CIMSS AWIPS II Activities

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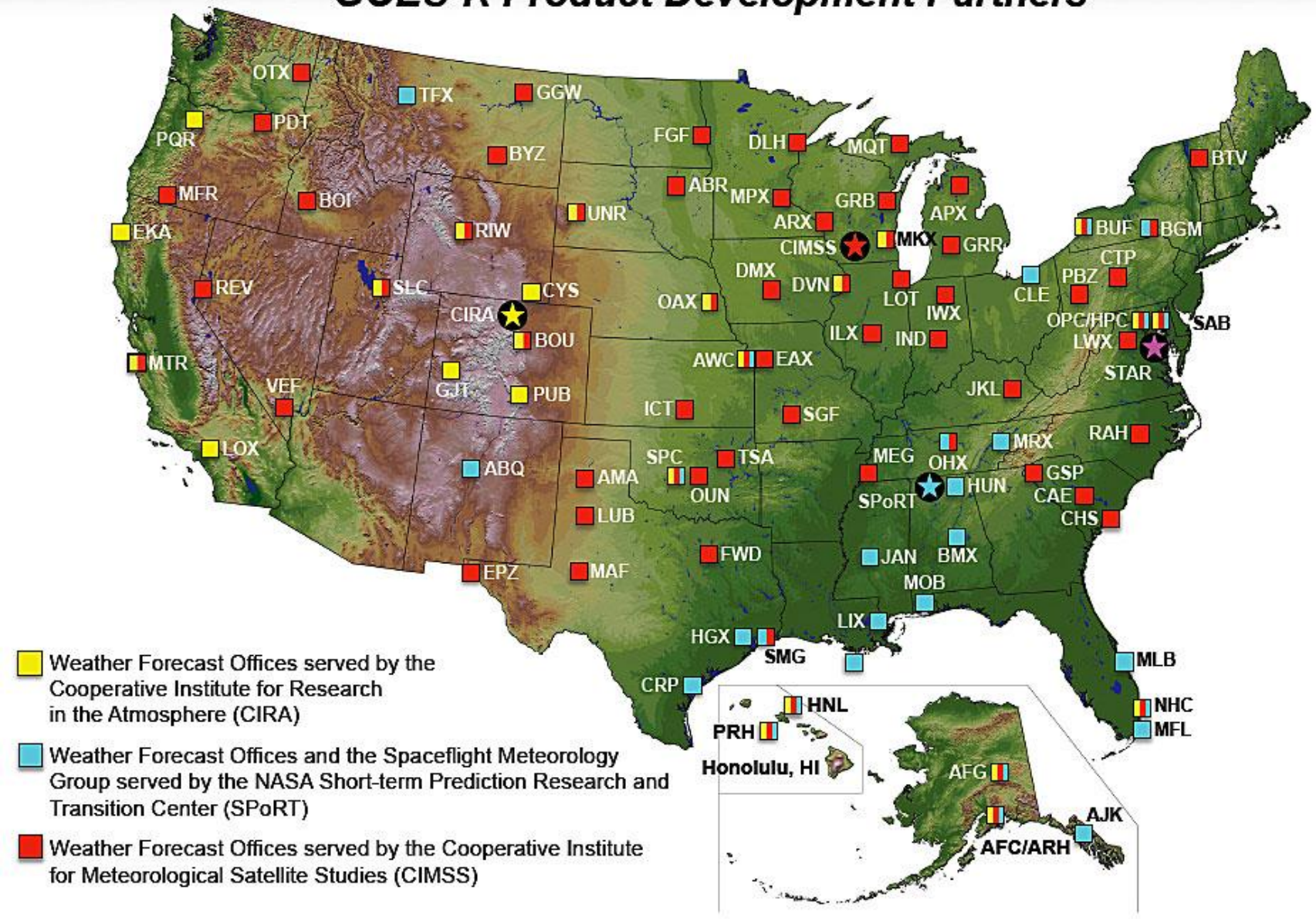
University of Wisconsin, Madison
3 May 2012

NOAA Satellite Science Week

GOES-R Product Development Partners



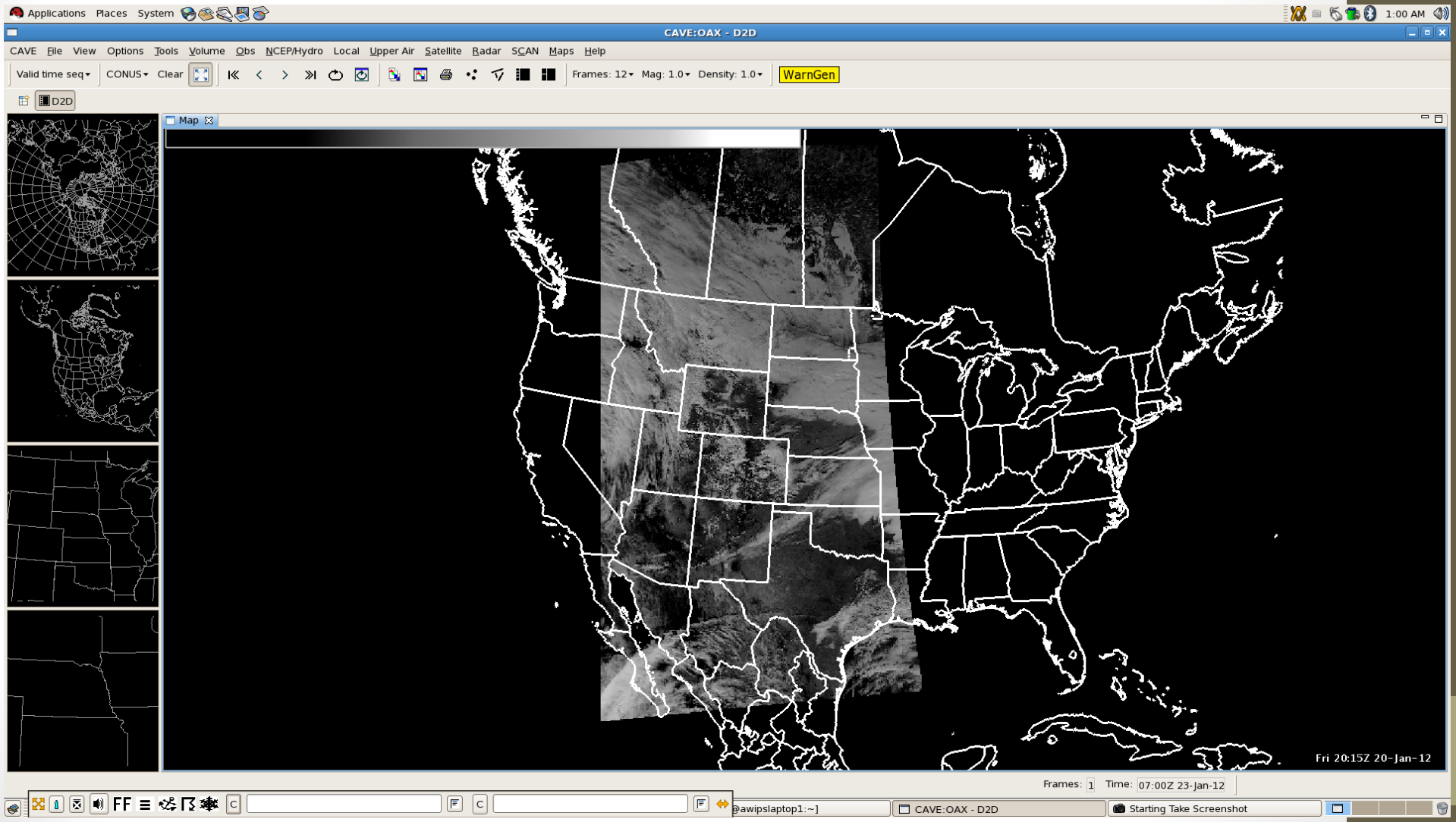
- Weather Forecast Offices served by the Cooperative Institute for Research in the Atmosphere (CIRA)
- Weather Forecast Offices and the Spaceflight Meteorology Group served by the NASA Short-term Prediction Research and Transition Center (SPoRT)
- Weather Forecast Offices served by the Cooperative Institute for Meteorological Satellite Studies (CIMSS)

