

# CIMSS AWIPS II Activities

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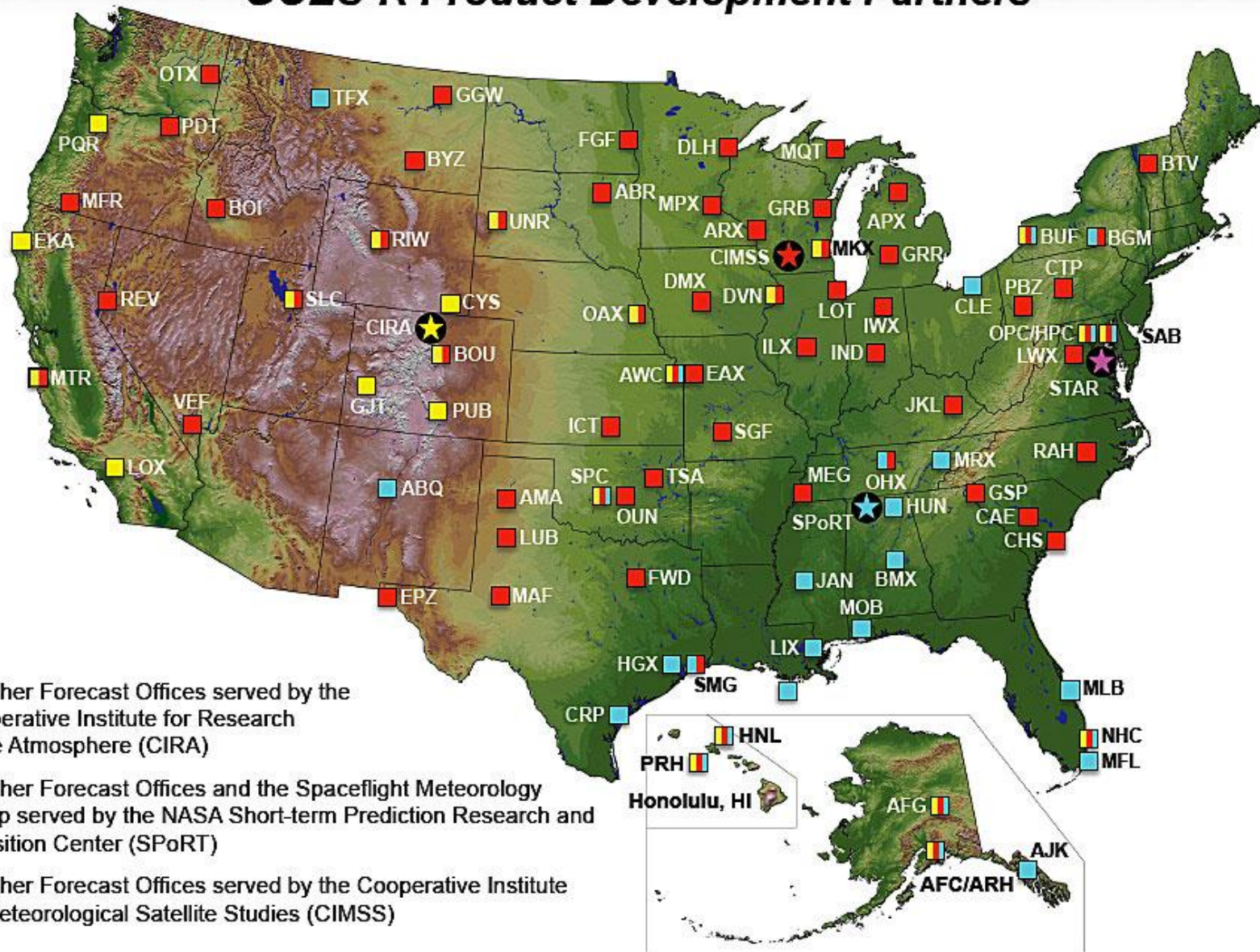
University of Wisconsin, Madison

