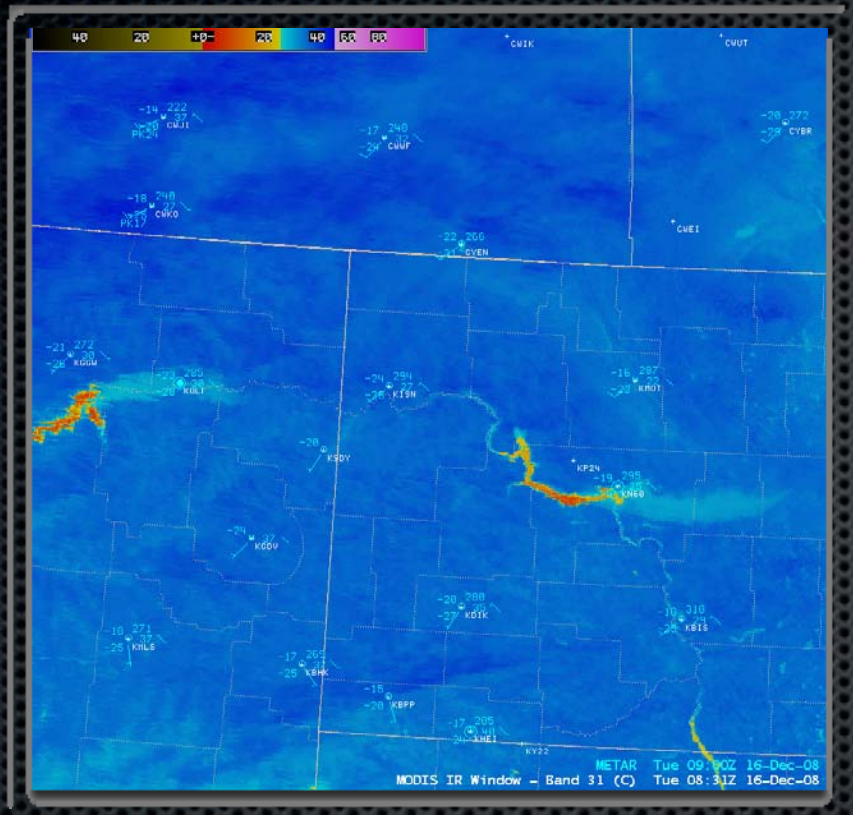
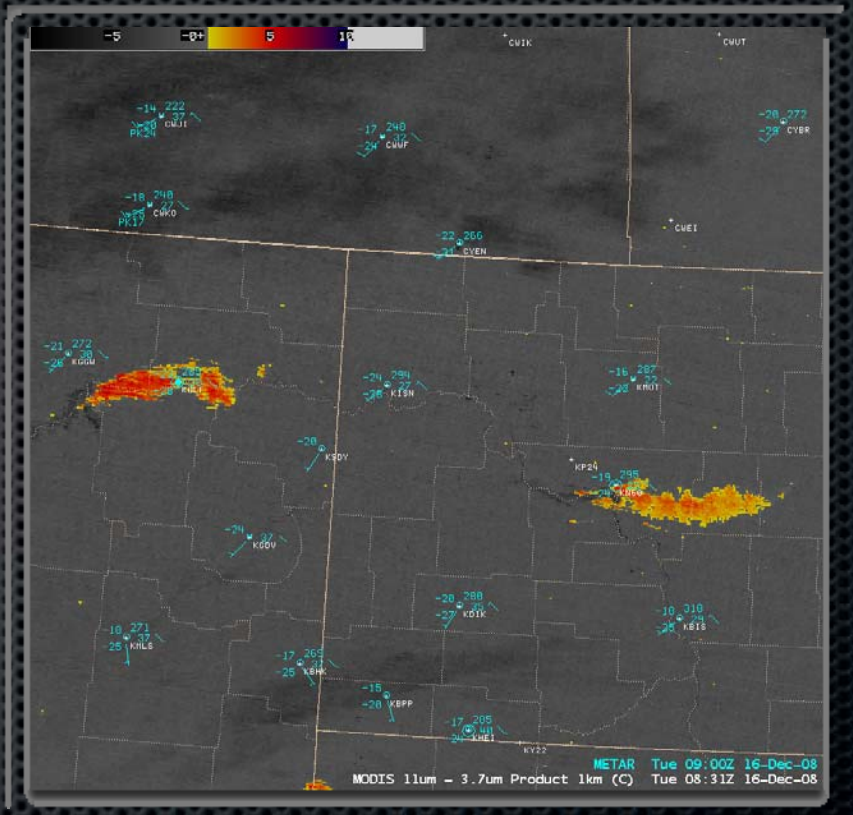
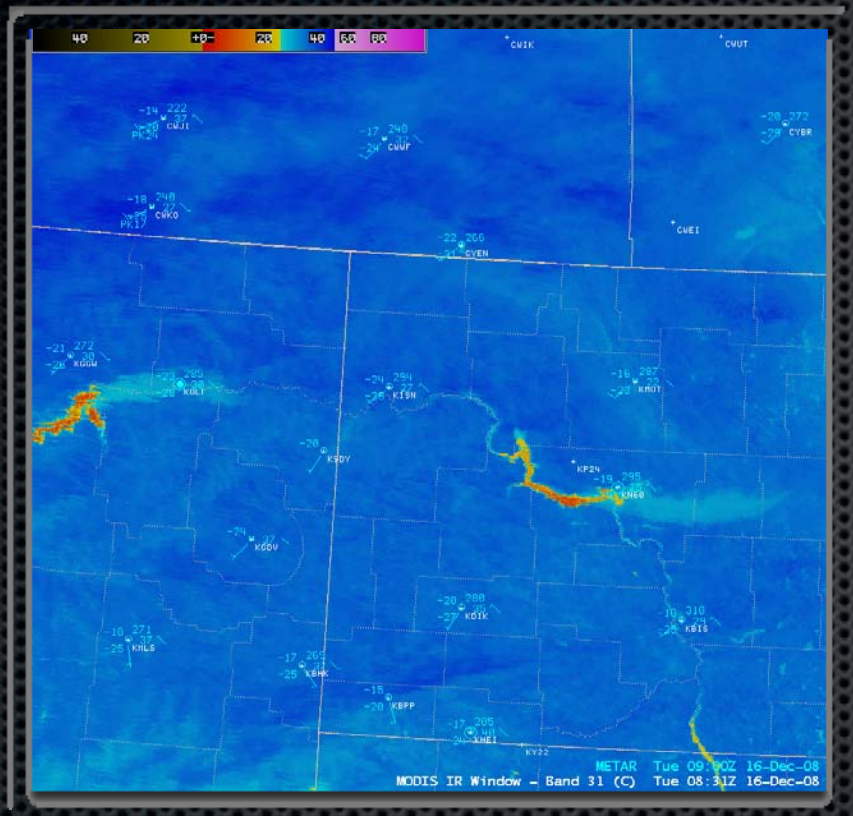
Satellite Training Activities at CIMSS: Helping to Prepare Forecasters for the GOES-R and NPOESS Era

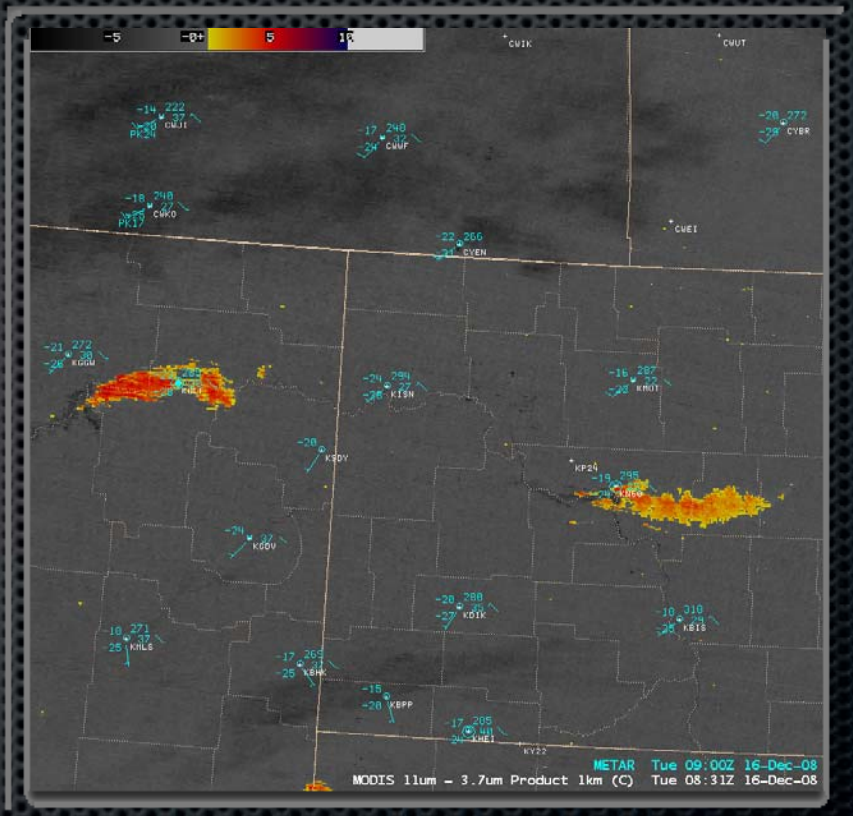




Scott Bachmeier, Jordan Gerth
Cooperative Institute for Meteorological Satellite Studies
Space Science and Engineering Center
University of Wisconsin - Madison

Satellite Training Activities at CIMSS: Helping to Prepare Forecasters for the GOES-R and NPOESS Era





CIMSS CIRA → VISIT SHyMet

CIMSS “Satellite Proving Ground” Activities

(1) Distribution of CIMSS Satellite products into AWIPS:

- MODIS images and products
- GOES Sounder products
- GOES Mesoscale Winds
- CRAS model synthetic (forecast) satellite imagery
- Convective Initiation product suite

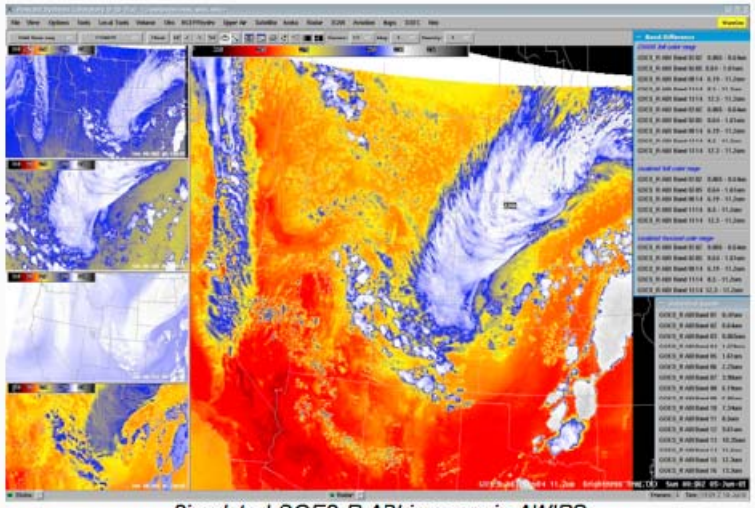
CIMSS "Satellite Proving Ground" Activities

(2) Hosting "GOES-R Proving Ground" site

cimss.ssec.wisc.edu/goes_r/proving-ground.html

GOES-R Proving Ground

» Home » GOES-R Proving Ground



Simulated GOES-R ABI imagery in AWIPS

GOES-R Satellite Proving Ground Mission Statement

The Geostationary Operational Environmental Satellite (GOES-R) Satellite Proving Ground project engages the National Weather Service (NWS) forecast and warning community in pre-operational demonstrations of selected capabilities anticipated from the next generation of National Oceanic and Atmospheric Administration (NOAA) geostationary earth observing systems.