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 R2O

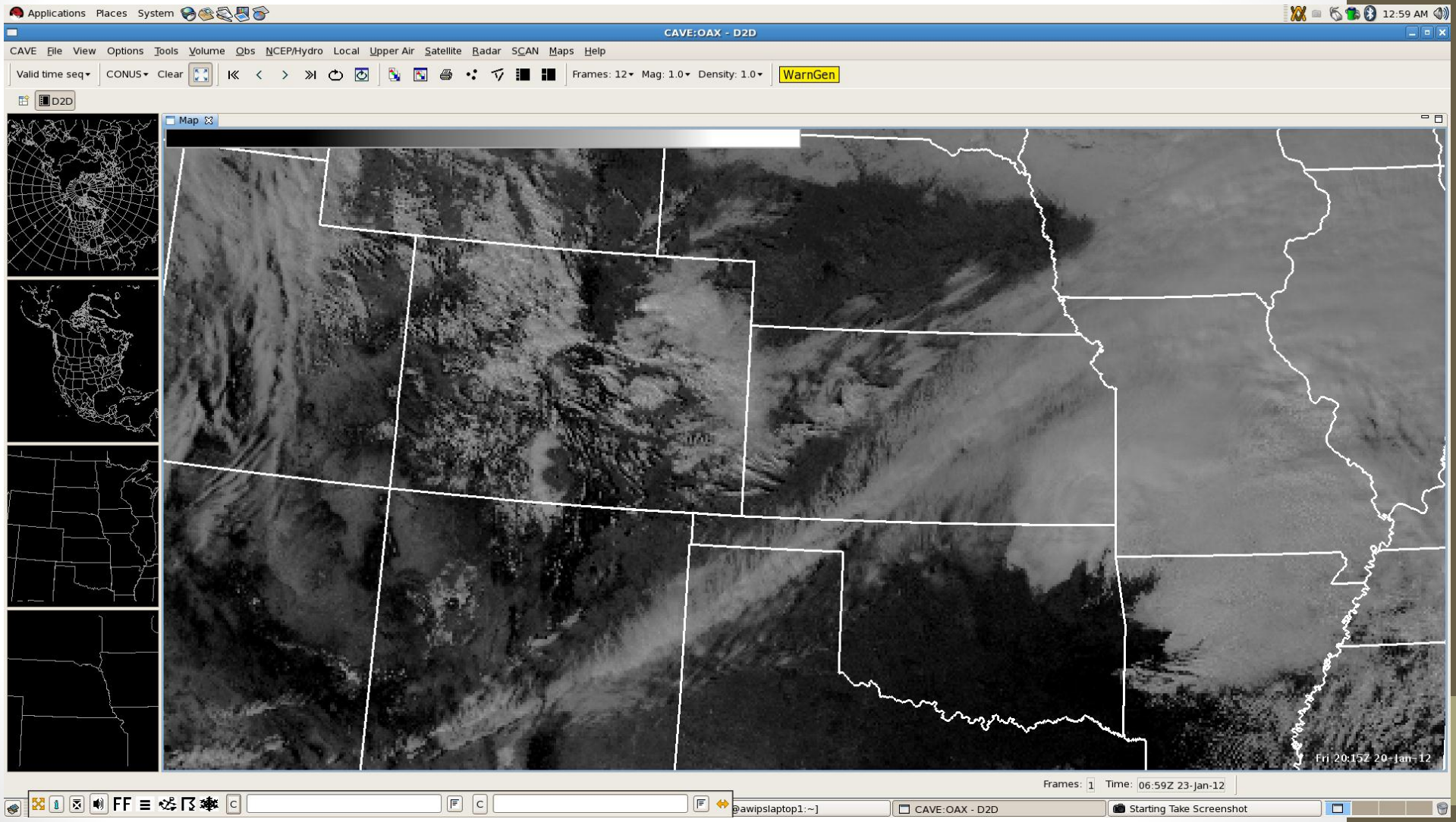
- Compared to geostationary satellites, polar satellites provide observations on greater spatial and spectral scales, while geostationary satellites provide more expansive coverage over a short time interval, ideal for operational meteorologists in the mid-latitudes and tropics
- Legacy AWIPS did not 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