3 May 2012



**WISCONSIN**  
UNIVERSITY OF WISCONSIN-MADISON

# GOES-R Product Development Partners

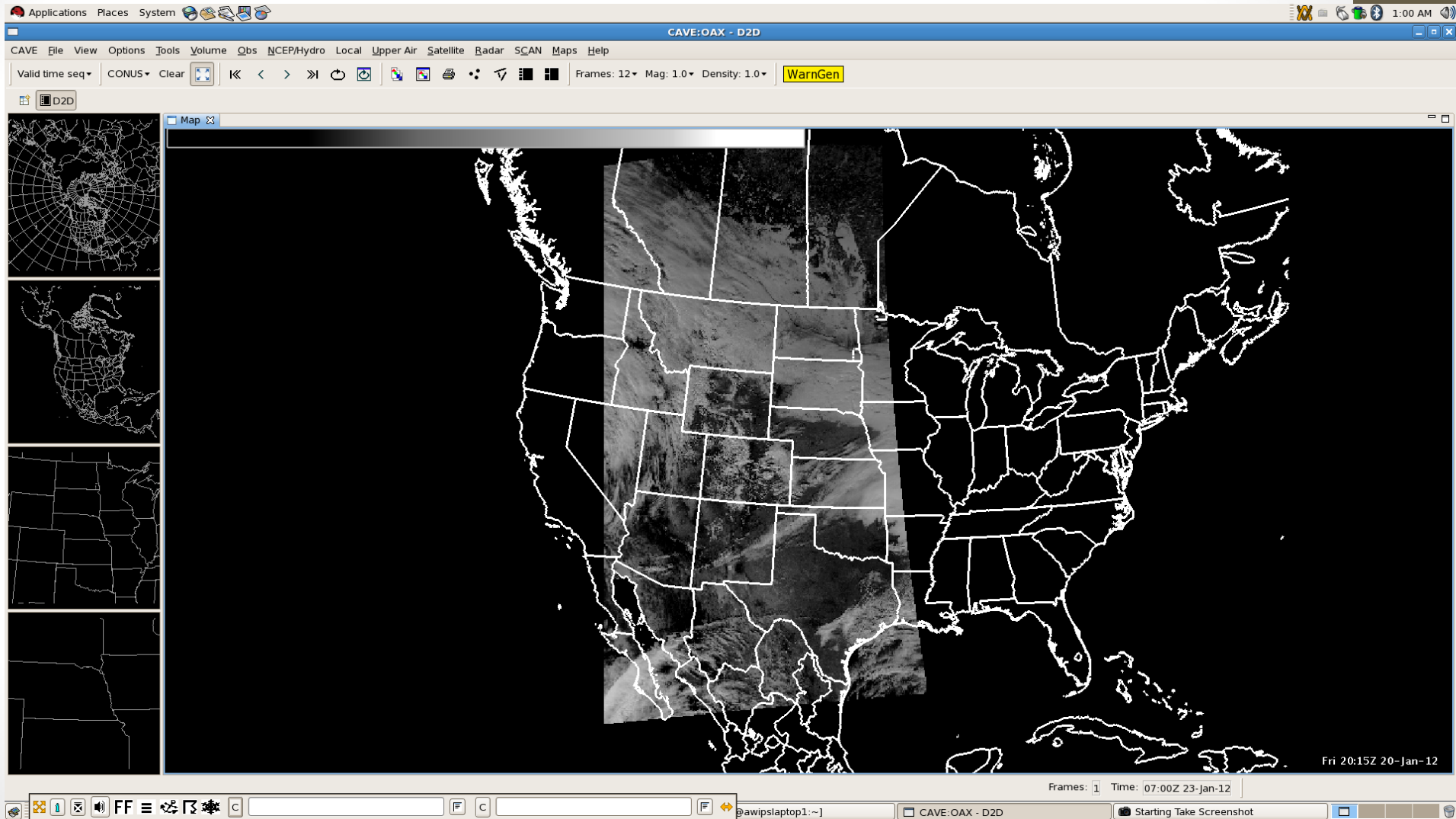


The real-time distribution of CIMSS and STAR ASPB experimental satellite imagery and products has grown to 70 NWS WFOs, Headquarters, and Centers. The imagery and products have contributed toward more than 440 forecast decisions, based on unique Area Forecast Discussion (AFD) references.

# How AWIPS II will Improve R20

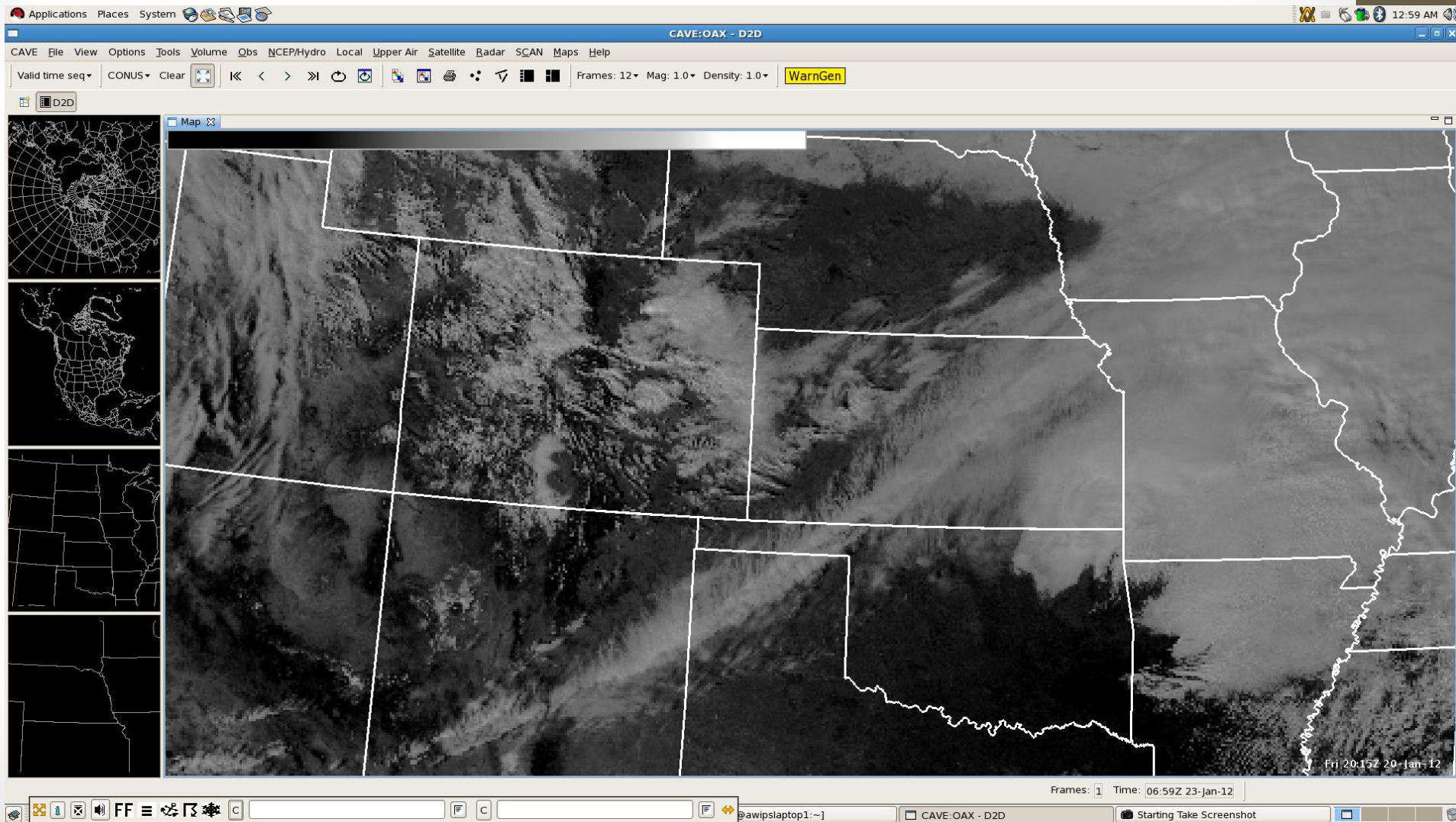
- Compared to geostationary satellites, polar satellites provide observations on greater spatial and spectral scales, while geostationary satellites provide more expansive coverage over a short time interval, ideal for operational meteorologists in the mid-latitudes and tropics
- Legacy AWIPS did not allow multi-layer image combinations
- SPoRT initially built a combined MODIS and GOES product *prior* to transmitting it to legacy AWIPS
- **By supporting dynamic image data array manipulations, AWIPS II:**
  - allows for more timely creation of this product,
  - promotes a single, fused source for satellite information, and
  - decreases bandwidth usage while increasing value of imagery to the forecasters.

