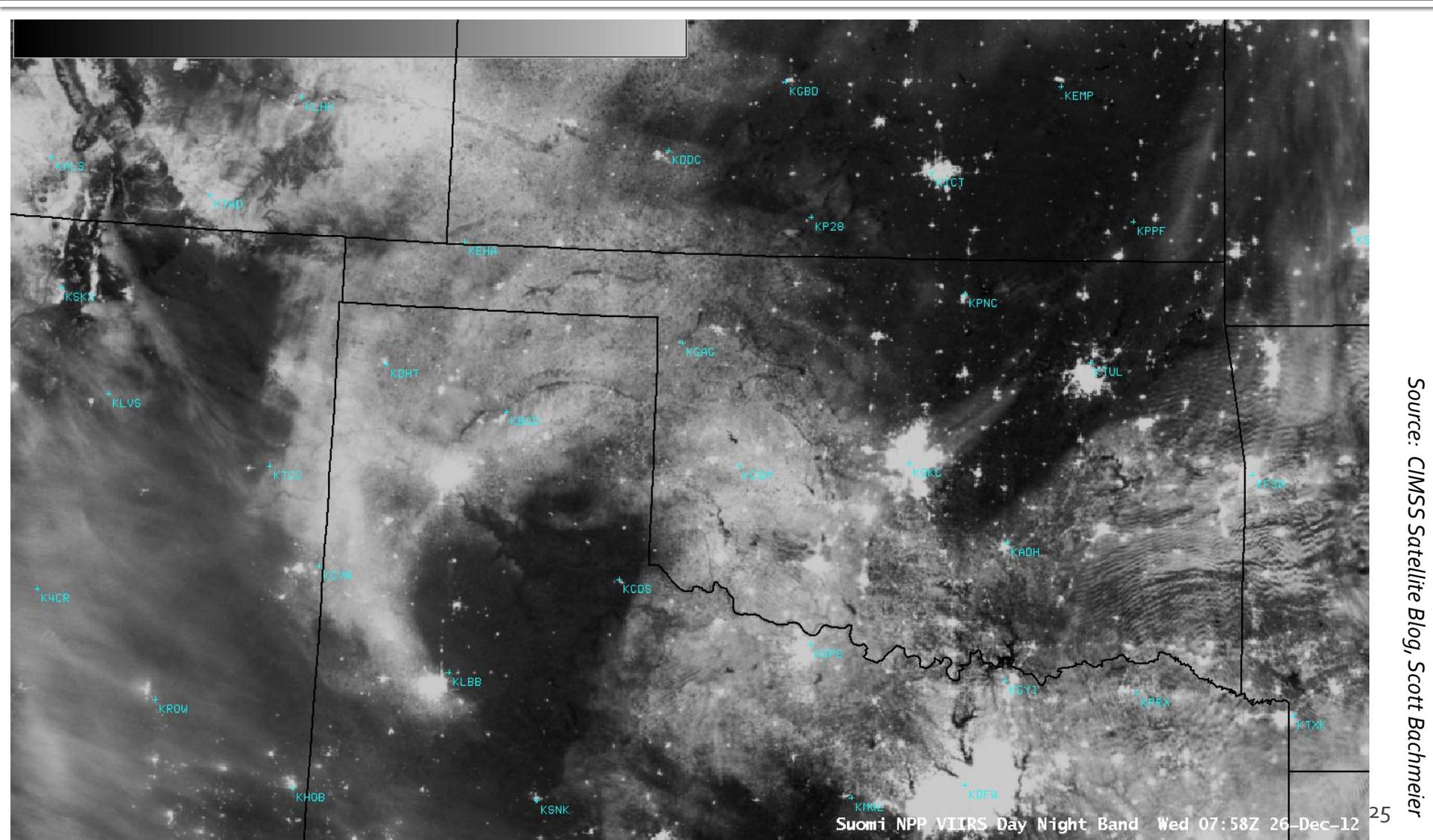
Ingredients for Success

- Personnel on the interagency interface who are conversant with requirements for facilitation across interagency gaps,
- Sufficient and certain budget allocations, particularly for operational continuity,
- Necessary information technology (IT) resources and infrastructure, including computing capabilities and telecommunication bandwidth, and
- Emphasized mission-priority principles, where security and non-mission regulations are not restrictions