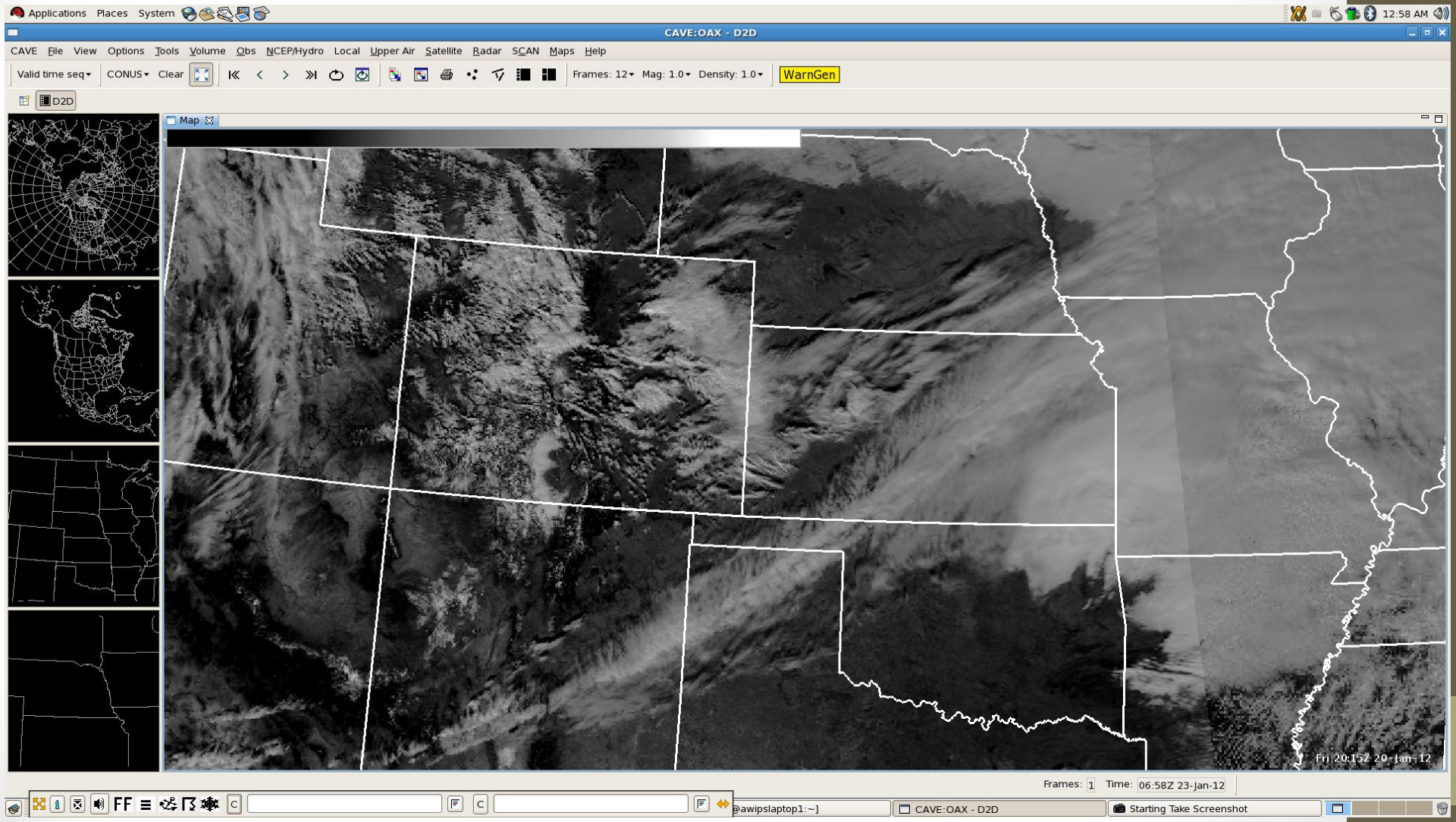
Coverage of 1 km MODIS visible imagery swath, 20:15 UTC 20 January 2012

Image Layering in AWIPS II



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

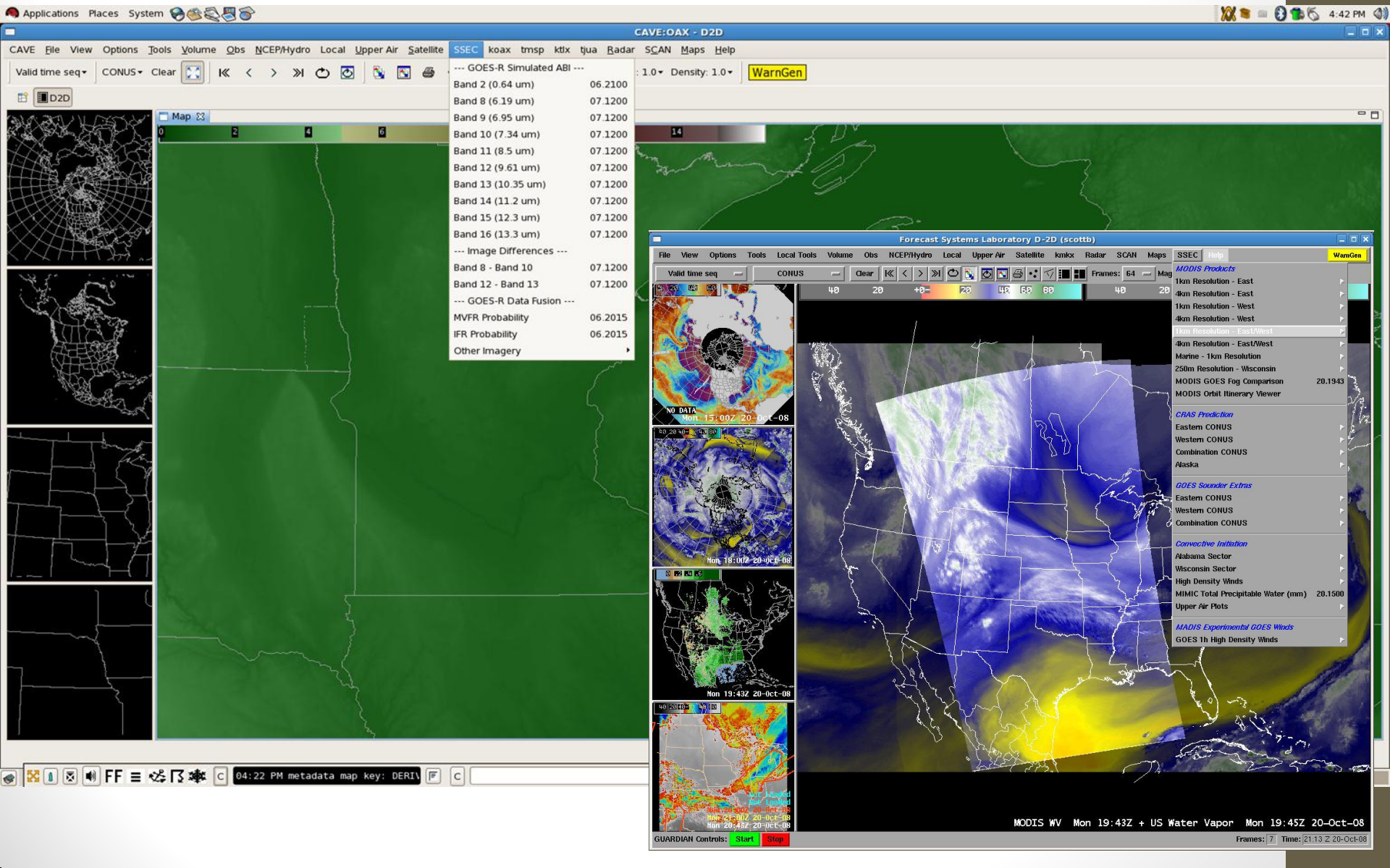
Image Layering in AWIPS II



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

The Challenge:

Assuring CIMSS products are available in AWIPS "II"



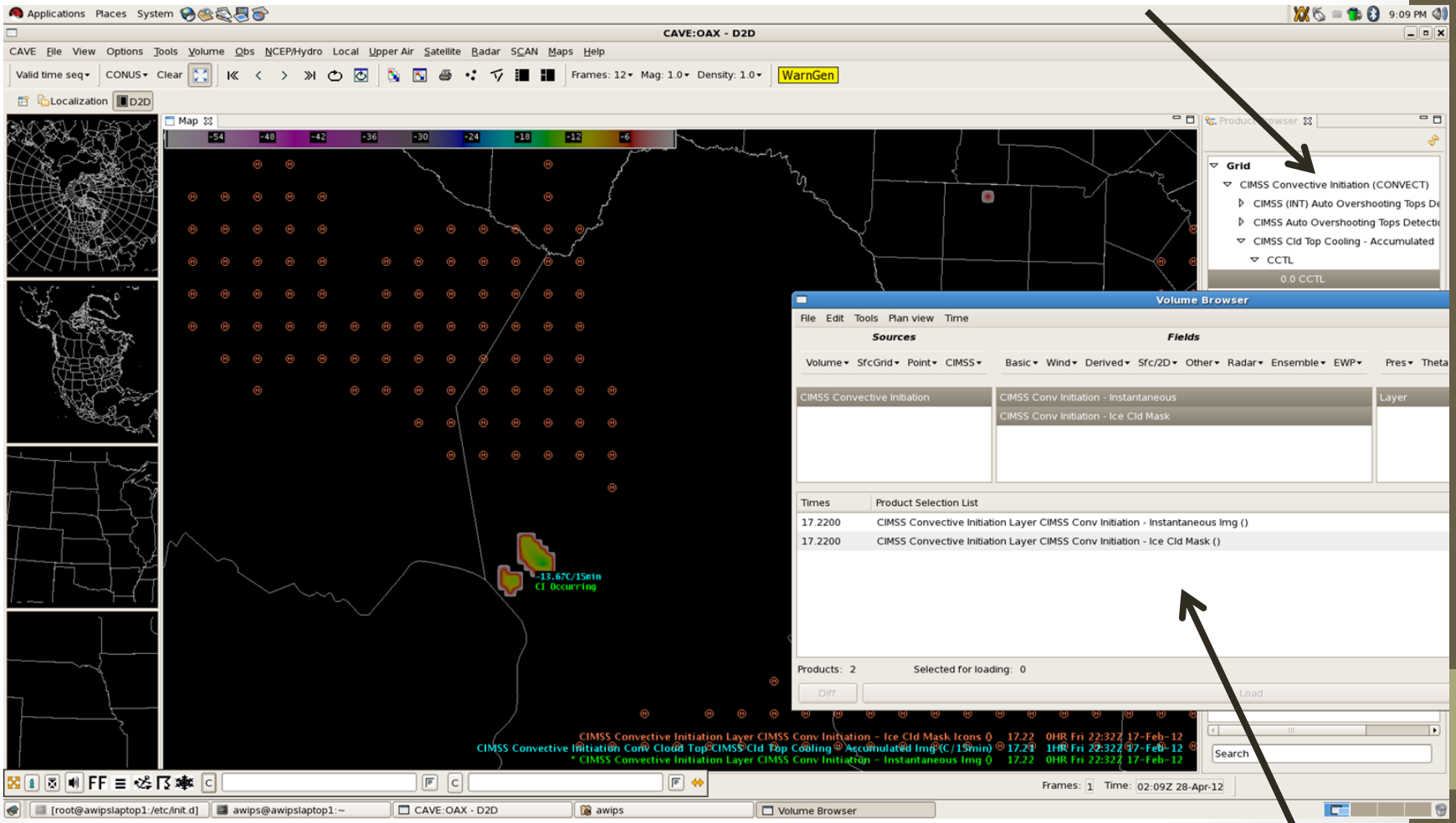
The Roadmap


GOES-R
Launch
New functionality
New configuration
New data distribution format

Successfully Tested

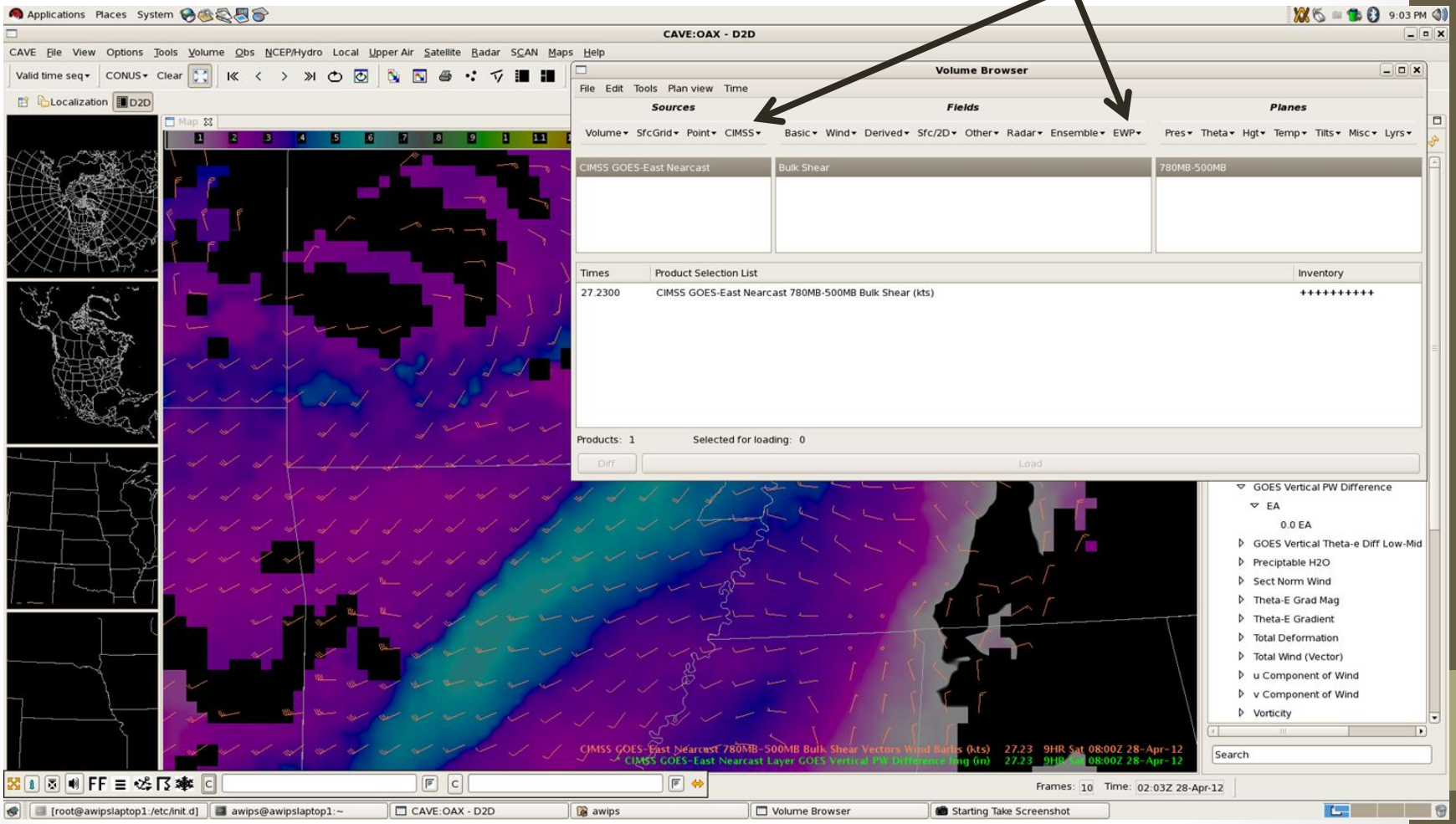
- Satellite Imagery/Products (GINI/AREA/netCDF3)
  - MODIS (First in 2008)
  - AVHRR (GINI sector for Pacific Region is too large for baseline plug-in)
  - Morphed Integrated Microwave Imagery at CIMSS - Total Precipitable Water (MIMIC-TPW)
  - Atmospheric Infrared Sounder (AIRS)
  - Simulated ABI (from 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



