

Developing AWIPS to support forecaster demands in the new generation of satellites

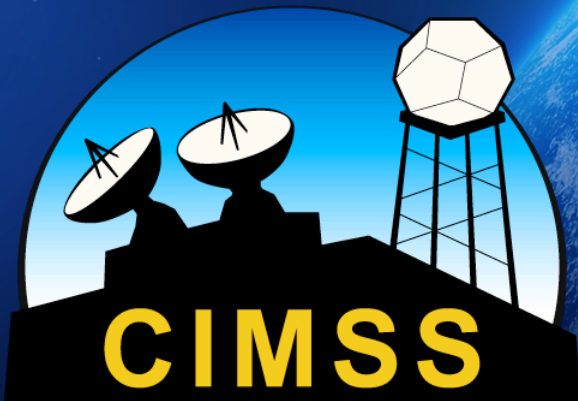
AWIPS System Updates, Part II

32nd Conference on Environmental Information Processing Technologies

96th American Meteorological Society Annual Meeting

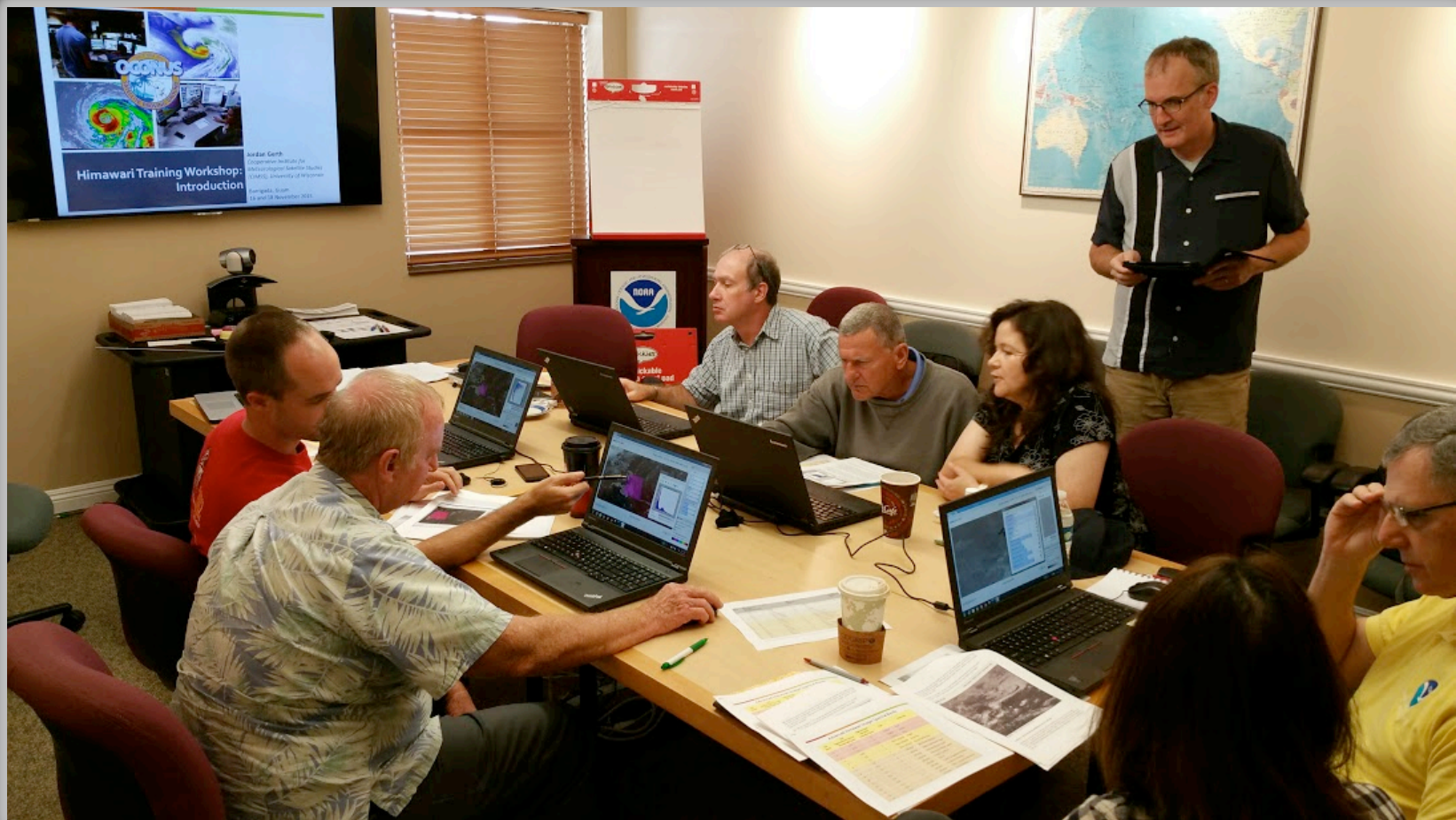
New Orleans, Louisiana

11 January 2016



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University of Wisconsin at Madison

Includes contributions from colleagues



The challenge is to prepare operational meteorologists for new generation weather satellites.