The Proving Ground project objective is to bridge the gap between research to operations by:

- Utilizing current systems (satellite, terrestrial, or model/synthetic) to emulate various aspects of future GOES-R capabilities
- Infusing GOES-R products and techniques into the NWS operational environment, with emphasis on the Advanced Weather Information Processing System (AWIPS) and transitioning to AWIPS-II.

Resources

- CIMSS "MODIS Imagery in D-2D"
- CIMSS Proving Ground Products
- CIRA Proving Ground Products
- SPoRT Proving Ground Products
- NWS Collaborative Site Visits
- GOES-R ABI Bands
- GOES-R ABI Weighting Function Examples

Real-time GOES-13 data

- GOES-13 Image Browser
- GOES-13 ("GOES-Central") Sounder DPI
- GOES-13 Visible Imagery

CIMSS "Satellite Proving Ground" Activities

(3) Preparation of two AWIPS Weather Event Simulator (WES) cases

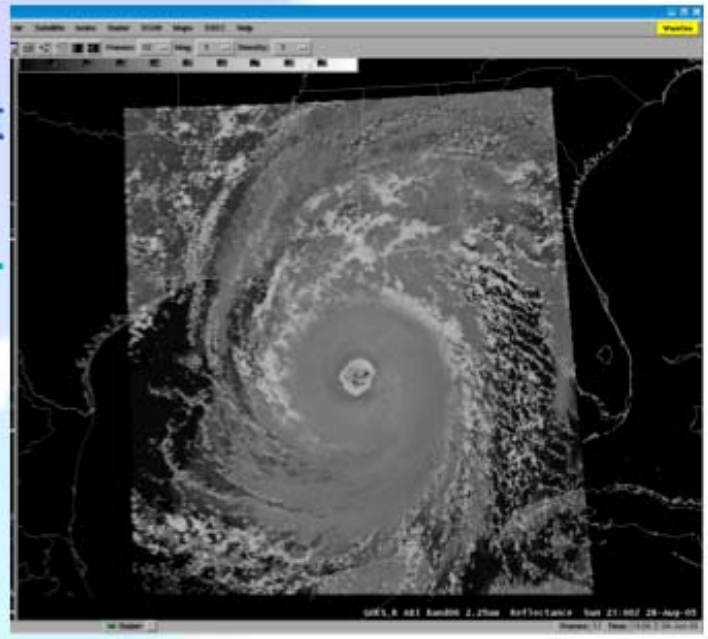
STAR Center for Satellite Applications and Research
formerly ORA — Office of Research and Applications

16th Conference on Satellite Meteorology:

Poster– GOES-R Proving Ground Plans for a Weather Event Simulator

Tim Schmit, Justin Sieglaff, Kaba Bah, Jordan Gerth, Jason Otkin , Wayne Feltz, James Gurka

- As part of the Proving Ground, CIMSS will prepare two Weather Event Simulator (WES) cases.
  - Leveraging AWG Proxy data.
- CONUS simulations for a convective outbreak (June 4-5, 2005) and also Hurricane Katrina (August 28, 2005) will be used.
  - Combination of NWP data and advanced radiative transfer models to simulate all ABI bands.



Katrina ABI simulation in AWIPS (ABI band 6 at 2.25 micrometers)

AMS 2009

CIMSS “Satellite Proving Ground” Activities

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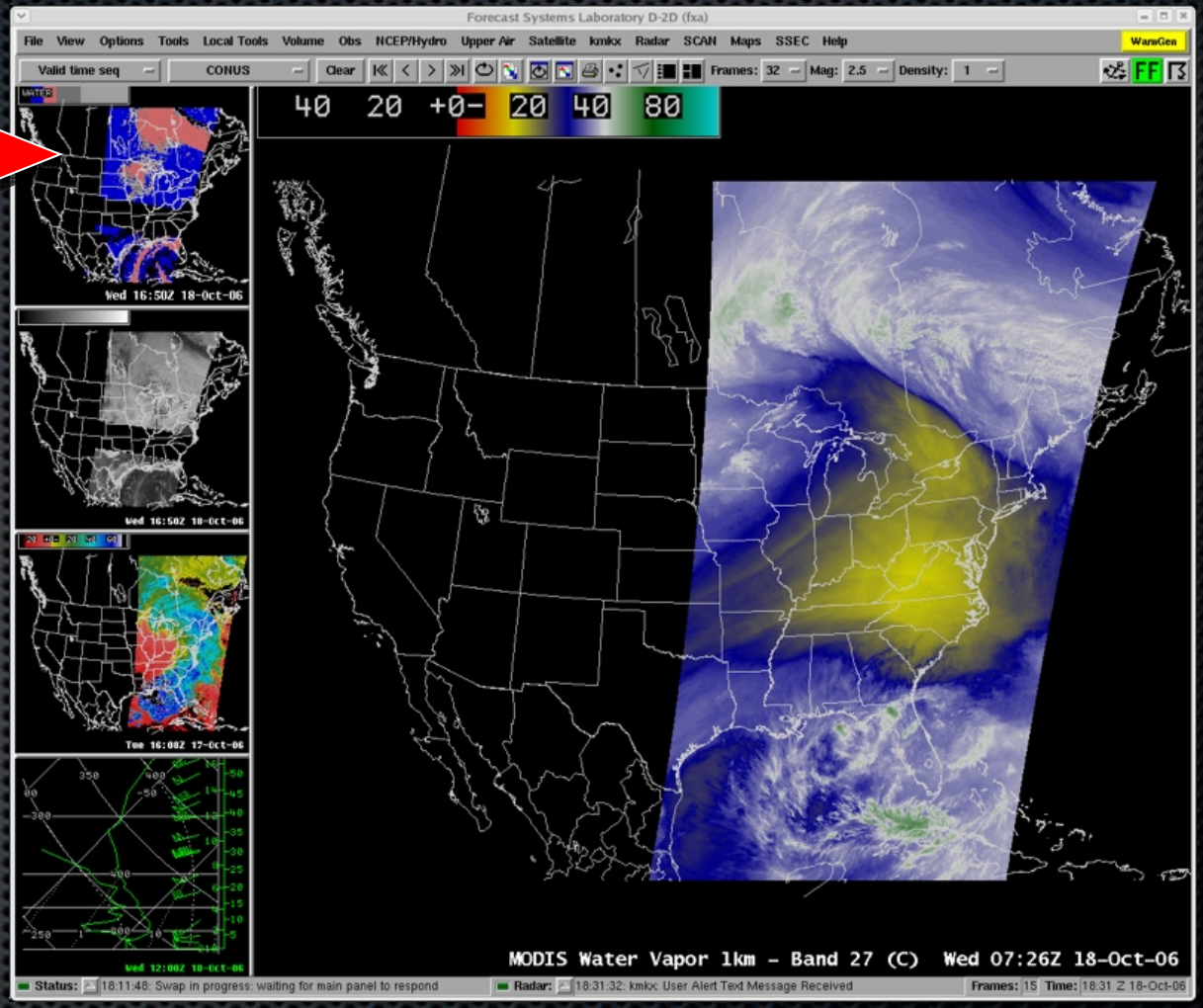
- Convective Initiation product suite

MODIS in AWIPS Project

MODIS direct broadcast ground station at SSEC



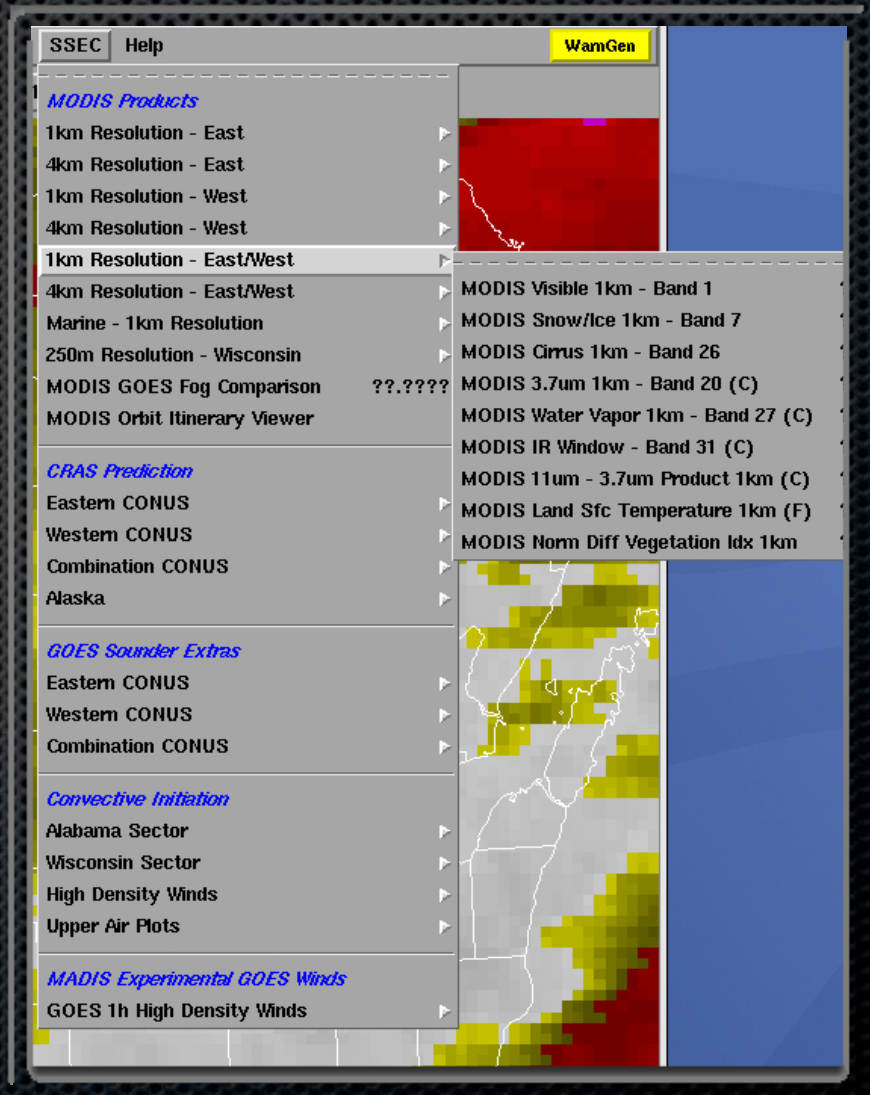
MODIS imagery and products in AWIPS (since July 2006)