CIMSS GOES-East Nearcasting

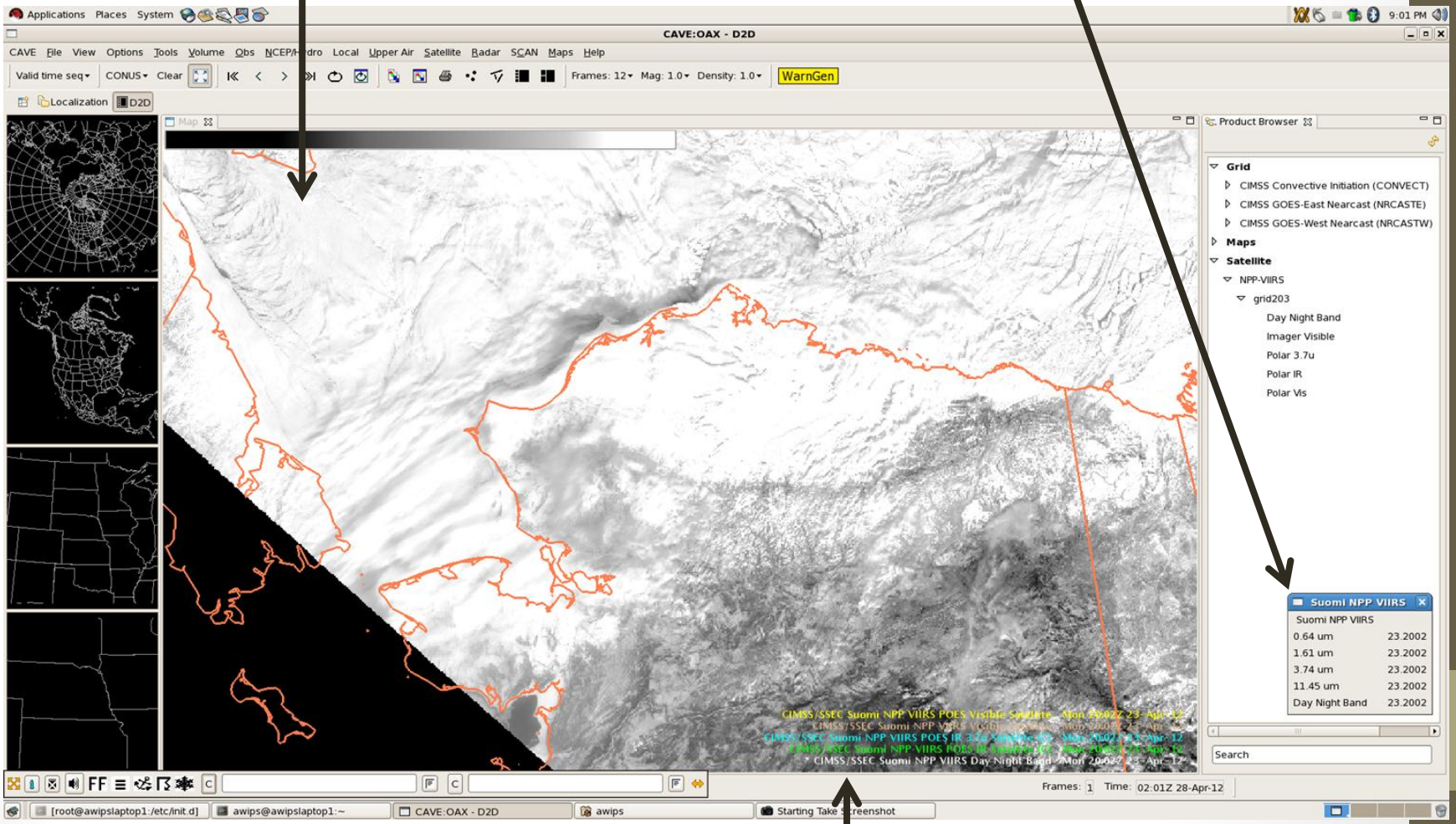
New menus built with XML



Suomi NPP (0.64 µm)