# Image Layering in AWIPS II



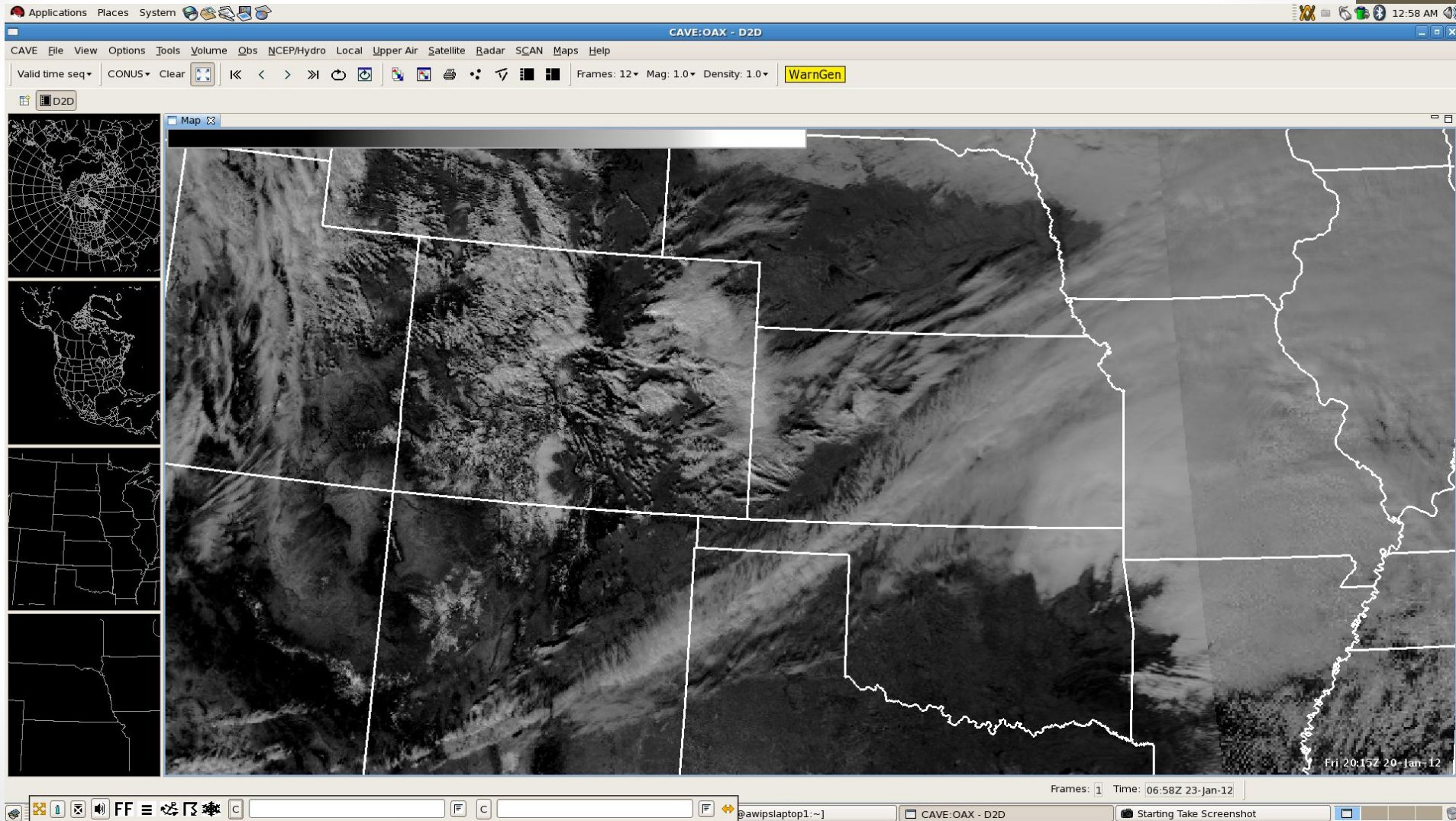
Coverage of 1 km MODIS visible imagery swath, 20:15 UTC 20 January 2012

# Image Layering in AWIPS II



GOES-13 (East) imagery only, 20:15 UTC 20 January 2012

# Image Layering in AWIPS II



Combination of MODIS and GOES visible imagery, 20:15 UTC 20 January 2012

# The Challenge:

Assuring CIMSS products are available in AWIPS "II"

The screenshot displays the CAVE software interface, which is used for visualizing meteorological data. The main window shows a large map of the United States with a color scale ranging from 0 to 14. The interface includes a menu bar with options like File, View, Options, Tools, Volume, Qbs, NCEP/Hydro, Local, Upper Air, Satellite, SSEC, koax, tmstp, ktx, tjua, Radar, SCAN, Maps, and Help. A dropdown menu is open, listing various data sources and products, including GOES-R Simulated ABI bands (Band 2 to Band 16), Image Differences, GOES-R Data Fusion, MVFR Probability, IFR Probability, and Other Imagery. A smaller window titled "Forecast Systems Laboratory D-2D (scottb)" is also visible, showing a detailed view of the data with a color scale from 40 to 20. The bottom status bar indicates the time as 04:22 PM and the metadata map key as DER1. The bottom right corner shows the time as 21:13 Z 20-Oct-08.

Applications Places System 4:42 PM

CAVE:OAX - D2D

CAVE File View Options Tools Volume Qbs NCEP/Hydro Local Upper Air Satellite SSEC koax tmstp ktx tjua Radar SCAN Maps Help

Valid time seq CONUS Clear 1.0 Density: 1.0 WarnGen

--- GOES-R Simulated ABI ---

Band 2 (0.64 um)	06.2100
Band 8 (6.19 um)	07.1200
Band 9 (6.95 um)	07.1200
Band 10 (7.34 um)	07.1200
Band 11 (8.5 um)	07.1200
Band 12 (9.61 um)	07.1200
Band 13 (10.35 um)	07.1200
Band 14 (11.2 um)	07.1200
Band 15 (12.3 um)	07.1200
Band 16 (13.3 um)	07.1200

--- Image Differences ---

Band 8 - Band 10	07.1200
Band 12 - Band 13	07.1200

--- GOES-R Data Fusion ---

MVFR Probability	06.2015
IFR Probability	06.2015

Other Imagery

Forecast Systems Laboratory D-2D (scottb)

File View Options Tools Local Tools Volume Qbs NCEP/Hydro Local Upper Air Satellite kmkx Radar SCAN Maps SSEC Help WarnGen

Valid time seq CONUS Clear Frames: 64

MODIS Products

- 1km Resolution - East
- 4km Resolution - East
- 1km Resolution - West
- 4km Resolution - West
- 1km Resolution - East/West
- 4km Resolution - East/West
- Marine - 1km Resolution
- 250m Resolution - Wisconsin
- MODIS GOES Fog Comparison 20.1943
- MODIS Orbit Itinerary Viewer

GRAS Prediction

- Eastern CONUS
- Western CONUS
- Combination CONUS
- Alaska

GOES Sounder Extras

- Eastern CONUS
- Western CONUS
- Combination CONUS

Convective Initiation

- Alabama Sector
- Wisconsin Sector
- High Density Winds
- MIMIC Total Precipitable Water (mm) 20.1500
- Upper Air Plots