SSEC → NWS Regional Headquarters → LDM subscription at WFO

MODIS 1-km Imagery and Products in AWIPS

- Band 1 - (0.6µm) - ***Visible***
- Band 7 - (2.1µm) - ***Snow/Ice***
- Band 20 - (3.7µm) - ***Shortwave IR***
- Band 26 - (1.3µm) – ***Cirrus***
- Band 27 - (6.7µm) - ***Water Vapor***
- Band 31 - (11.0µm) - ***IR Window***
- 11µm - 3.7µm - ***Fog/Stratus Product***
- ***Land Surface Temperature***
- ***Normalized Difference Vegetation Index***

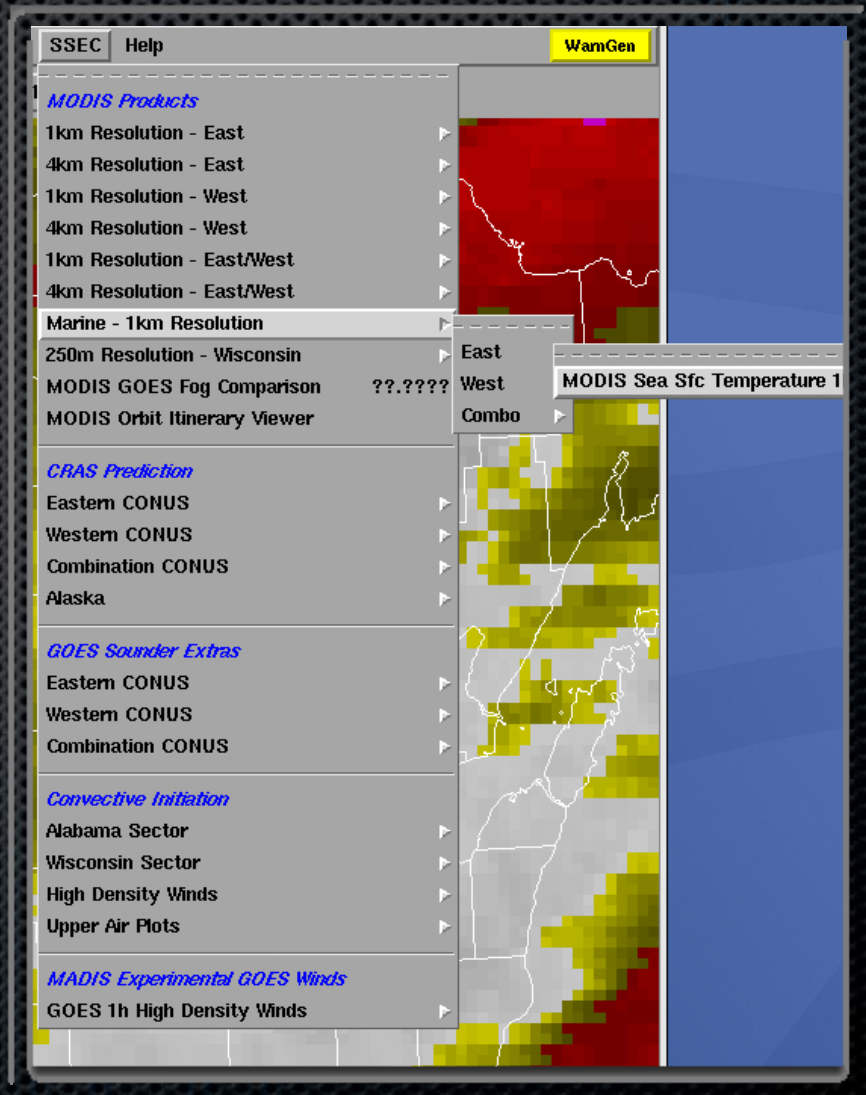
AWIPS "SSEC" menu



MODIS 1-km Imagery and Products in AWIPS

- ***Sea Surface Temperature (SST)***

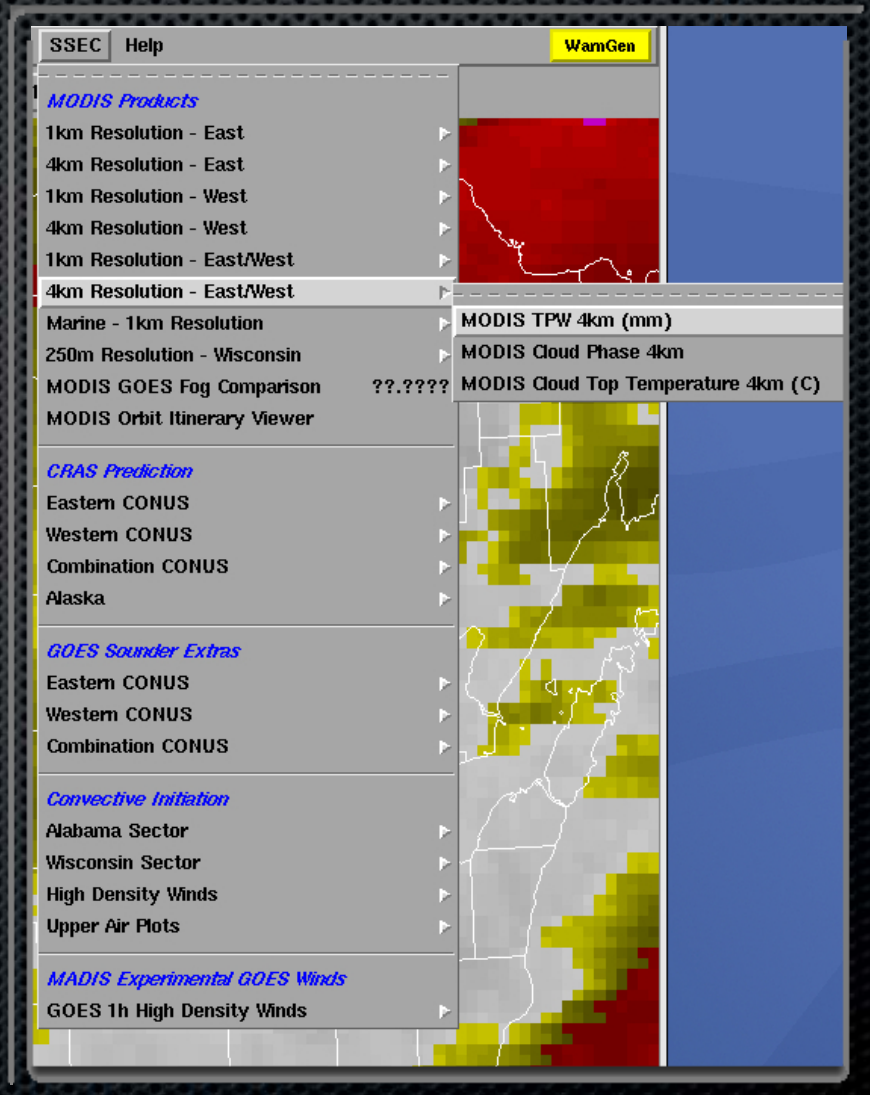
AWIPS "SSEC" menu



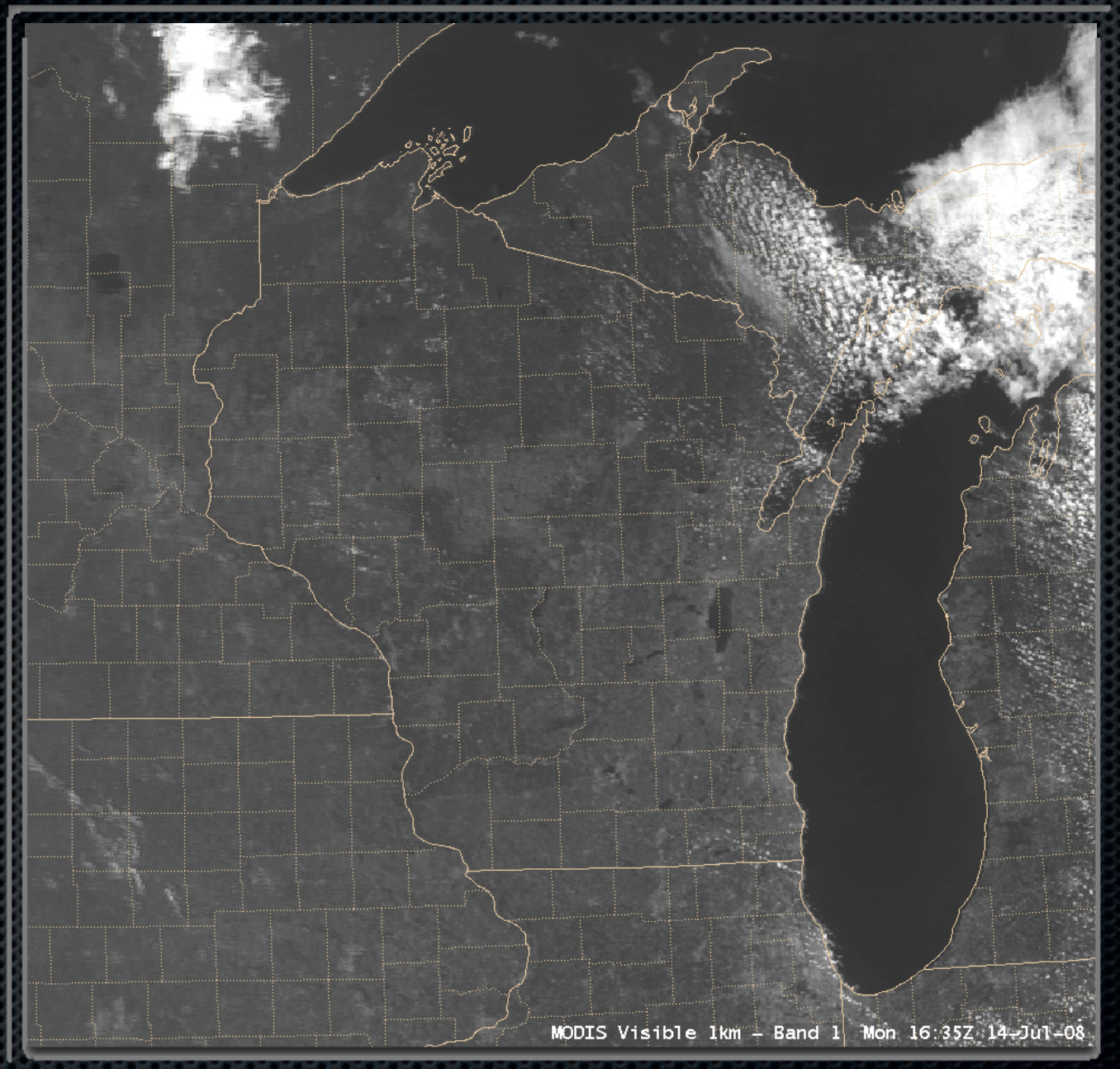
MODIS 4-km Products in AWIPS

- ***Total Precipitable Water (TPW)***
- ***Cloud Phase***
- ***Cloud Top Temperature***