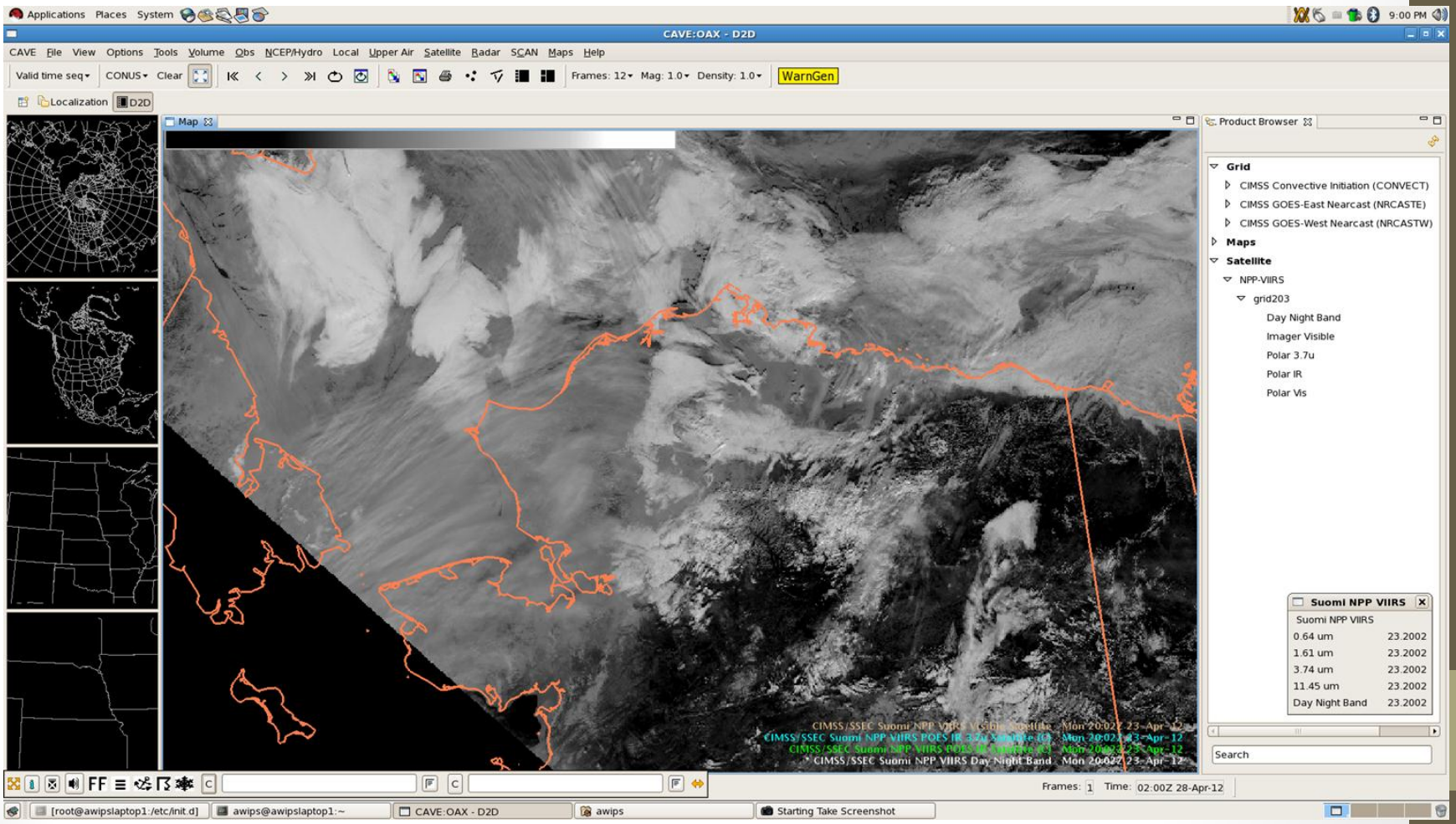
netCDF3 ingested with regionalsat (Kretz)