The Challenge

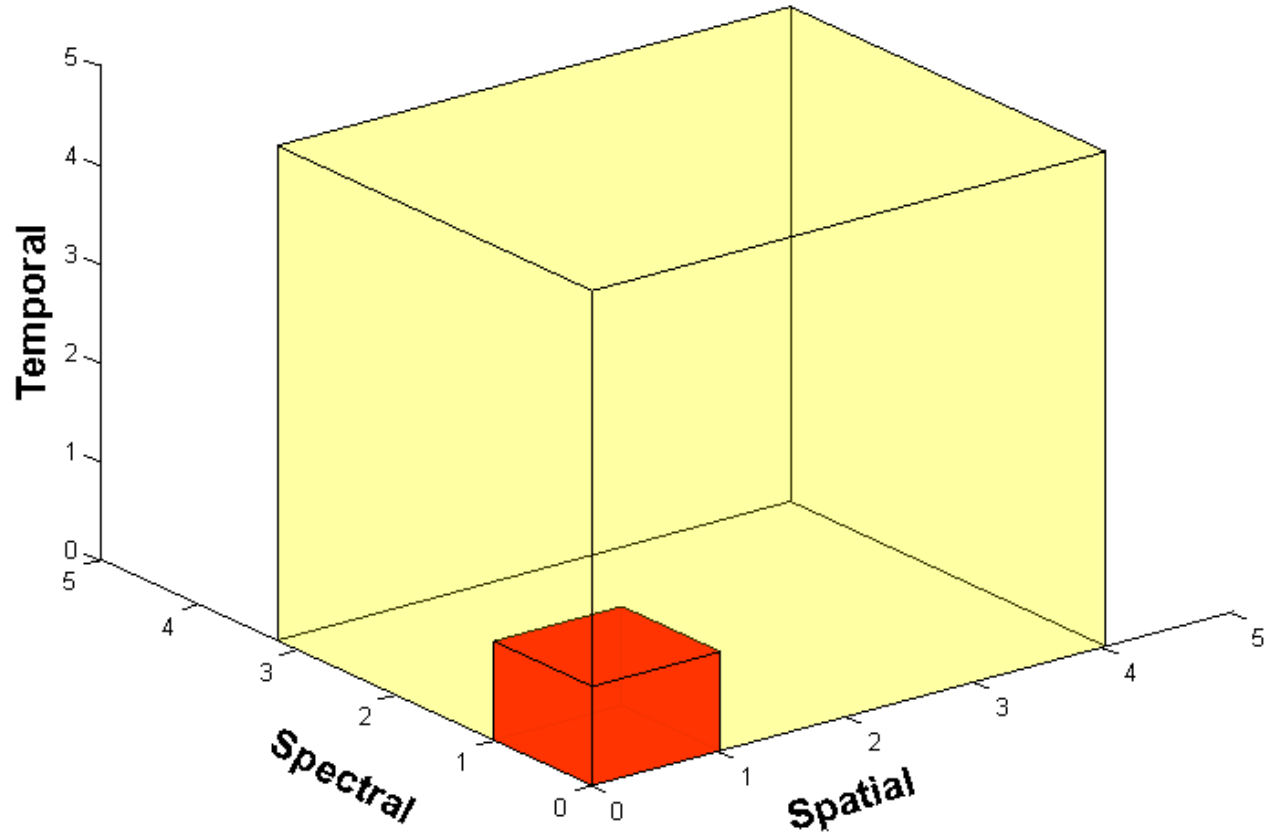
- Practically, this means building capacity.
 - Ensuring technical systems are capable of delivering and displaying imagery and products at the full spatial, spectral, and temporal resolution
 - Infusing imagery and products into the operational forecast process
 - Integrating new satellite data into predictive models (numerical weather prediction and otherwise)

New Generation Satellites

- Geostationary Operational Environmental Satellite R-Series (GOES-R)
 - Advanced Baseline Imager (ABI)
 - Geostationary Lightning Mapper (GLM)
- National Polar-orbiting Project (NPP) and Joint Polar Satellite System (JPSS)
 - Advanced Technology Microwave Sounder (ATMS)
 - Visible Infrared Imaging Radiometer Suite (VIIRS)
 - Cross-track Infrared Sounder (CrIS)
- International missions

GOES-R ABI

Compared to today's
geostationary imager



NOAA/NESDIS ASPB

5^x Faster scanning
(5-minute full disk
vs. 25-minute)

4^x Improved spatial
resolution (2 km IR
vs. 4 km)

3^x More spectral
bands (16 on ABI
vs. 5)

Value of Observations

Value =

Quality of Actionable Information (Statements) –
Amount of Factual Information (Data)



Value of Observations

- Value decreases when data increases without impacting a decision process.
- In this era of “big data”, the amount of data is endlessly increasing.
- Unfortunately, the time duration allocated to make a decision is generally fixed.
- Modernizing weather forecast services hinges on the practitioner leveraging the right data at the right time.