AWIPS "SSEC" menu

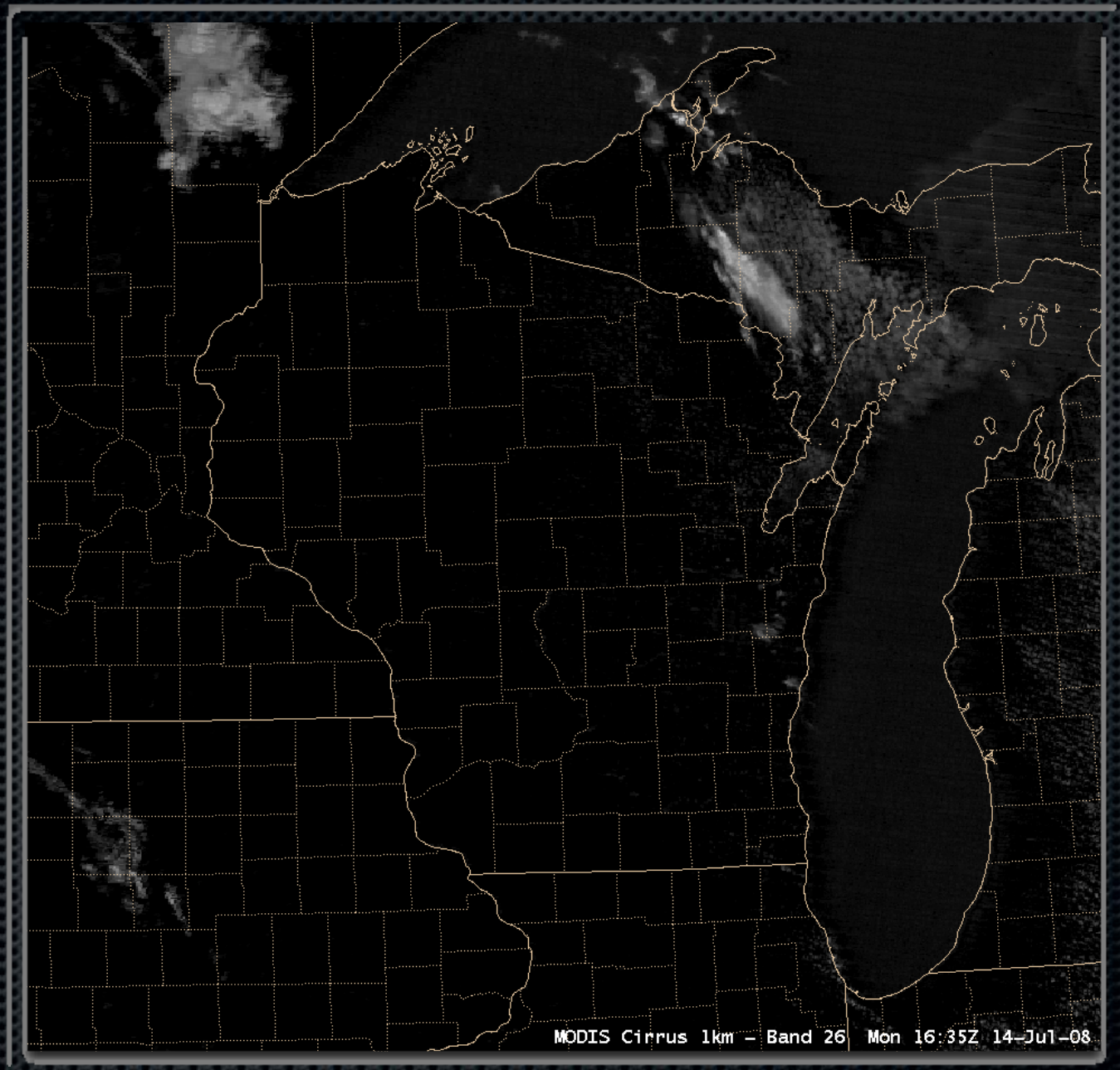


MODIS Products in AWIPS



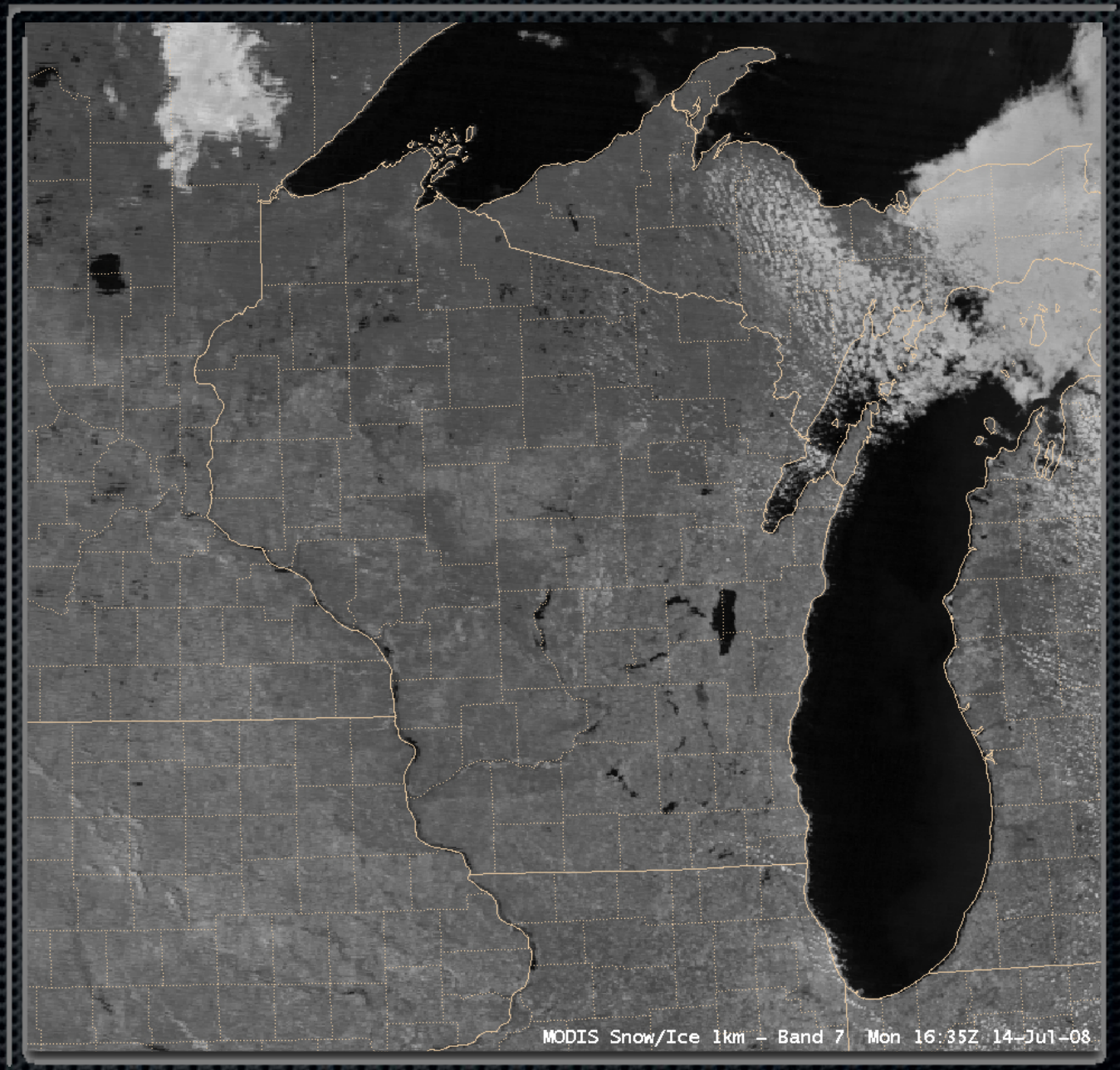
Visible (0.65 μm): 1-km resolution

MODIS Products in AWIPS



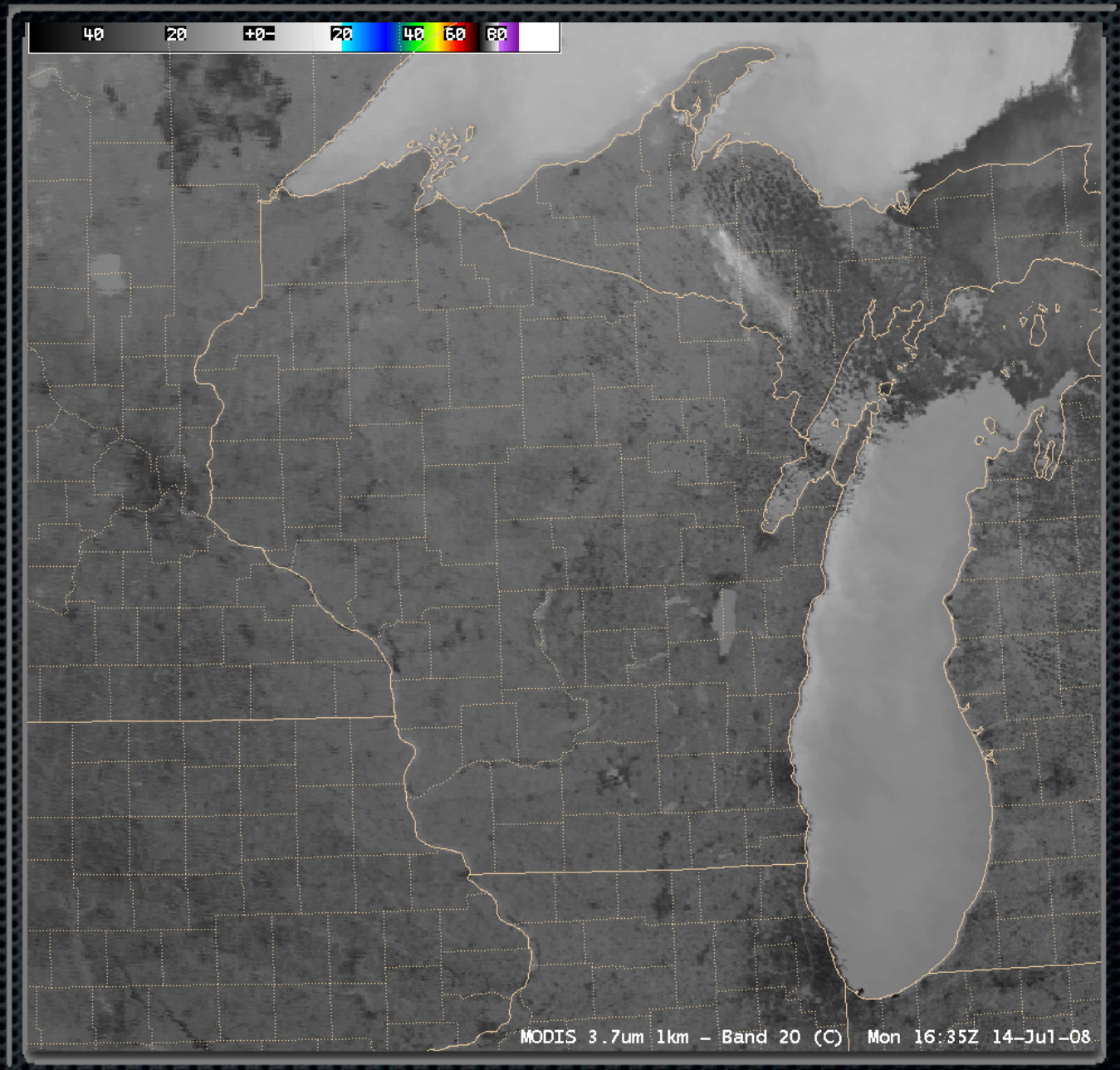
Cirrus detection (1.3 μm): 1-km resolution

MODIS Products in AWIPS



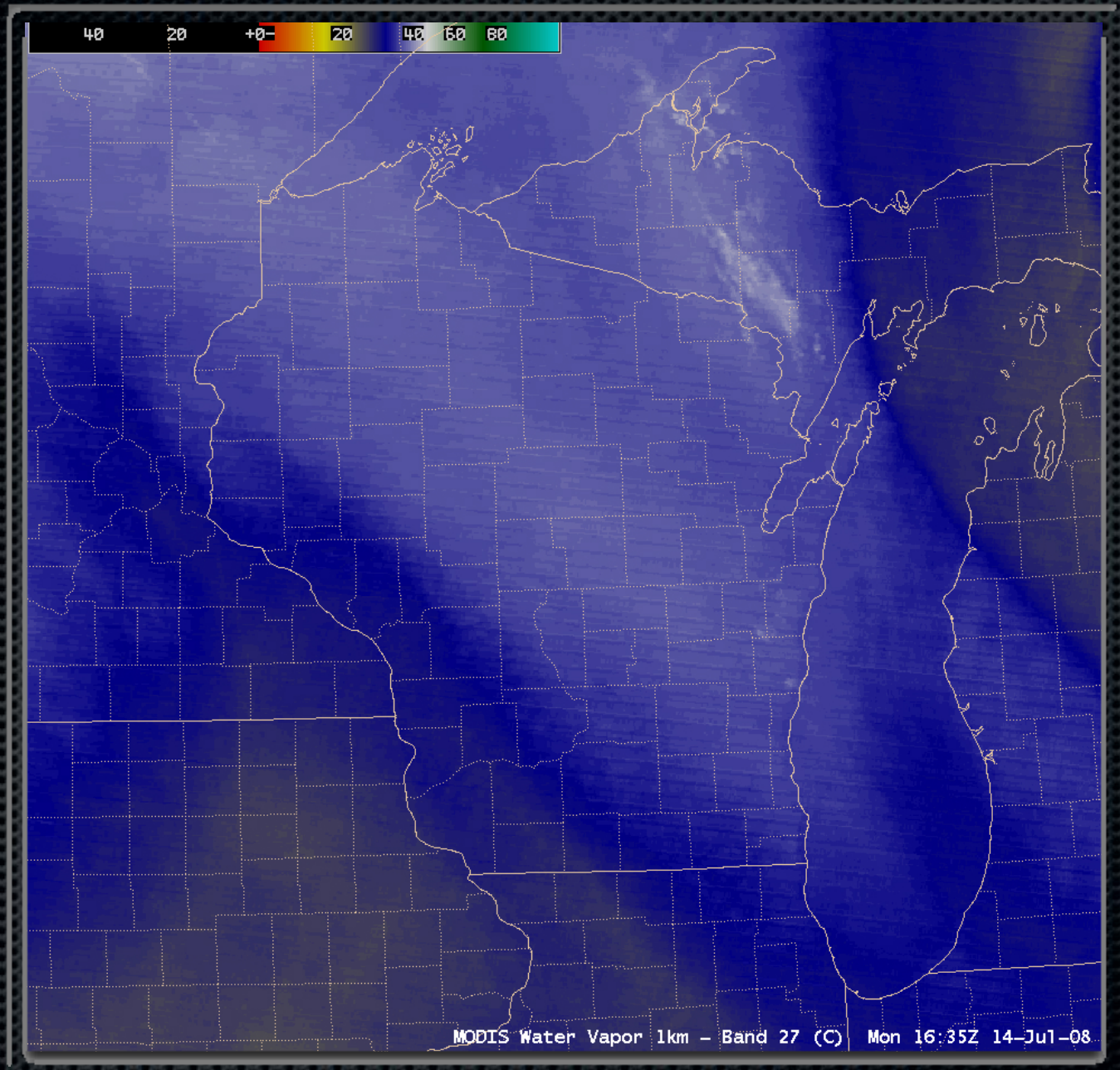
Snow/ice discrimination (2.1 μm): 1-km resolution