New menus built with XML

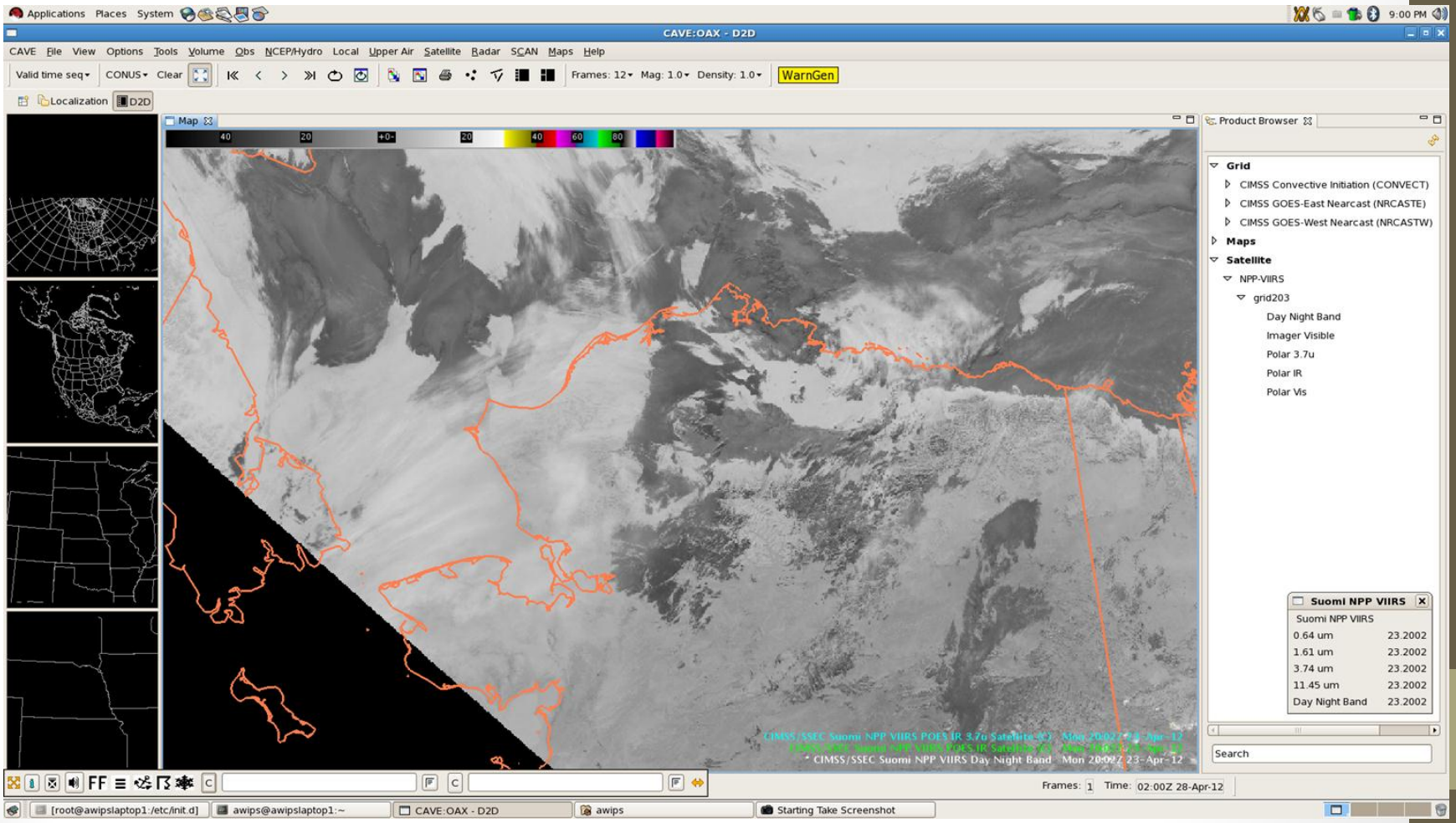


Viz.satellite plug-in re-built to support

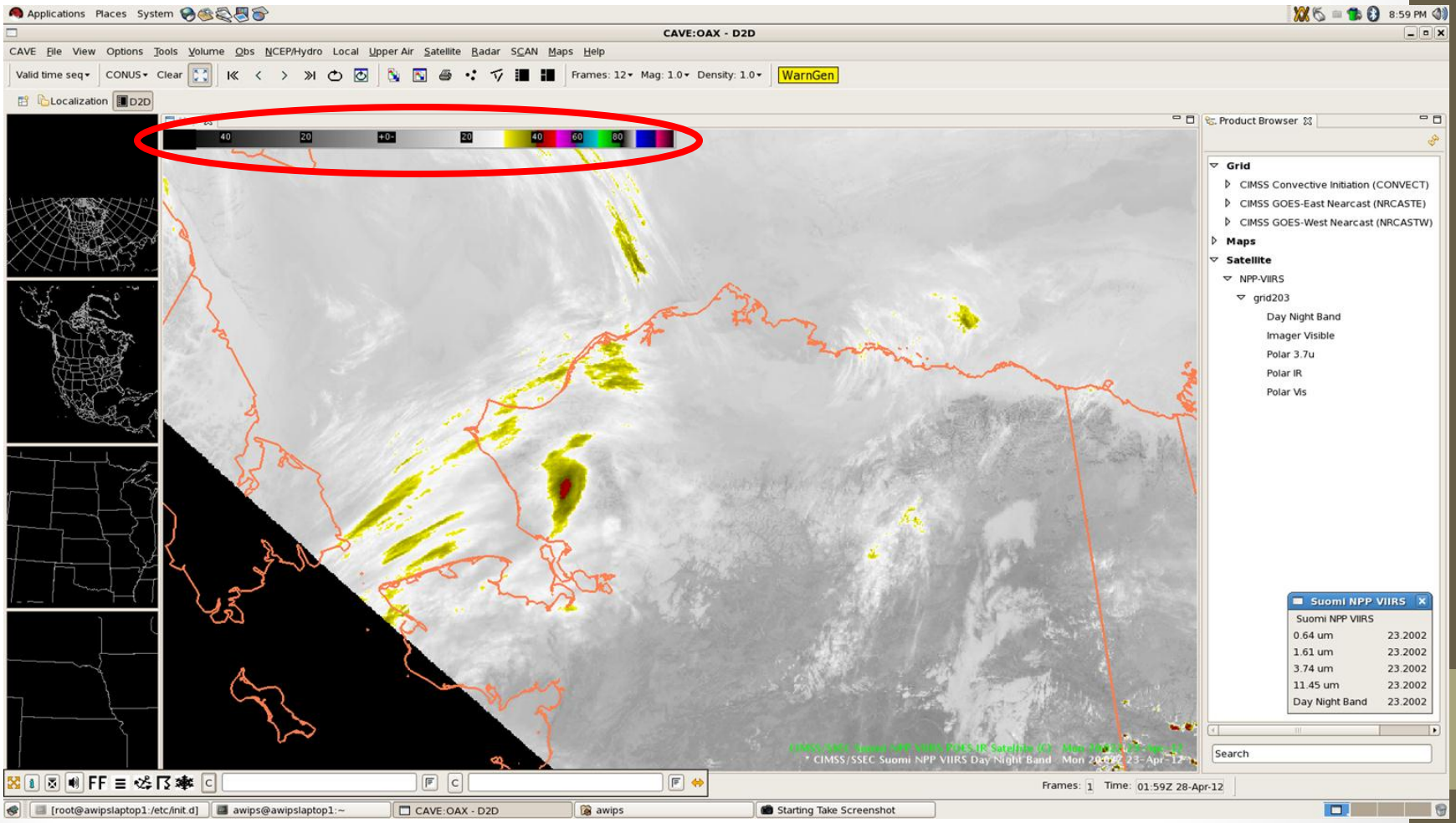
Suomi NPP (1.61 µm)



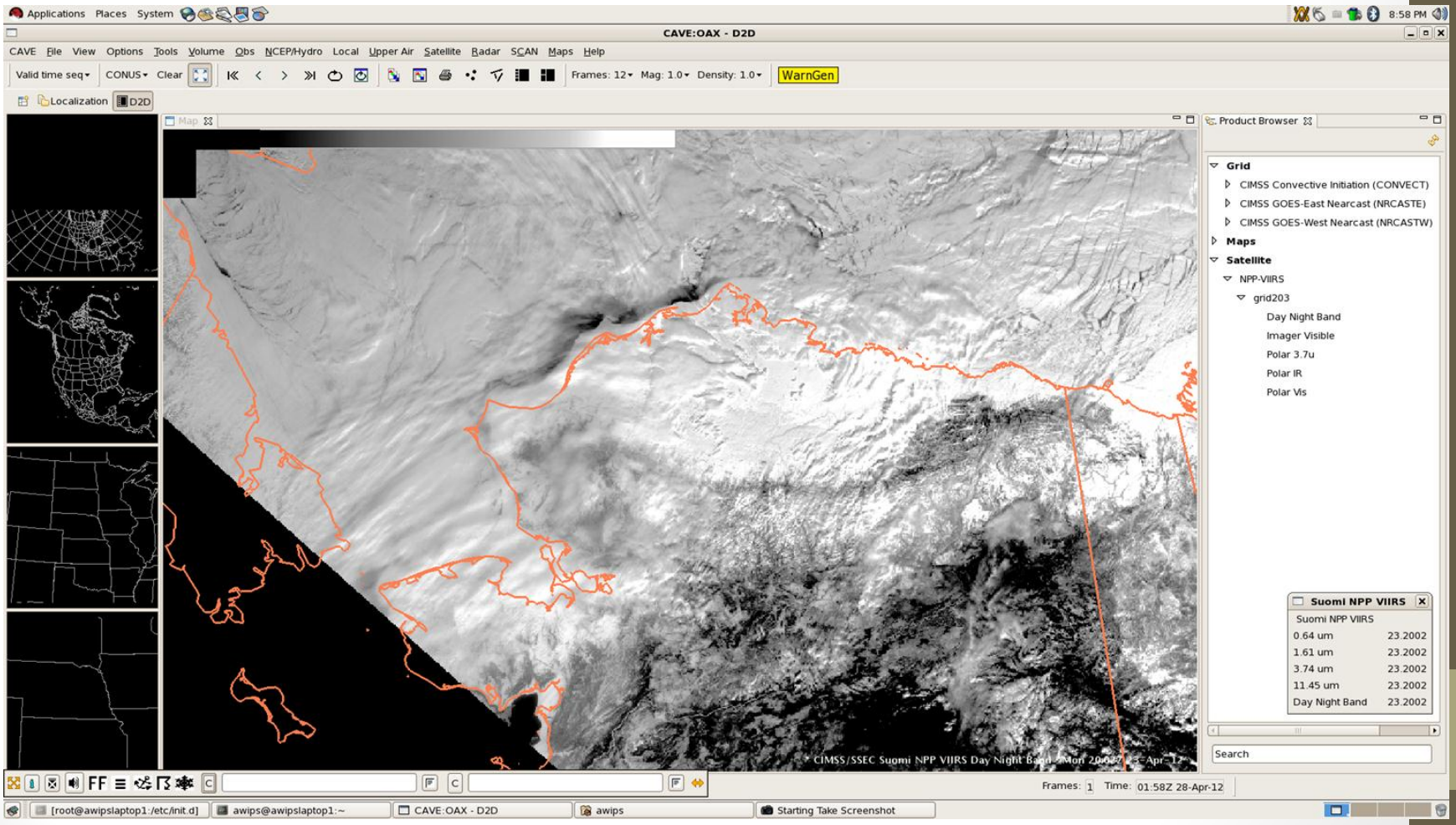
Suomi NPP (3.74 µm)