MODIS Experimental GOES Winds

- GOES 1h High Density Winds

04:22 PM metadata map key: DER1

MODIS WV Mon 19:43Z + US Water Vapor Mon 19:45Z 20-Oct-08

GUARDIAN Controls: Start Stop

Frames: 7 Time: 21:13 Z 20-Oct-08

# The Roadmap



GOES-R  
Launch

New functionality

New configuration

New data distribution format

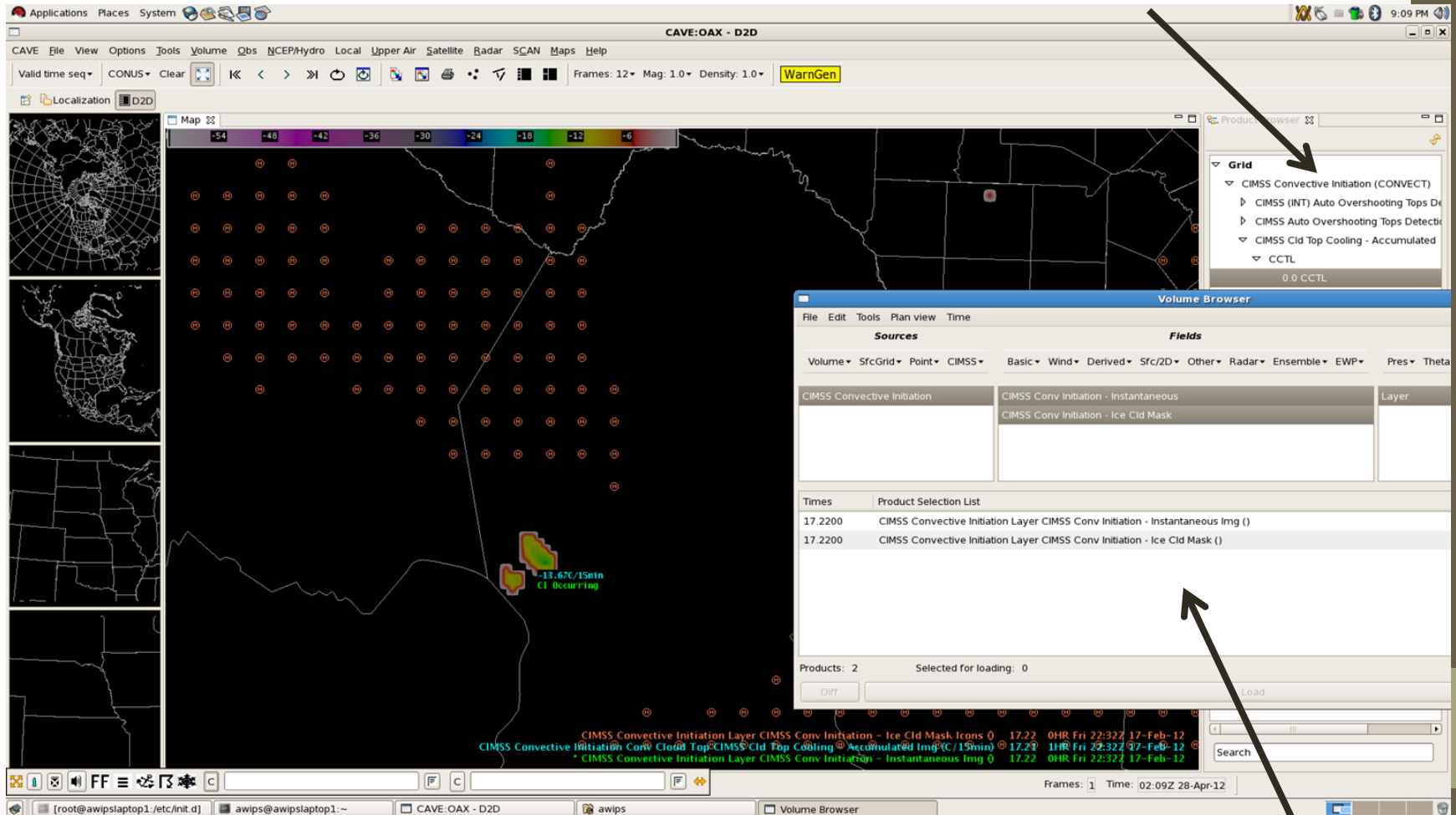


# Successfully Tested

- Satellite Imagery/Products (GINI/AREA/netCDF3)
  - MODIS (First in 2008)
  - AVHRR (GINI sector for Pacific Region is too large for baseline plug-in)
  - Morphed Integrated Microwave Imagery at CIMSS - Total Precipitable Water (MIMIC-TPW)
  - Atmospheric Infrared Sounder (AIRS)
  - Simulated ABI (from NSSL WRF)
  - MVFR/IFR (Flight Rules) Probabilities
  - Suomi National Polar-orbiting Partnership (NPP)
- Gridded (GRIB2)
  - CIMSS Regional Assimilation System (CRAS)
    - Simulated imagery
    - Pacific Region domain (Subset of NCEP Grid 254)
  - CIMSS Convective Initiation and Cooling Rates
  - CIMSS GOES-East/West Nearcasting

# CIMSS Convective Initiation

Product browser



Volume browser

# CIMSS GOES-East Nearcasting

New menus built with XML

The screenshot displays the CAVE:OAX - D2D software interface. The main window shows a weather map with a color scale from 1 to 11. A 'Volume Browser' window is open, showing a list of products and fields. The 'Sources' menu is set to 'CIMSS', and the 'Fields' menu is set to 'Bulk Shear'. The 'Planes' menu is set to '780MB-500MB'. The 'Product Selection List' shows one product: 'CIMSS GOES-East Nearcast 780MB-500MB Bulk Shear (kts)'. The 'Inventory' shows a list of products with a search bar. The 'GOES Vertical PW Difference' menu is expanded, showing a list of products. The status bar at the bottom indicates 'Frames: 10 Time: 02:03Z 28-Apr-12'.

CAVE:OAX - D2D

Volume Browser

Sources: Volume, SfcGrid, Point, CIMSS

Fields: Basic, Wind, Derived, Sfc/2D, Other, Radar, Ensemble, EWP

Planes: Pres, Theta, Hgt, Temp, Tilts, Misc, Lyrs

Times	Product Selection List	Inventory
27.2300	CIMSS GOES-East Nearcast 780MB-500MB Bulk Shear (kts)	+++++

Products: 1 Selected for loading: 0

Diff Load

- GOES Vertical PW Difference
  - EA
    - 0.0 EA
    - GOES Vertical Theta-e Diff Low-Mid
    - Precipitable H2O
    - Sect Norm Wind
    - Theta-E Grad Mag
    - Theta-E Gradient
    - Total Deformation
    - Total Wind (Vector)
    - u Component of Wind
    - v Component of Wind
    - Vorticity