MODIS Products in AWIPS



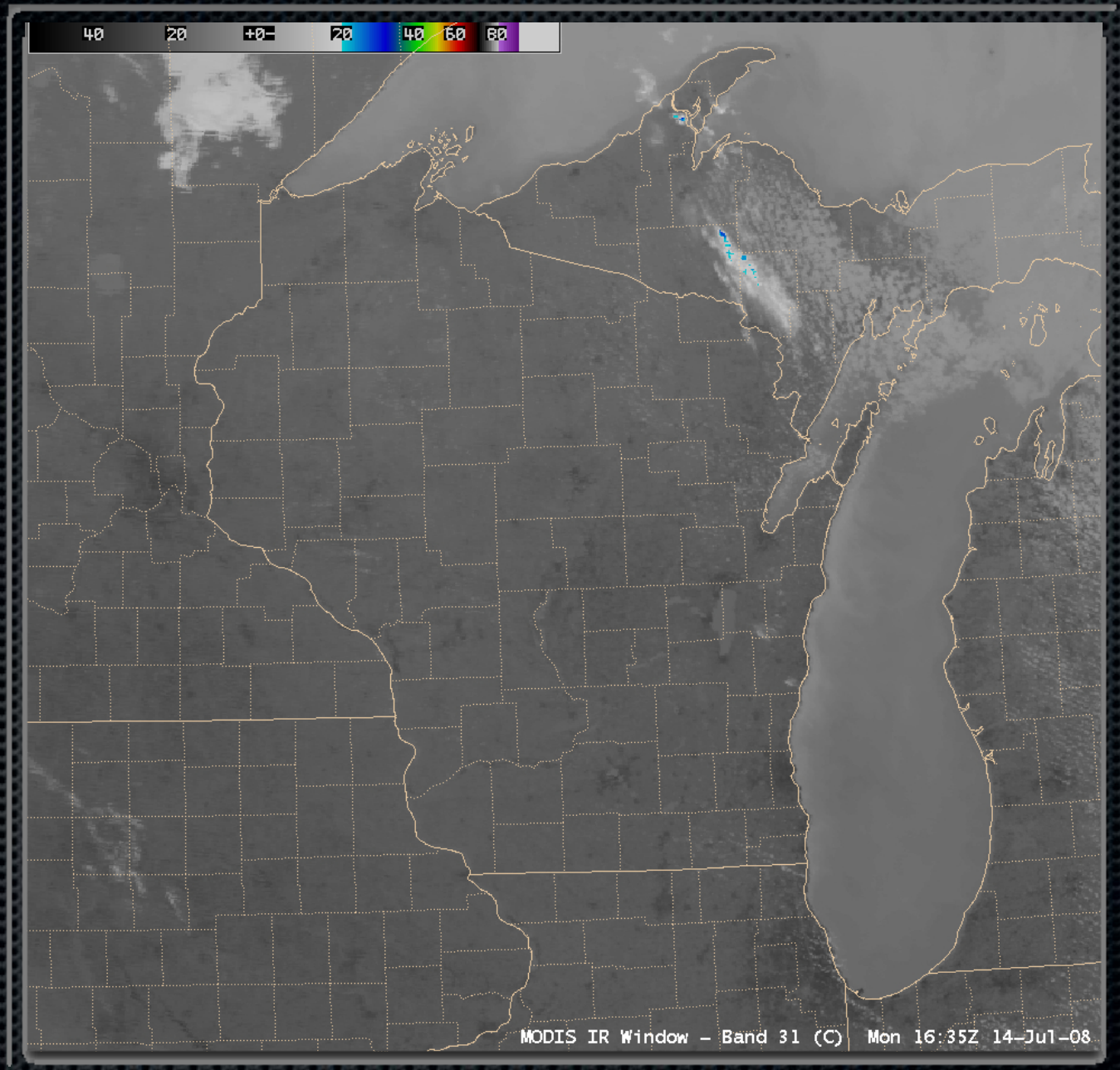
Shortwave IR (3.7 µm): 1-km resolution

MODIS Products in AWIPS



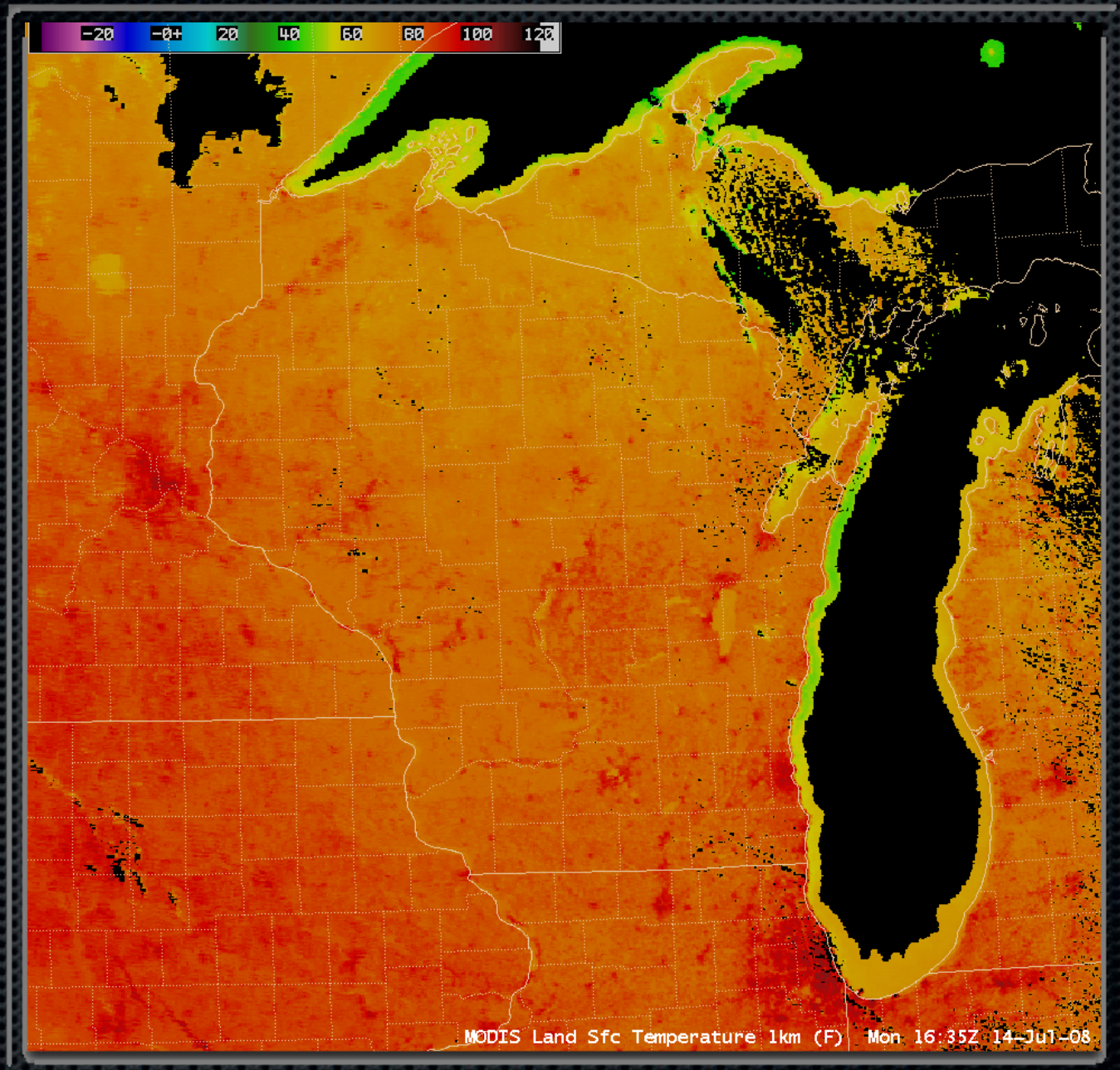
Water vapor (6.7 μm): 1-km resolution

MODIS Products in AWIPS



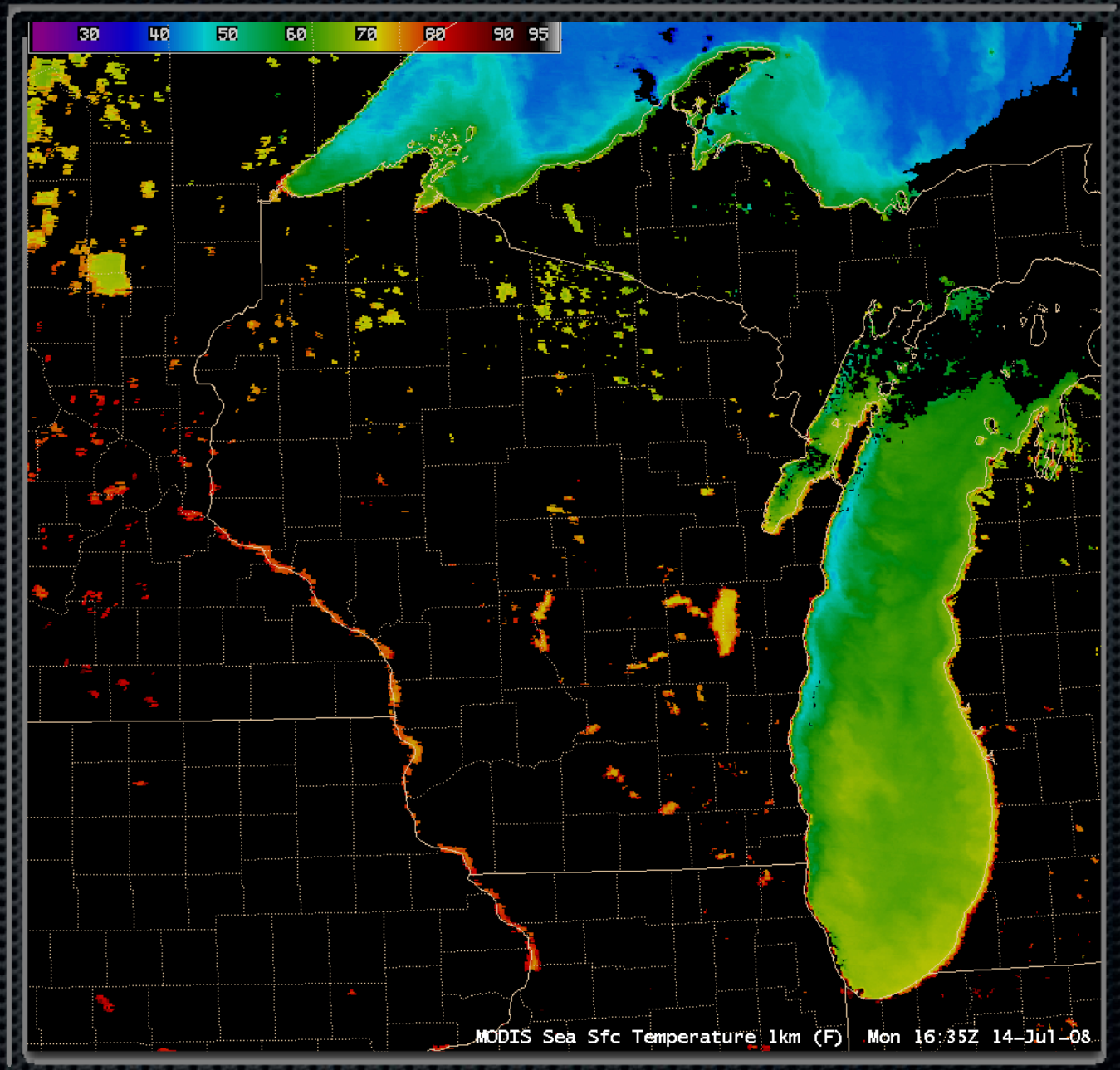
IR window (11.0 μm): 1-km resolution

MODIS Products in AWIPS



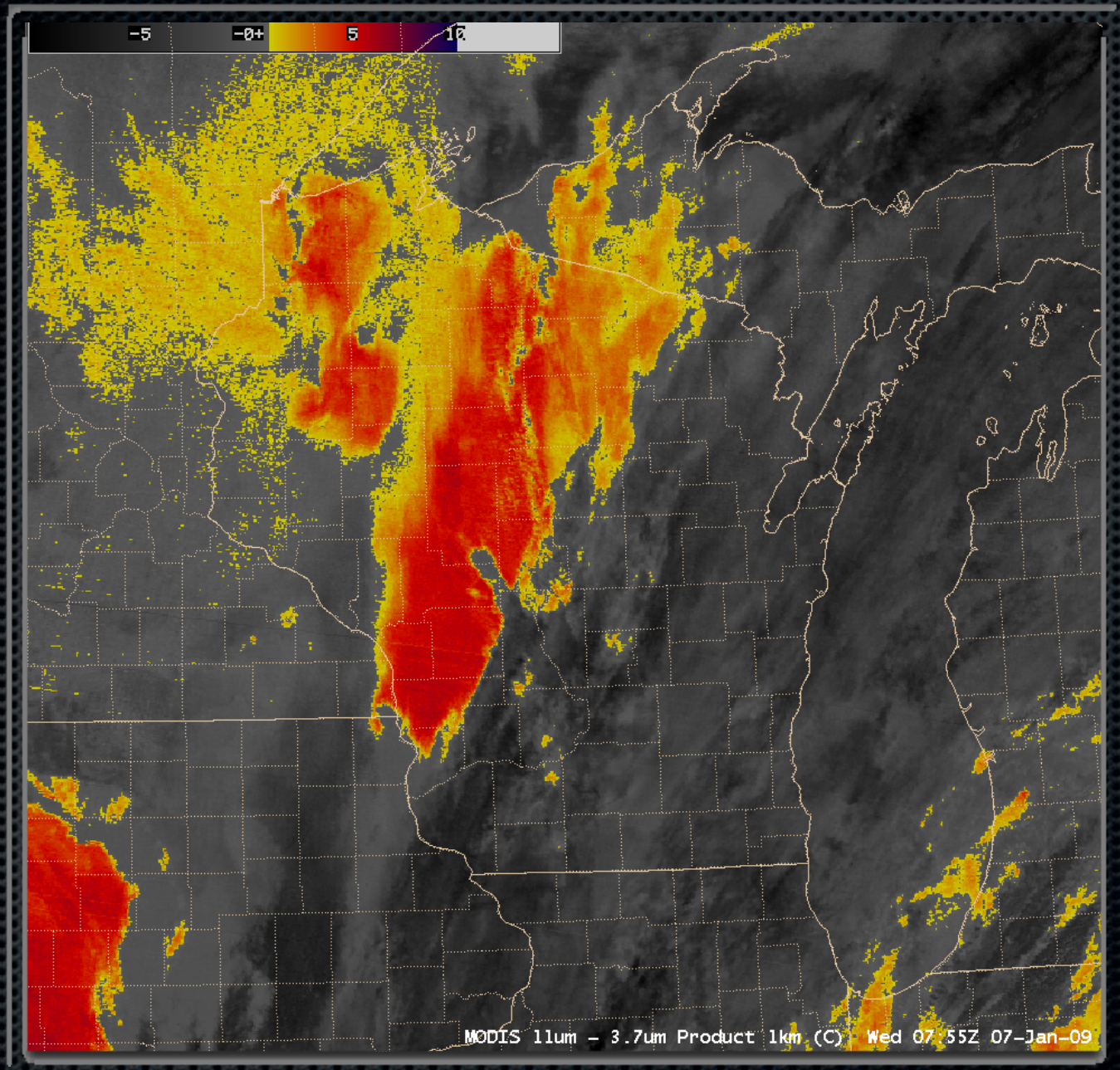
Land Surface Temperature: 1-km resolution