AWIPS Now and Then

- The Advanced Weather Interactive Processing System (AWIPS) is the weather data ingestion, visualization, and dissemination platform for National Weather Service meteorologists.
- The majority of the software has been recoded to modern and maintainable standards over the past decade.
- The user concept (“look and feel”) is similar today as it was 20 years ago.
 - There are some new features and capabilities.

AWIPS and New Generation Satellites

The Total Operational Readiness – Satellites (TOWR-S) project is focused on integrating new generation satellite data in AWIPS.

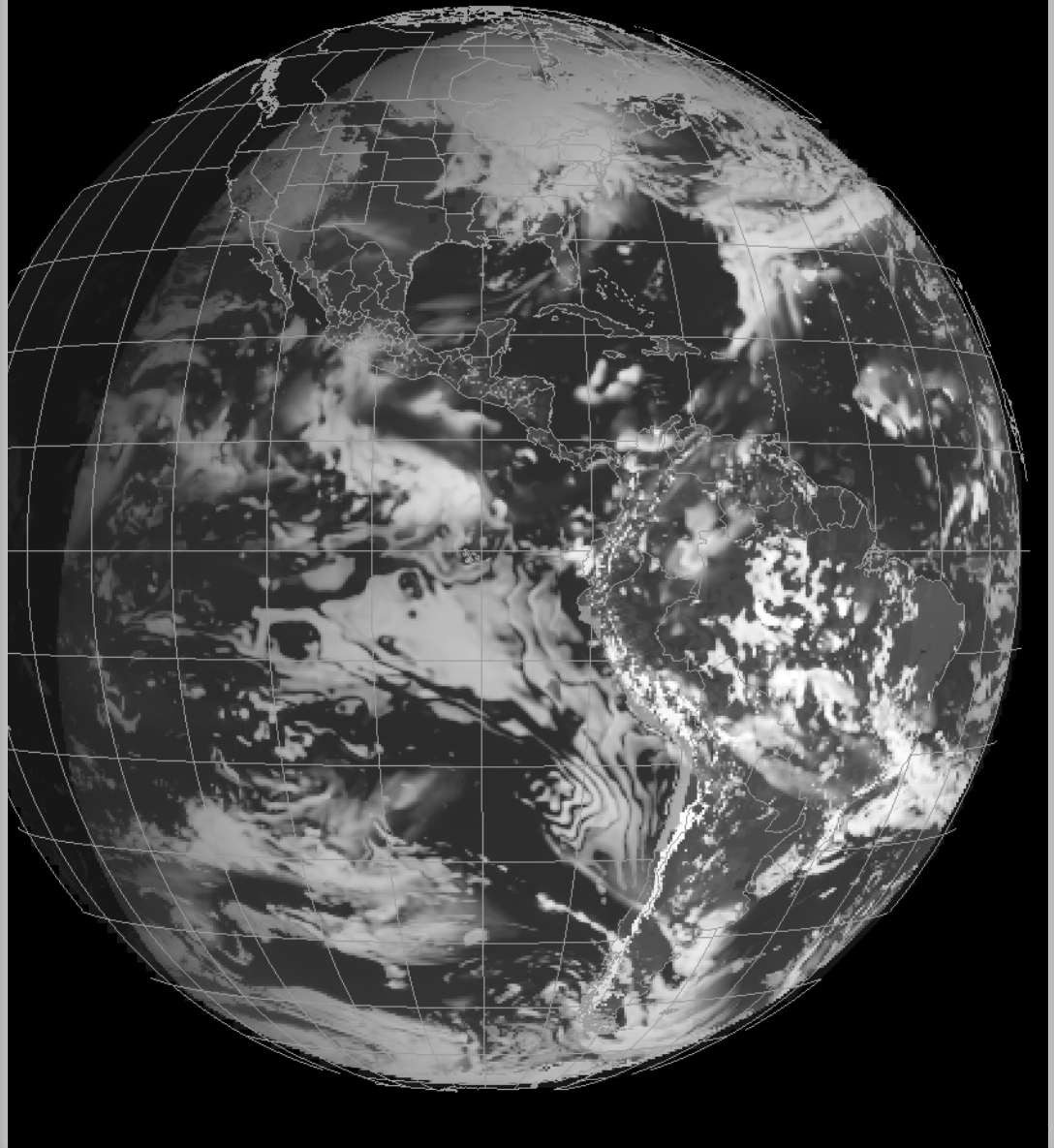
TOWR-S is confronting technical challenges, such as data delivery and visualization.