R2O Driving Future Capabilities

- The SPSRB and PG processes begin after new satellite procurement has started.
- Good recommendations resulting from the SPSRB and PG processes will not alter the specifications of current or future observing systems.
- The SPSRB and PG need a follow-on process to continually monitor and assess implemented products as science, spacecraft, instruments, distribution strategies, and visualization systems evolve.
- A closer relationship between product development and the operations *floor* will allow for organic and realistic user requests fueling the R2O loop.

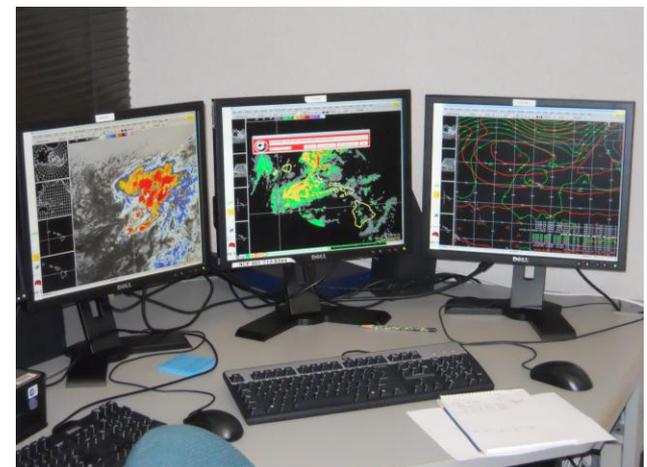
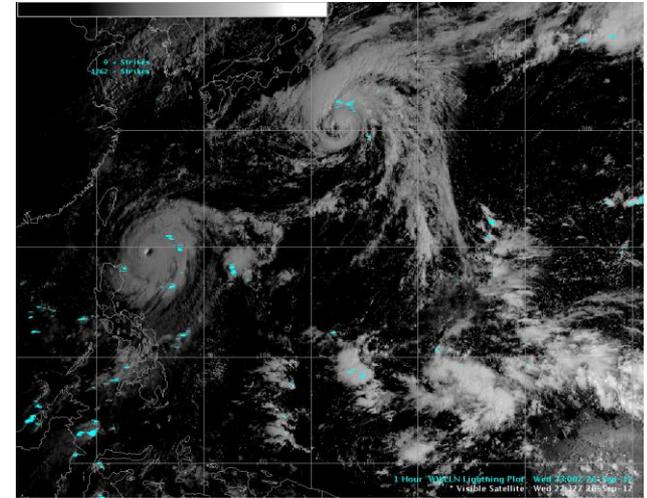
R2O Driving Future Capabilities



Source: CIMSS Satellite Blog, Scott Bachmeier

Developments at CIMSS

- Participation in NOAA Testbeds
 - Personnel, products, technical support
- Local area demonstrations
- Alaska Region
 - Development of standalone software to produce polar-orbiting satellite imagery for AWIPS
- Pacific Region
 - Aided satellite antenna acquisition for Honolulu Community College
 - AWIPS and AWIPS II support



Questions? Comments?

- Contact me: Jordan.Gerth@noaa.gov

Previous presentations:

- *An Outline in Transferring Satellite Research Products to National Weather Service Operations*
 - Talk, American Meteorological Society Annual Meeting—1st R2O Conference (Seattle, Washington)
 - January 27, 2011
- *Transitioning Satellite Products to National Weather Service Operations, and Future Directions for the GOES-R Era*
 - Talk, American Meteorological Society Annual Meeting—16th SATMET Conference (Phoenix, Arizona)
 - January 14, 2009