MODIS Products in AWIPS



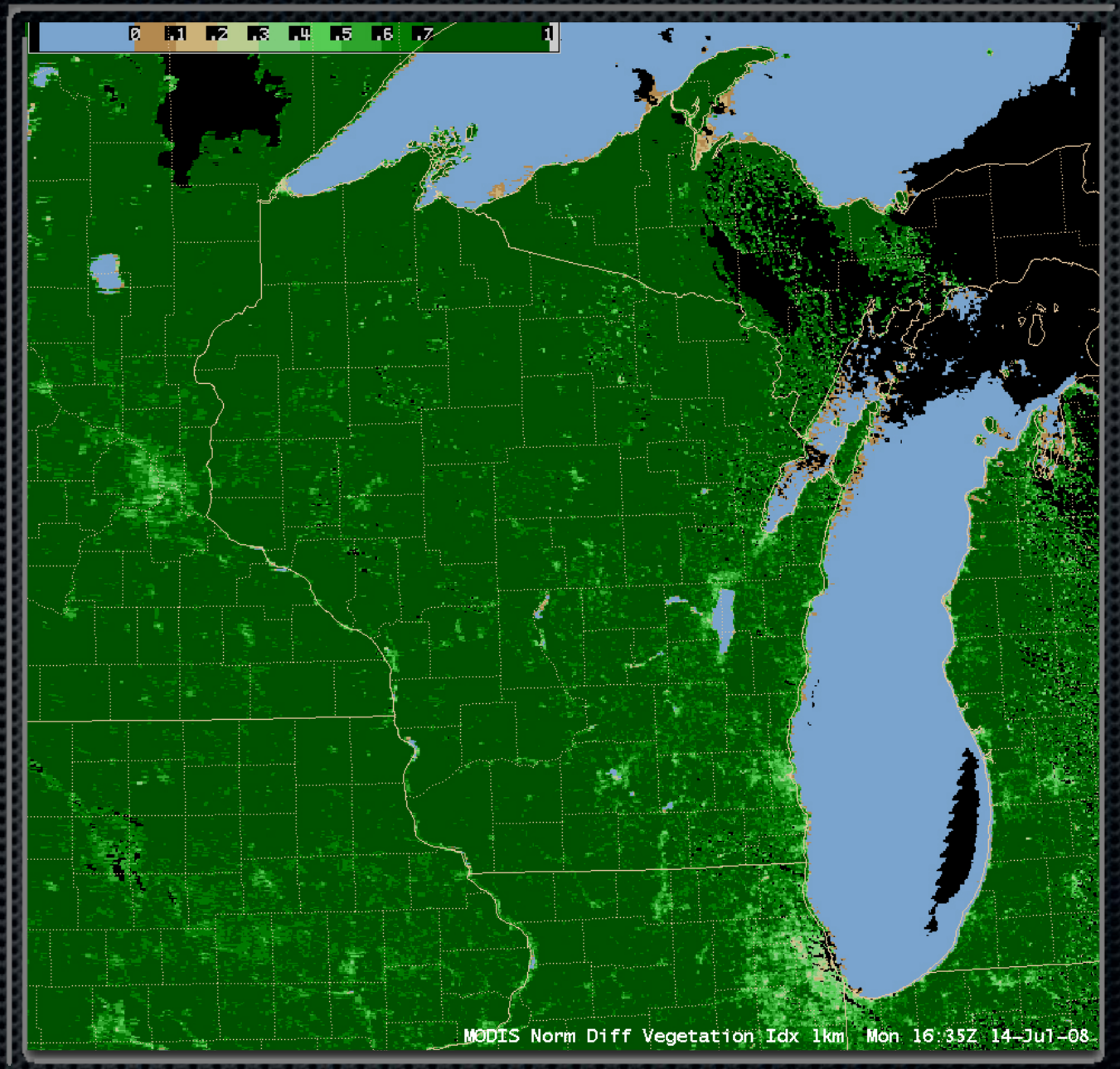
Sea Surface Temperature: 1-km resolution