For more information:

6.3 Weather Ready Nation: NWS Exploitation of New Satellite Data

Wednesday, 13 January 2016: 2:00 PM
Room 255/257

Mike W. Johnson, NOAA/NWS, Silver Spring, MD; and J. K. Zajic, E. Guillot, W. Campbell, and L. Byerle

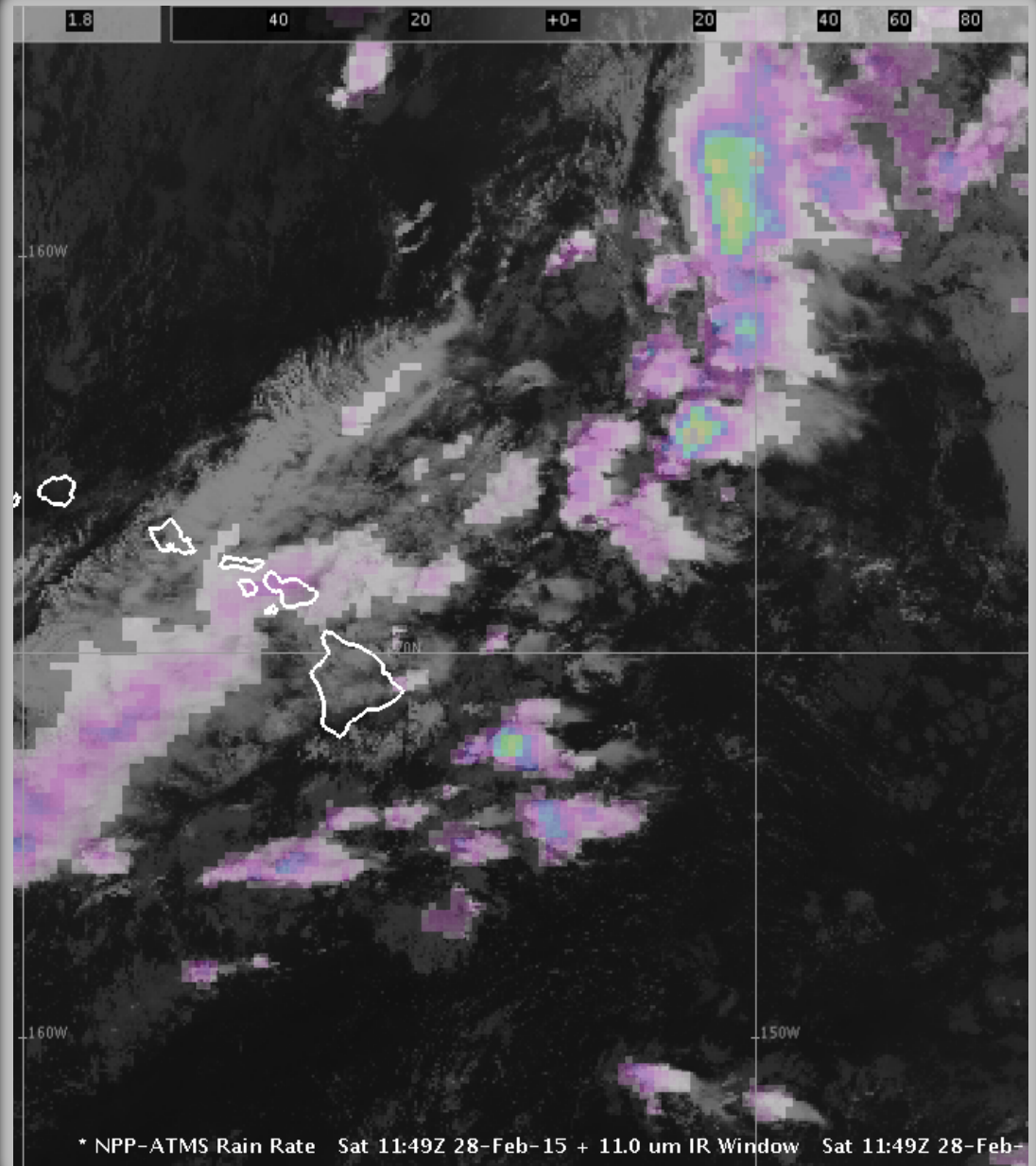


**28 February 2015
11:49 UTC**

Example of NPP ATMS
Rain Rate and 11.0 μm IR
Window in AWIPS

New AWIPS “II” capability:
Layering multiple images and
controlling transparency of certain
portions of the color map

Benefit to meteorologists:
Helps corroborate different
variables to determine sensible
weather and impact on forecast



20 August 2015

18:57 UTC

Example of NPP VIIRS
Red-Green-Blue (RGB)
composite of three bands:

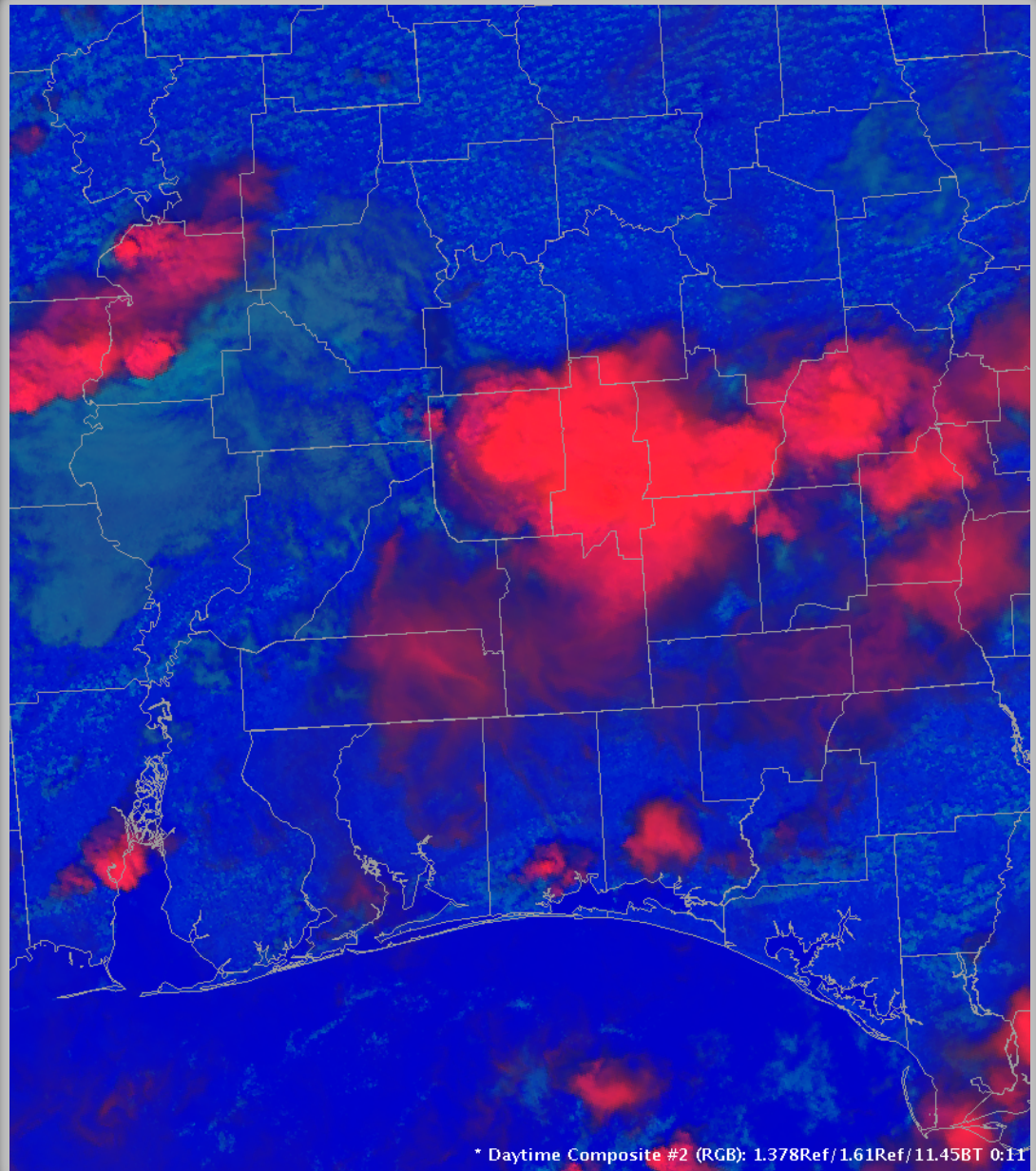
- 1.378 μm Ref
- 1.61 μm Ref
- 11.45 μm BT

New AWIPS “II” capability:

Displaying a 24-bit RGB composite
of three disparate images through
the graphics card

Benefit to meteorologists:

Ability to recognize spatial patterns
relative to quantitative products for
corroborating atmospheric
phenomena



Examples of Evolving AWIPS

- CIMSS has developed two plug-ins that visualize data-to-statement model output.
 - NOAA/CIMSS ProbSevere Model
 - VIIRS Active Fire Product
- The actionable information that these products provide makes this possible.
- The software enhancement enables access to the important information relative to the users' constraints.

NOAA/CIMSS ProbSevere Model

- An unfilled shape is plotted for each identified object.
 - Intended to overlay on radar imagery
- The line width and color of the shape is based on the probability that the storm corresponding to the object is severe.
- The user can change the colors of the shapes using the traditional editor.

NOAA/CIMSS ProbSevere Model

If users hover over a shape while sampling is enabled, the values of select storm attributes are shown.