Search

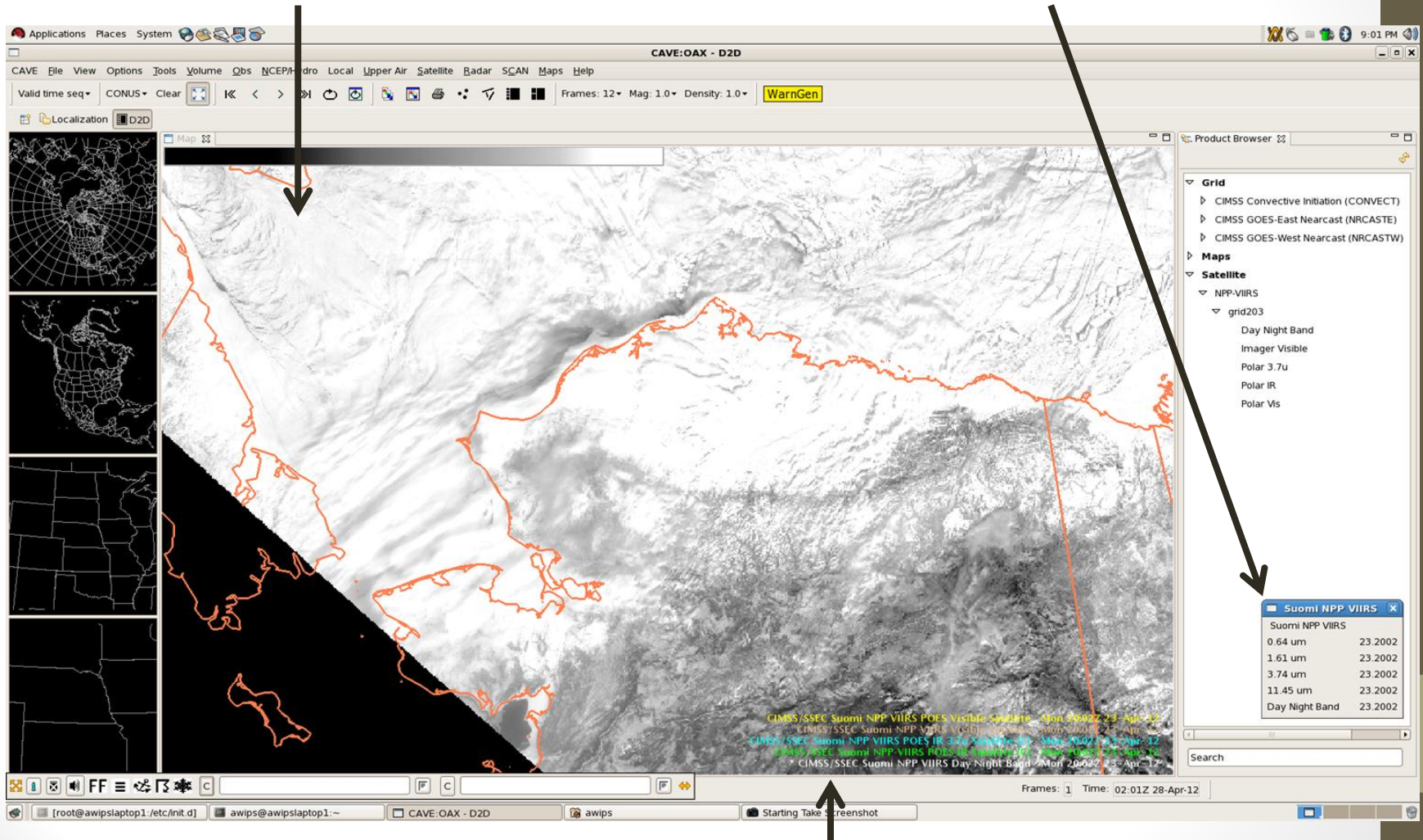
Frames: 10 Time: 02:03Z 28-Apr-12

[root@awips1aptop1:~/etc/nit.d] awips@awips1aptop1:~ CAVE:OAX - D2D awips Volume Browser Starting Take Screenshot

# Suomi NPP (0.64 $\mu\text{m}$ )

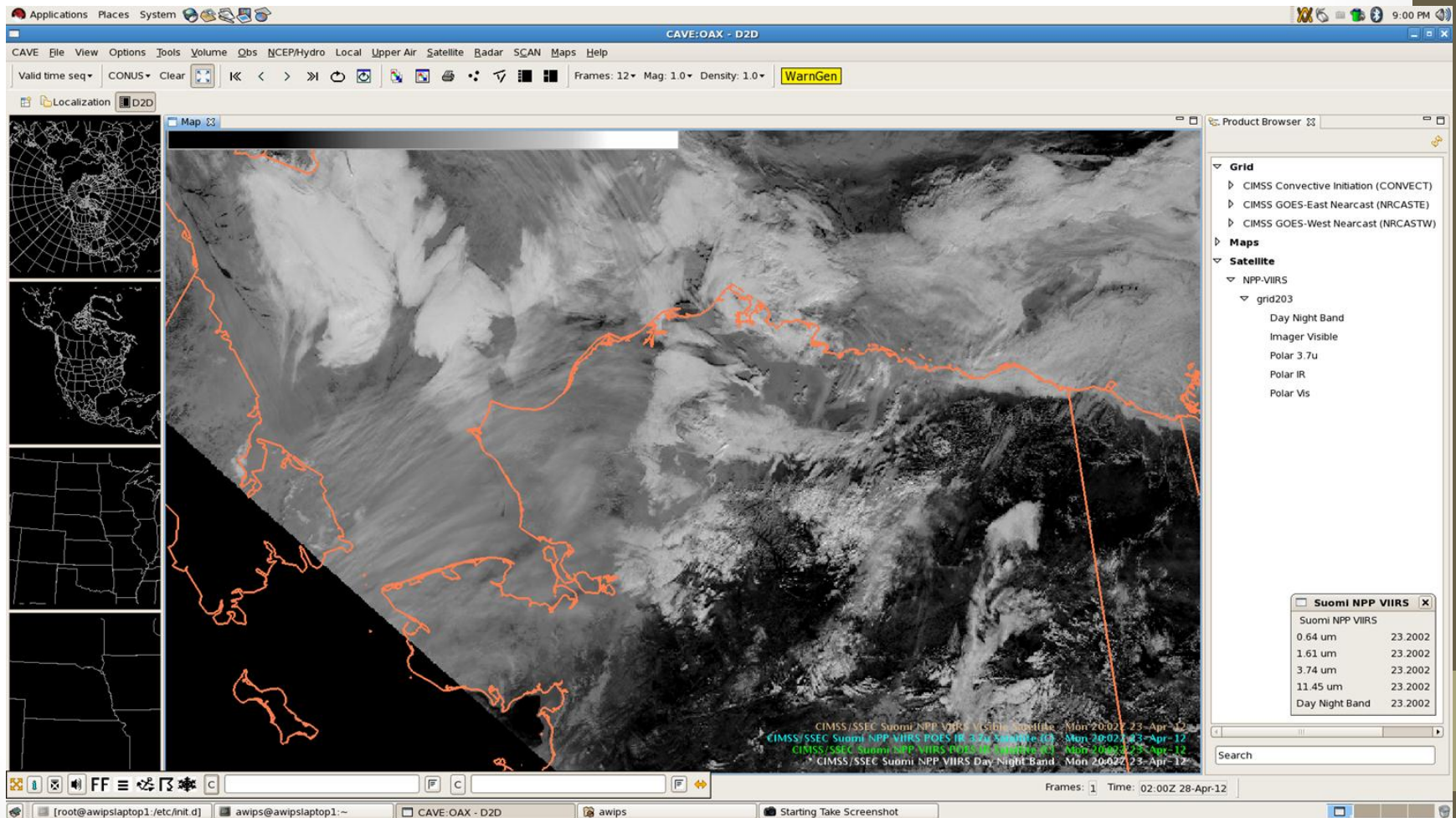
netCDF3 ingested with regionalsat (Kretz)