MODIS Products in AWIPS



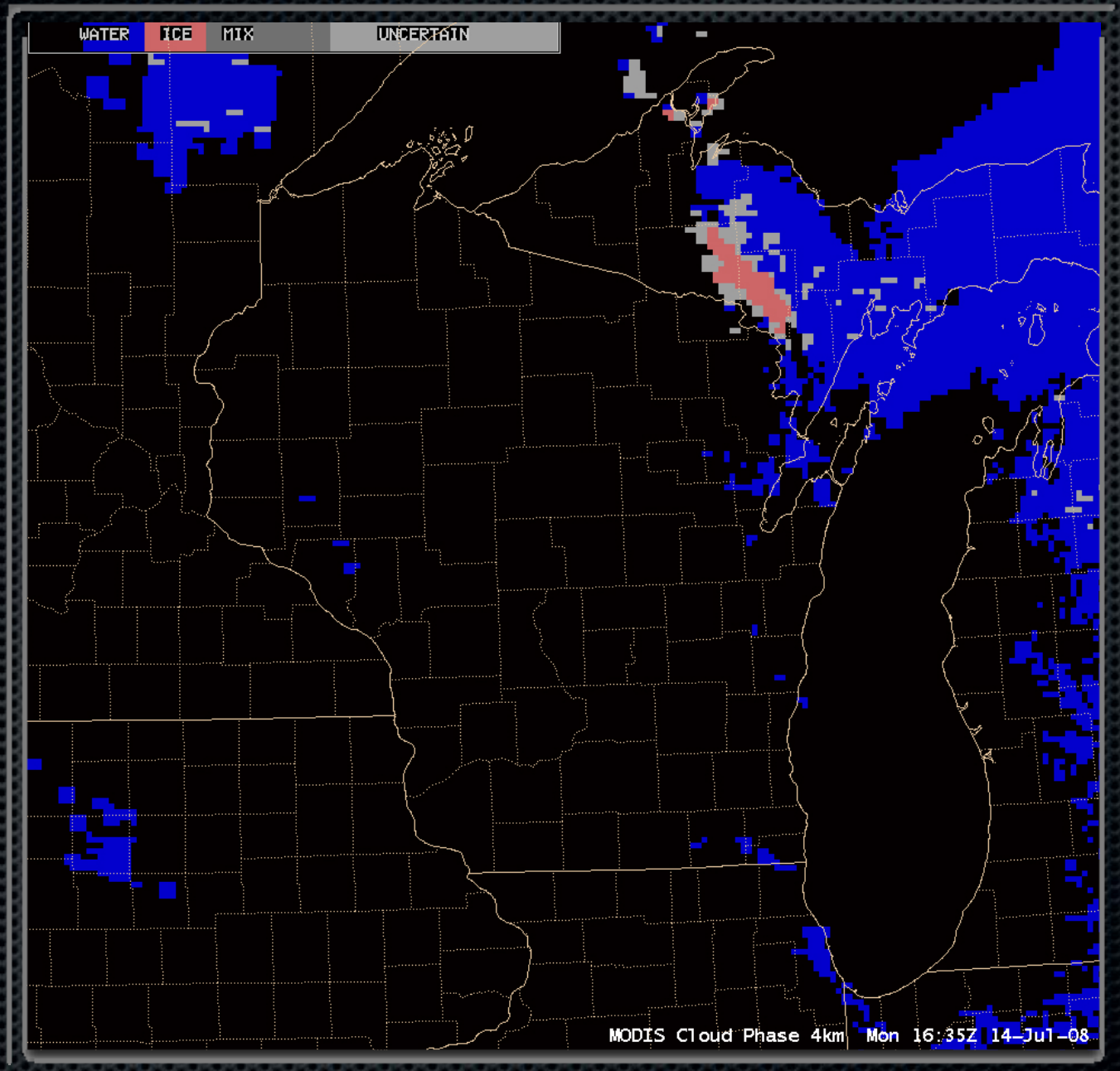
Fog/stratus product: 1-km resolution

MODIS Products in AWIPS



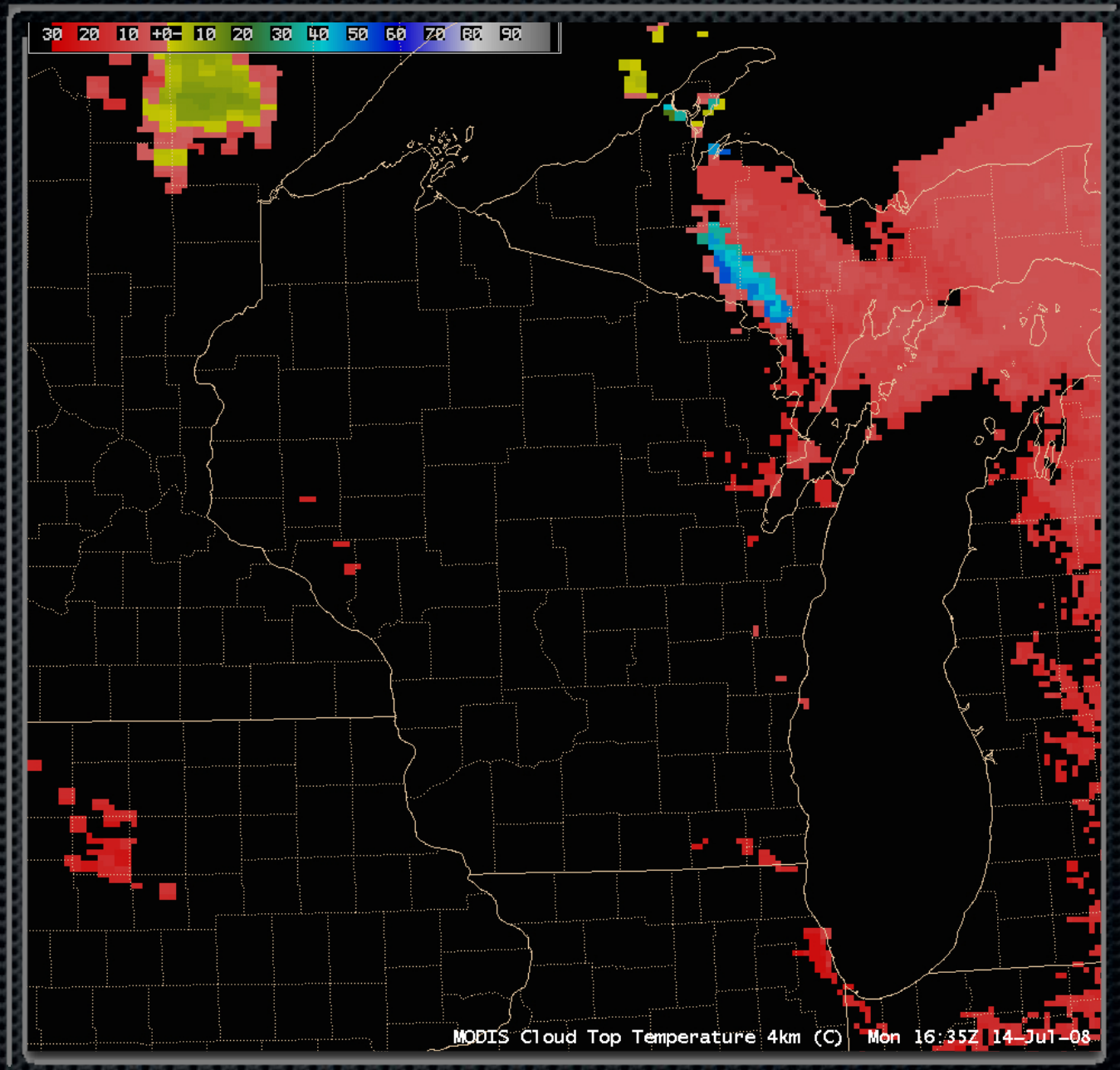
Normalized Difference Vegetation Index: 1-km