This plug-in is part of the AWIPS II baseline but the ProbSevere model output is pre-operational and only available to select users from CIMSS.

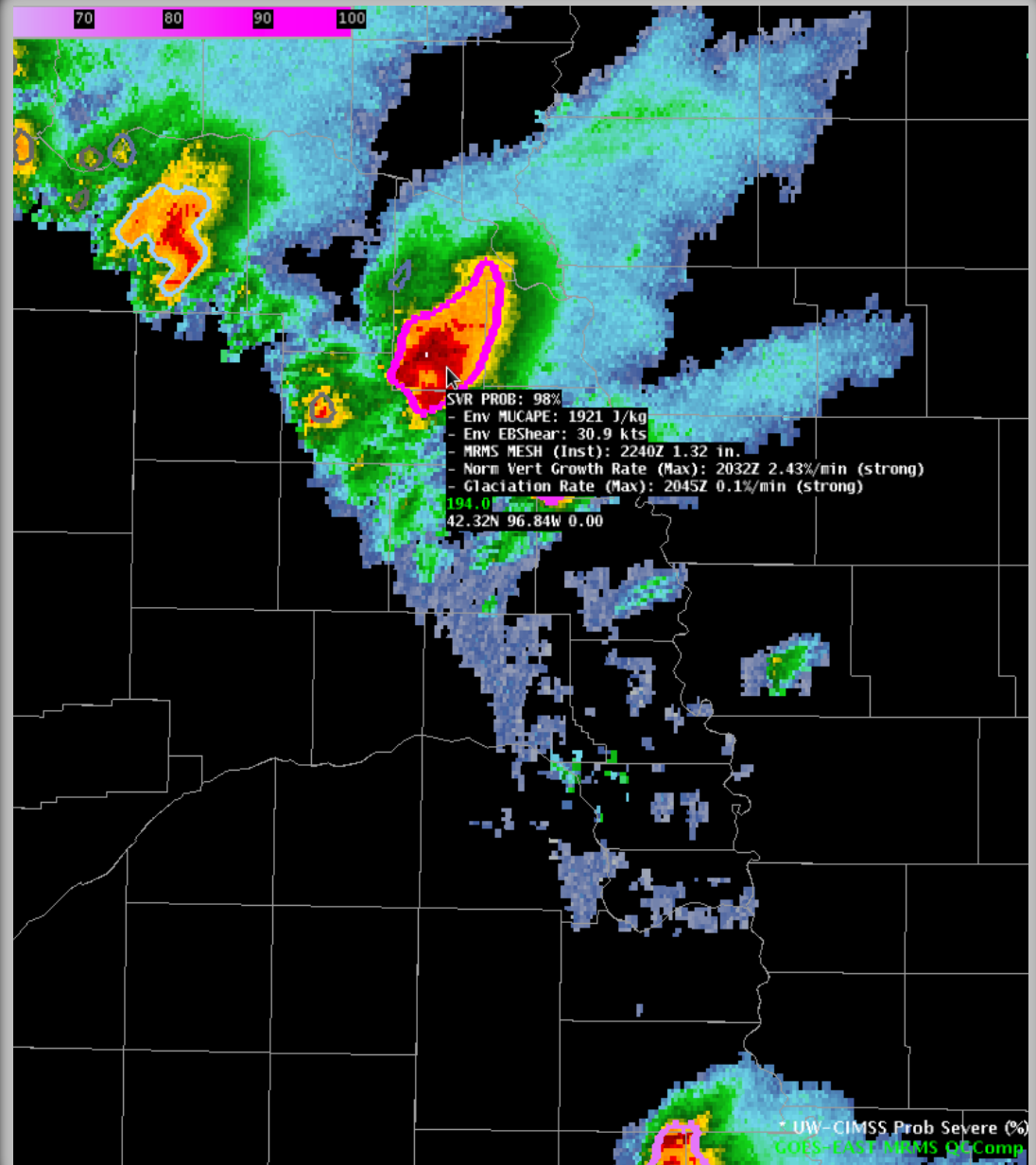
For more information:

8.2 The NOAA/CIMSS ProbSevere Model – Integration of NWP, Satellite, Lightning, and Radar data for Improved Severe Weather Warnings

Thursday, 14 January 2016: 8:45 AM

Room 225

Michael J. Pavolonis, NOAA/NESDIS,
Madison, WI; and J. L. Cintineo, J.
Sieglauff, and D. T. Lindsey



VIIRS Active Fire Product

- A circle is plotted at the latitude and longitude of each fire.
- The size and color of the circle is based on the power, and the confidence is shown by the width of the circle edge.
 - The circle is filled if the confidence is over 90%.
- The user can change the colors of the circles using the traditional editor.

VIIRS Active Fire Product

If users hover over a circle while sampling is enabled, the values of select fire attributes are shown.

This plug-in was first developed as part of the NASA Experimental Products Development Team (EPDT). It is not yet part of the AWIPS II baseline.