New menu built with XML

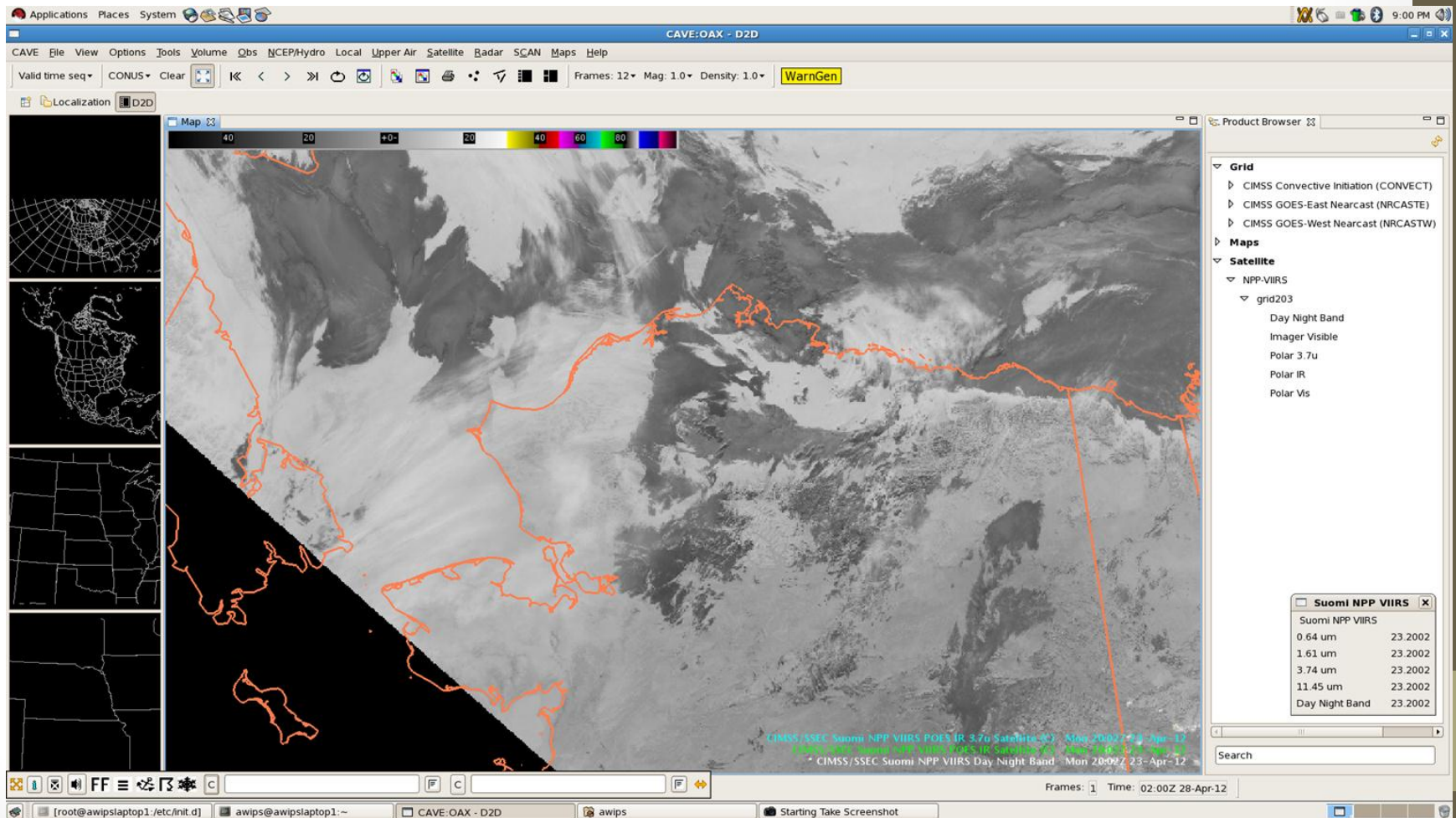


Viz.satellite plug-in re-built to support

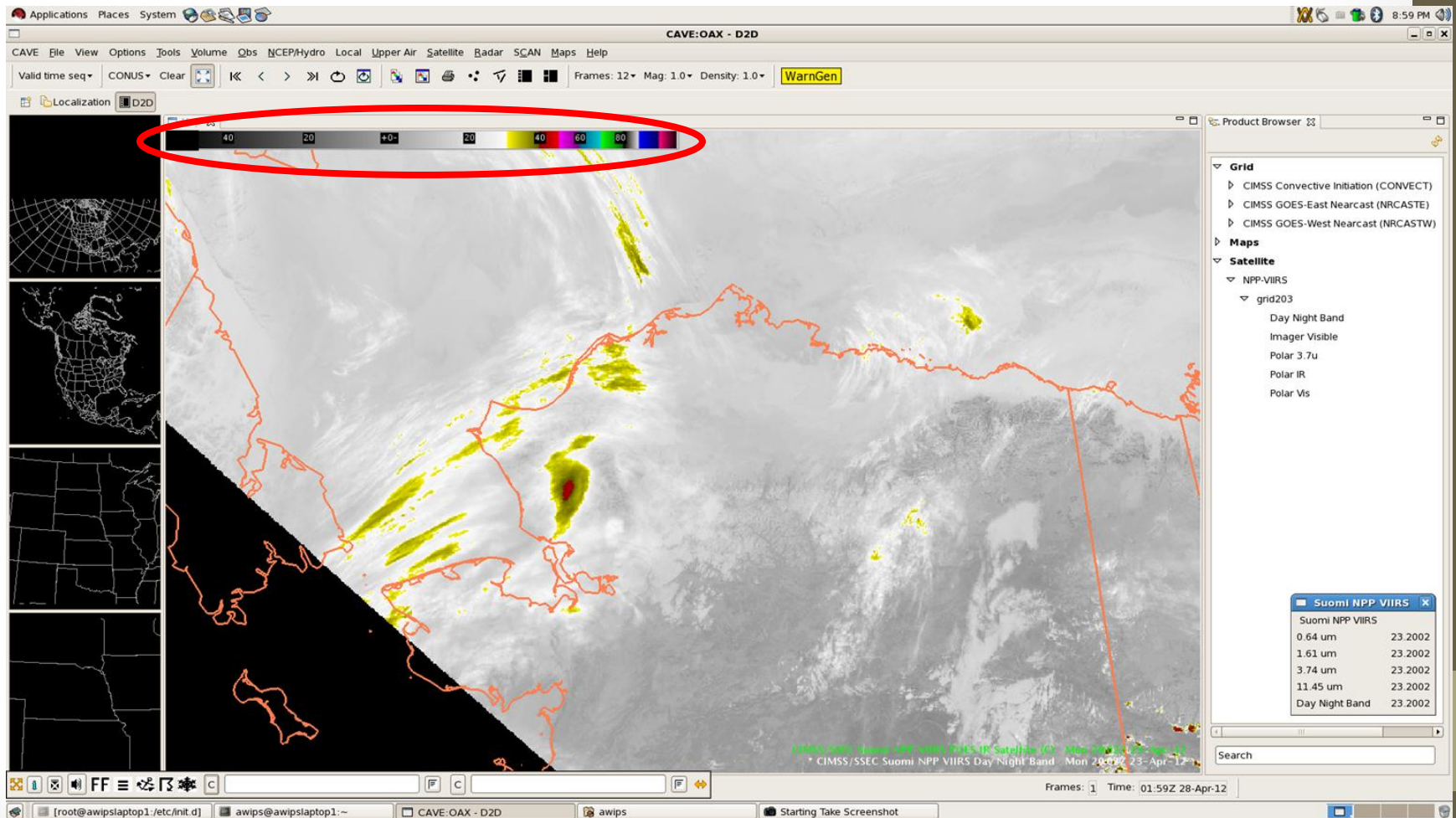
# Suomi NPP (1.61 $\mu\text{m}$ )