Suomi NPP (11.45 µm)



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.

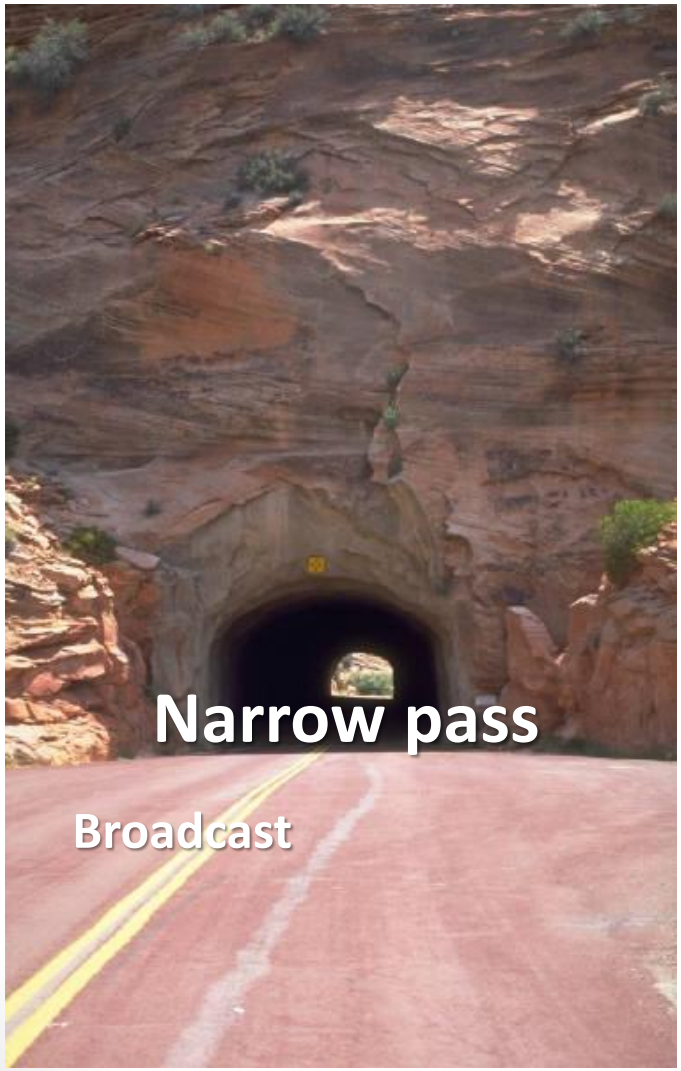
Moving Forward

- 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?

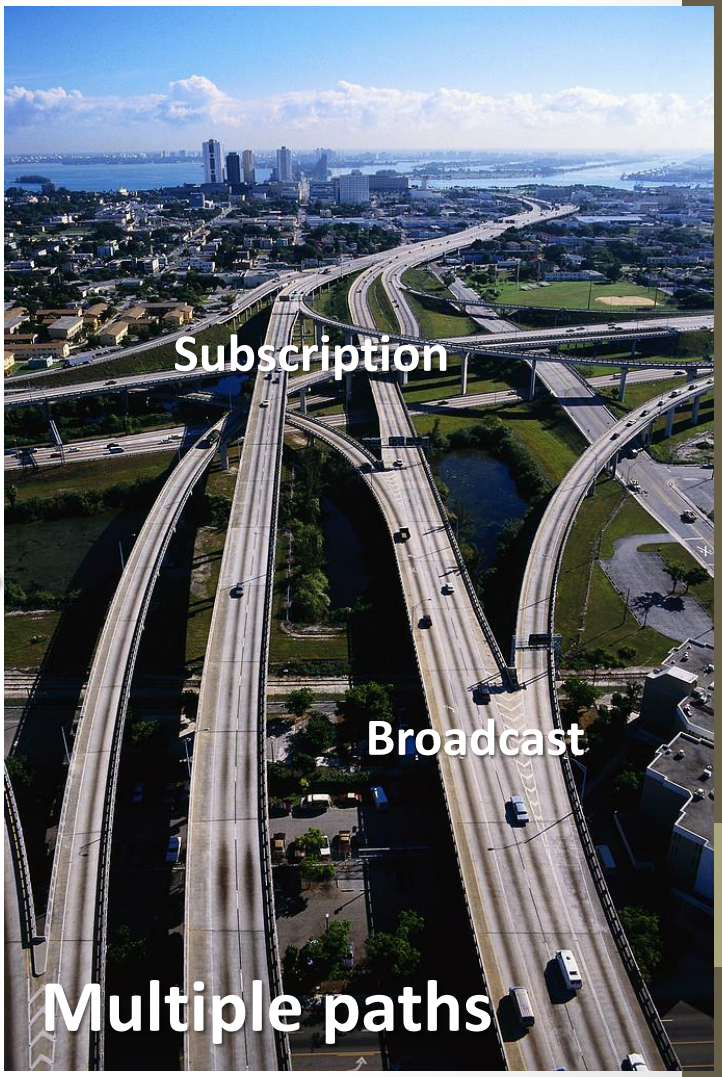
Moving Forward

- 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



Future



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**
- 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