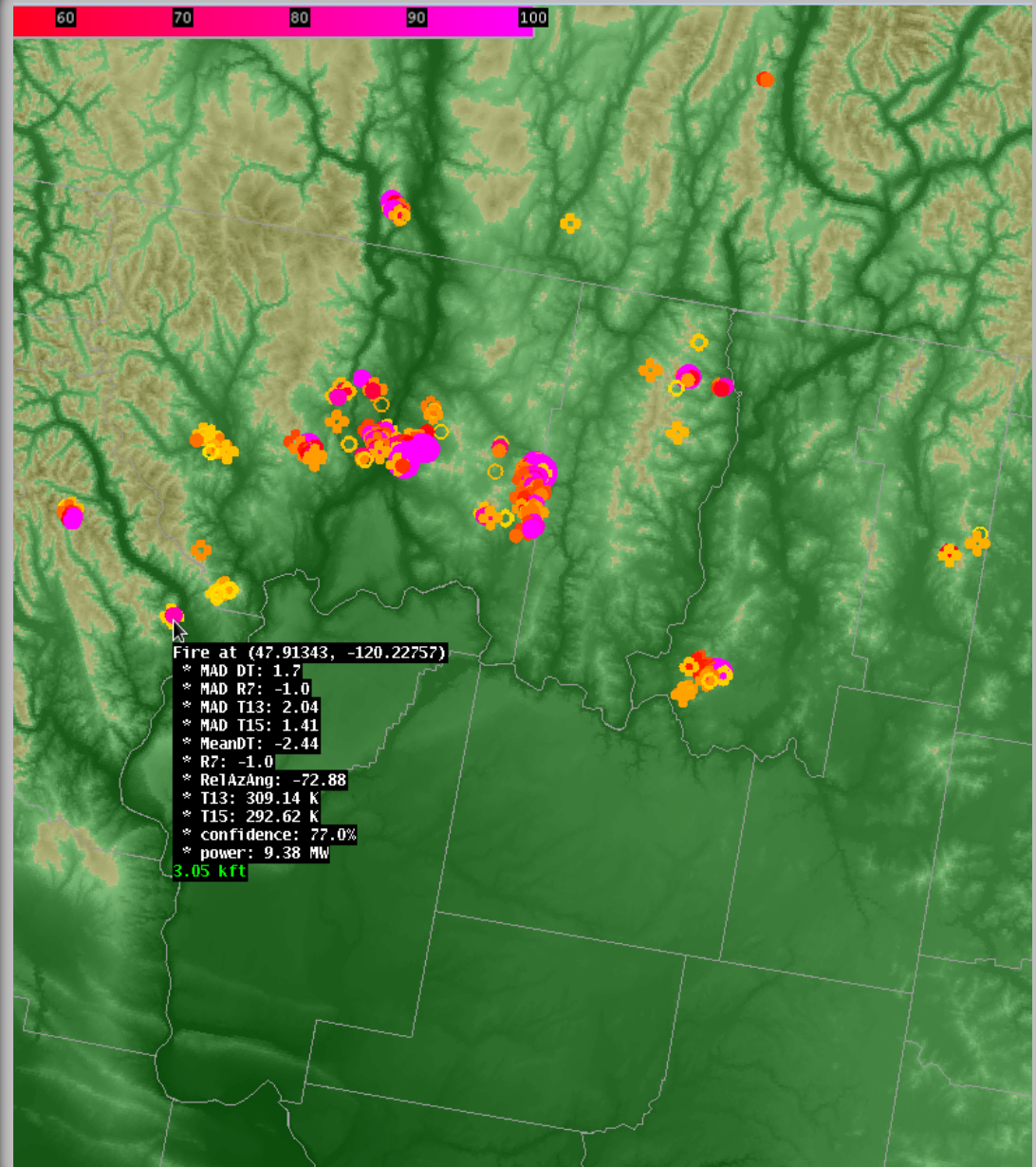
For more information:

11.6 The New Operational VIIRS Active Fire Product in NOAA's NDE System

Thursday, 14 January 2016: 2:45 PM

Room 225

Ivan A. Csiszar, NOAA/NESDIS, College Park, MD; and L. Giglio, W. Schroder, W. Wolf, M. Tsidulko, and V. Mikles