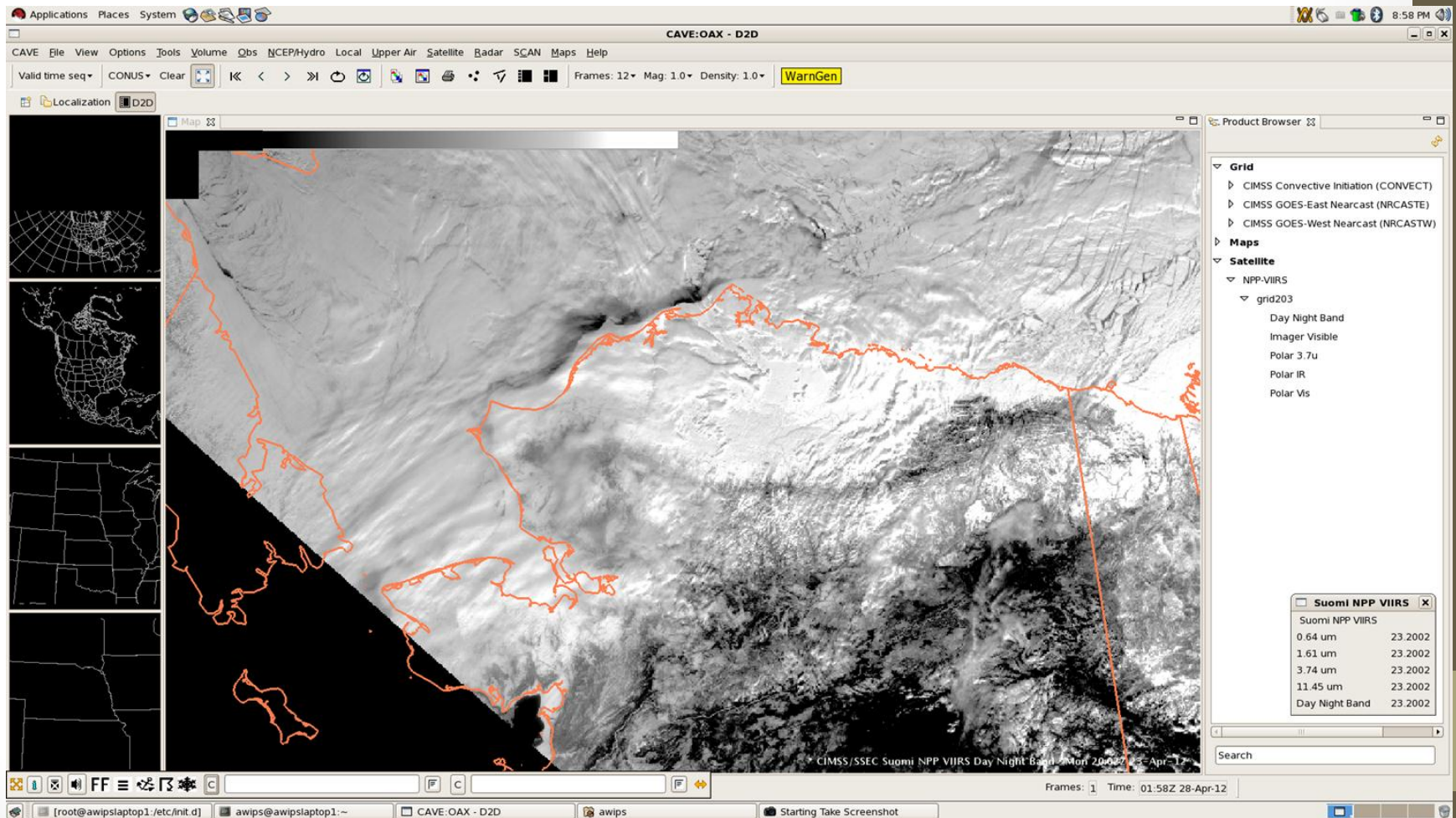
# Suomi NPP (3.74 $\mu\text{m}$ )



# Suomi NPP (11.45 $\mu\text{m}$ )



# Suomi NPP (Day Night Band)





# CIMSS Strategy

- Guide and review development of netCDF3 plug-in to meet needs of GOES-R Proving Ground (GRPG)
- Leverage the code base in the software as it exists
  - Adapt to current AWIPS II plug-ins (GRIB2, McIDAS AREA, GINI), update configuration tables, and reformat current AWIPS satellite imagery and products from CIMSS to a plug-in-compliant format
    - Repurposing functionality is the essence of a service-oriented architecture
  - Lower chance of adverse impact on system
  - Easier to assure functionality across builds
- Create, modify, and extend plug-ins only when necessary to meet legacy AWIPS capabilities
  - Wait for major code development and refactoring to subside

# CIMSS Strategy

- Recommend changes to baseline code base for tomorrow's capabilities
  - Accomplished via Technical Interchange Meetings (TIMs)
  - RGBA discussed tomorrow
- Proposing new capabilities
  - Expand data array structure
    - Currently byte values
  - Add advanced map projections, additional geospatial support
    - Pursuing strategies to add satellite perspectives (polar and geostationary)
    - Currently limited to Mercator, Lambert Conformal, and Polar Stereographic
  - Additional configurability via XML
    - Legends, scaling, purging, etc.