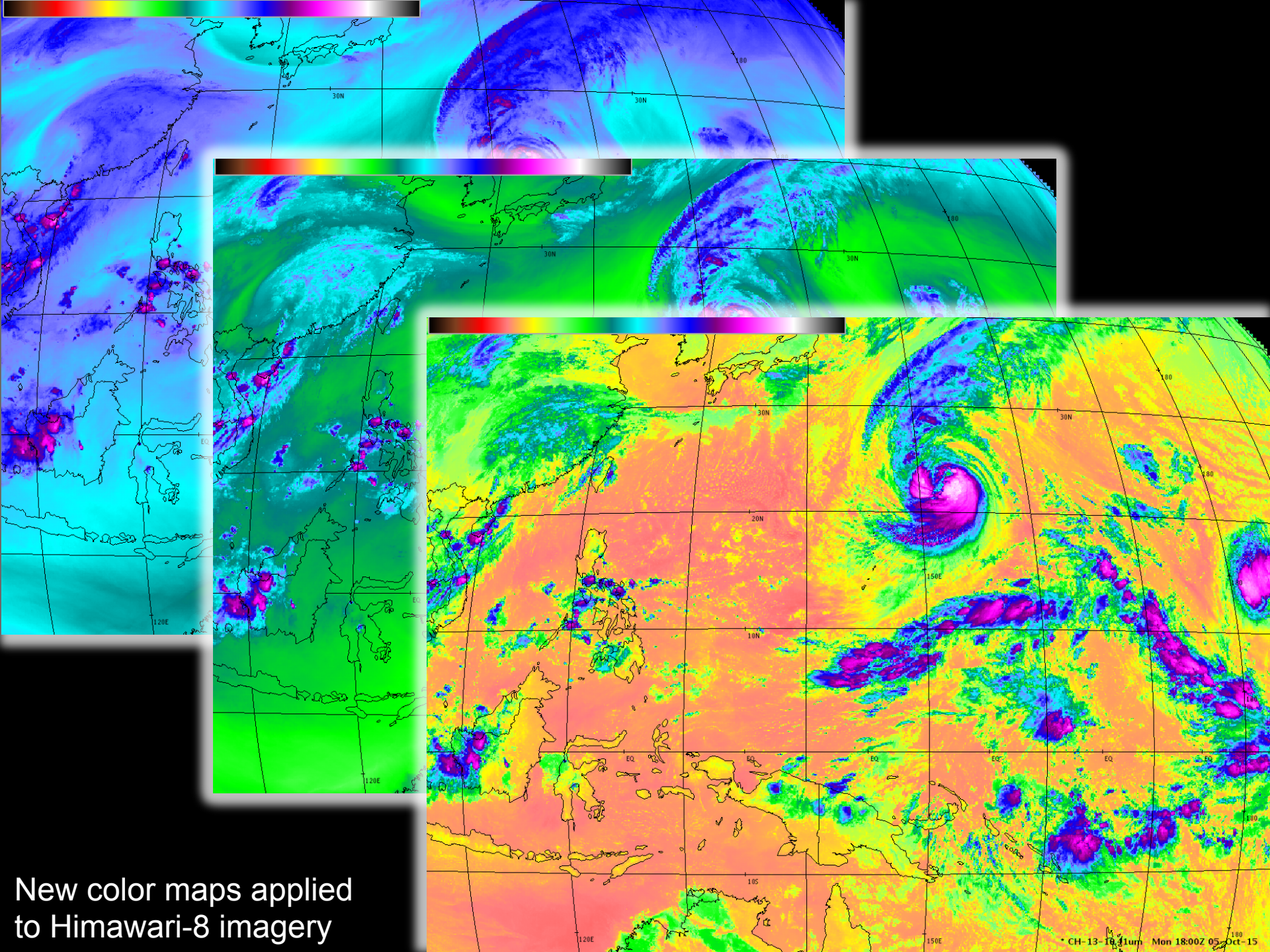
Benefits of New Visualizations



- Decrease number of clicks (amount of time) to load new information
- Reduce number of layers on the display
 - Only supply imagery when spatial recognition is necessary
- Not a “black box”
 - Contributing information is available to the user

Working Groups

- Considering concept of operations
 - How to composite current and new generation geostationary satellites
- Confirming cursor value for reflectances and brightness temperatures
- Developing new color maps to enhance new generation satellite spectral bands that have higher bit depths than today
 - 11 to 14 bits (2048 to 16384 unique values)



New color maps applied to Himawari-8 imagery

Other Enhancements

Under Development

- Automatic transition between a visible or near-infrared band and an infrared band when both are loaded, depending on the solar illumination of the scene
- User-controlled gamma correction for components of RGB composites
- Click-to-load aircraft soundings with moisture profile distinction on a plan view
- New derived products from satellites

Questions? Comments?

Jordan Gerth
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Related upcoming presentations:

J9.2 Increased Satellite Reception and Utilization Capabilities in NWS Pacific Region

Tuesday, 12 January 2016: 3:45 PM

Room 252/254

Jordan J. Gerth, CIMSS/Univ. of Wisconsin, Madison, WI; and B. Ward and E. Lau

12.4 The Himawari Training Program for NWS Pacific Region Meteorologists

Thursday, 14 January 2016: 4:15 PM

Room 252/254

Bill Ward, NOAA/NWS, Honolulu, HI; and J. J. Gerth