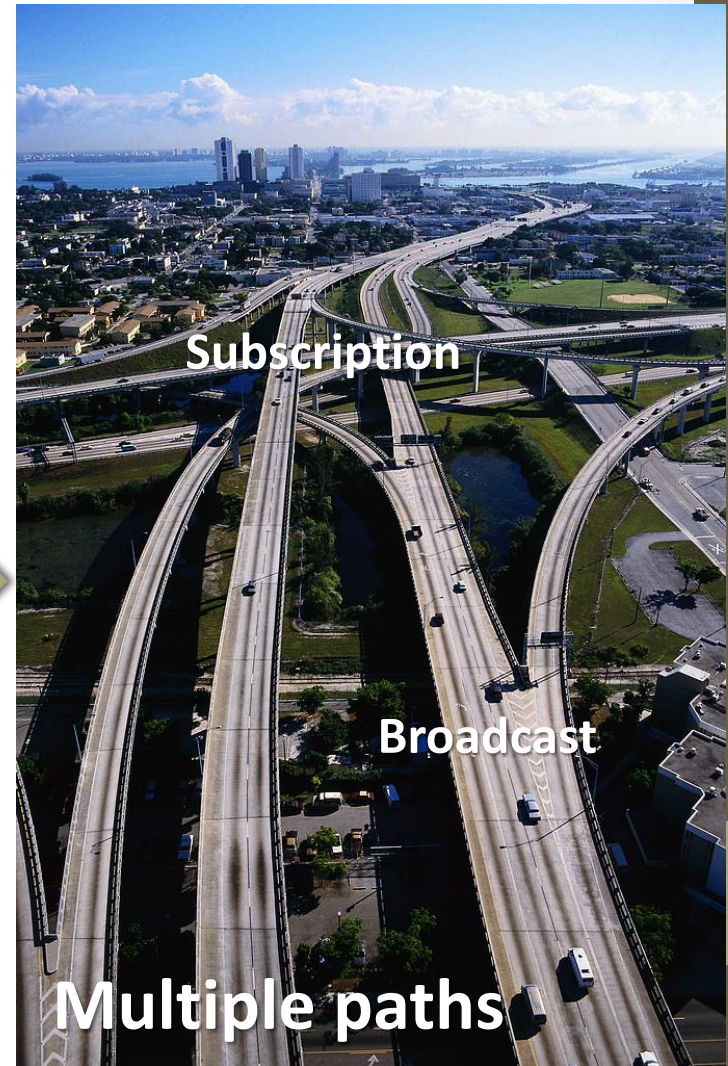
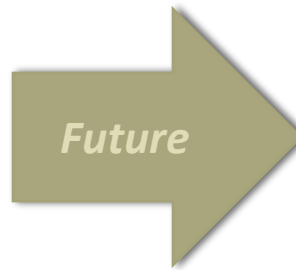
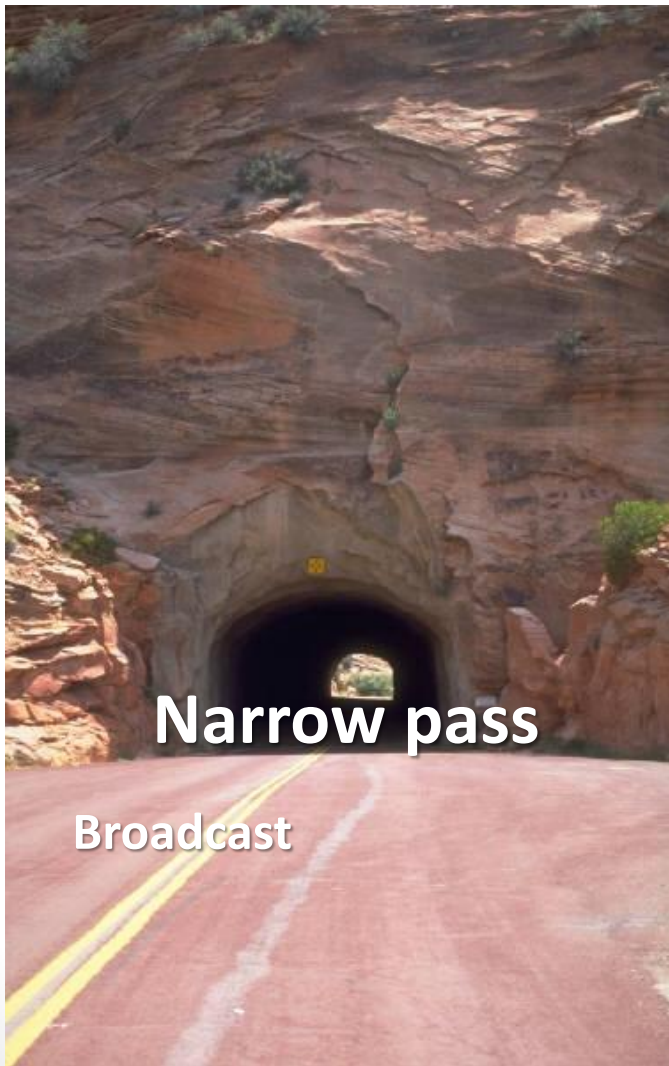
# Moving Forward

- Comfort with software and code base is increasing for a limited number of developers
  - Abbreviated but formalized AWIPS II technical skills training necessary for GRPG liaisons to complete tasks expeditiously
- Governance strategy still needed
- Joint academia-government-industry AWIPS II developers' workgroup not established
  - NWS has held developer outreach teleconferences with some success but they not completely integrated across the enterprise
- Documentation better but incomplete in some important areas (e.g., use of derived parameters, XML tags involving displays styling)
- Developer-level software features not perfect
  - TIMs with teeth?

# Moving Forward

- NOAA lacks permanent satellite advocates at the sub-agency interface between NWS and NESDIS
  - Limited inter-agency communication produces a sub-standard incremental implementation of new satellite imagery/product enhancements into AWIPS, as evident in switch to GOES-15
  - Responsibility for affirming satellite capabilities of AWIPS II unclear
    - CIMSS currently performs task in ad hoc capacity
- Transitional avenue to operations not identified for successful demonstrations within the GRPG
- GRPG providers cannot access the AWIPS LAN at WFOs, which increases frustration and time when troubleshooting ingest and display problems involving experimental PG products

# Diversification of paths for data delivery required



# Capabilities Wish List

- Product-push deployment, quick display capability, and direct display sharing with remote users
  - Ability to introduce new or special products just in time for use with high-impact or evolving weather events
  - Facilitate direct communication in training exercises to allow for interaction and quick answers to questions on data or products
- Incorporation of scientific programming languages to leverage display and data store
  - Increase use in research sector and academia
  - Allow for more efficient techniques development
  - Decrease amount of time for training in new language
- CAVE plug-in for displaying bit depths greater than eight
  - Partial re-factoring of EDEX plug-ins may be necessary

# Questions/Comments?

- **Contact me: Jordan Gerth, [Jordan.Gerth@noaa.gov](mailto:Jordan.Gerth@noaa.gov)**
- Thanks to...
  - Tom Kretz, Darrel Kingfield, John Olsen, Ed Mandel, Bill Campbell, and Frank Griffith
  - All of my Facebook friends, LinkedIn connections, and Twitter followers