MODIS Products in AWIPS



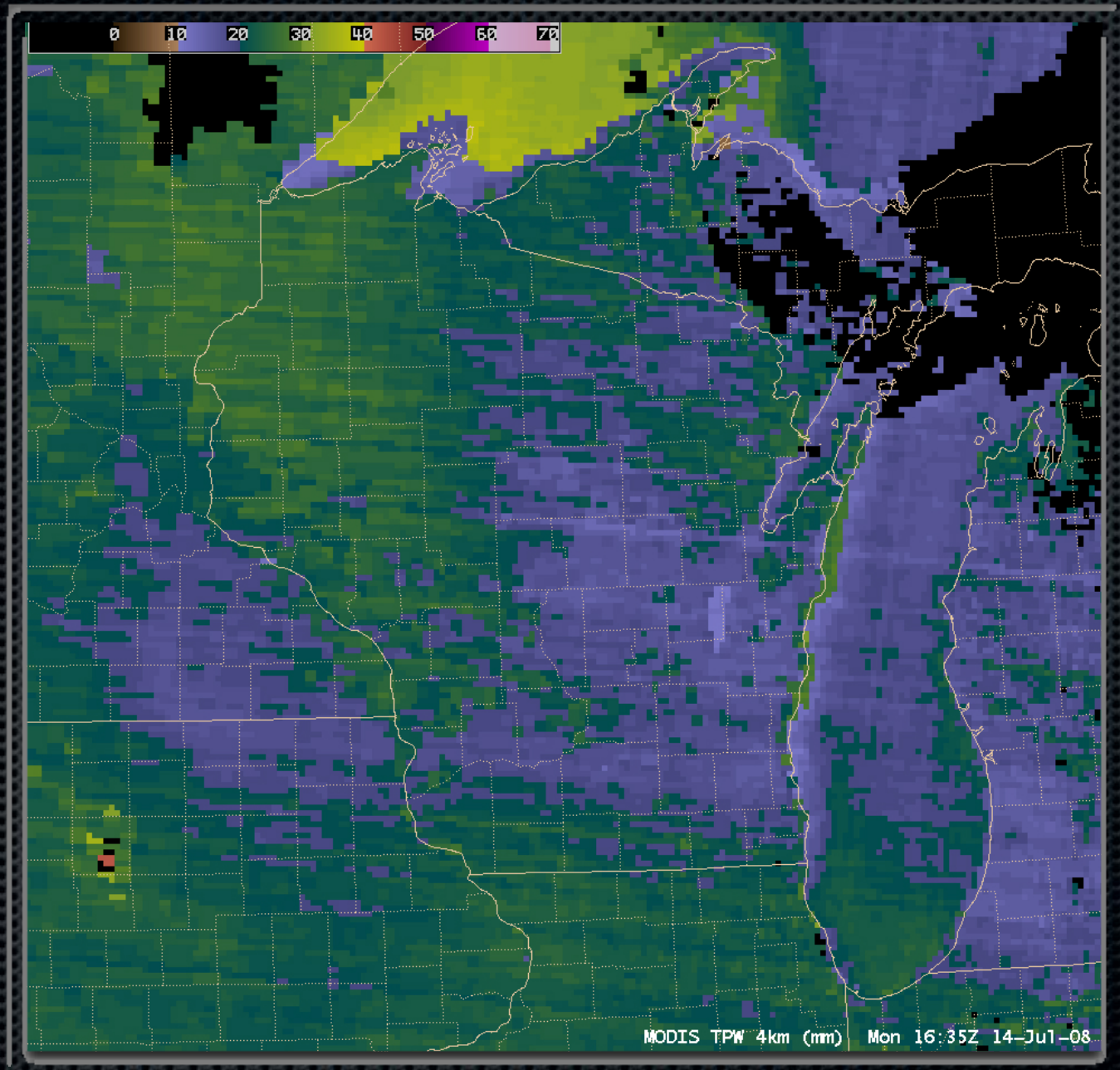
Cloud Phase: 4-km resolution

MODIS Products in AWIPS



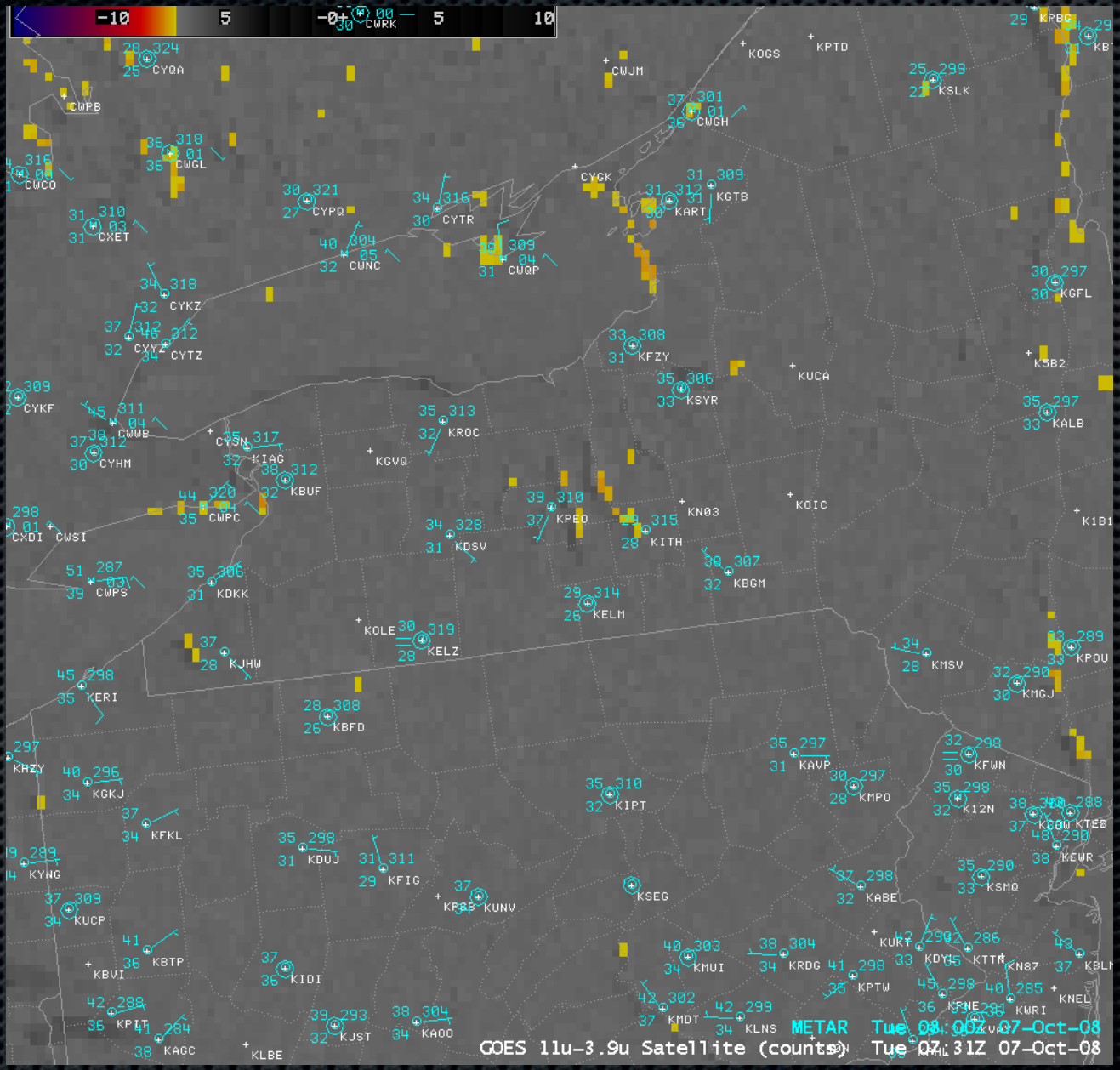
Cloud Top Temperature: 4-km resolution

MODIS Products in AWIPS



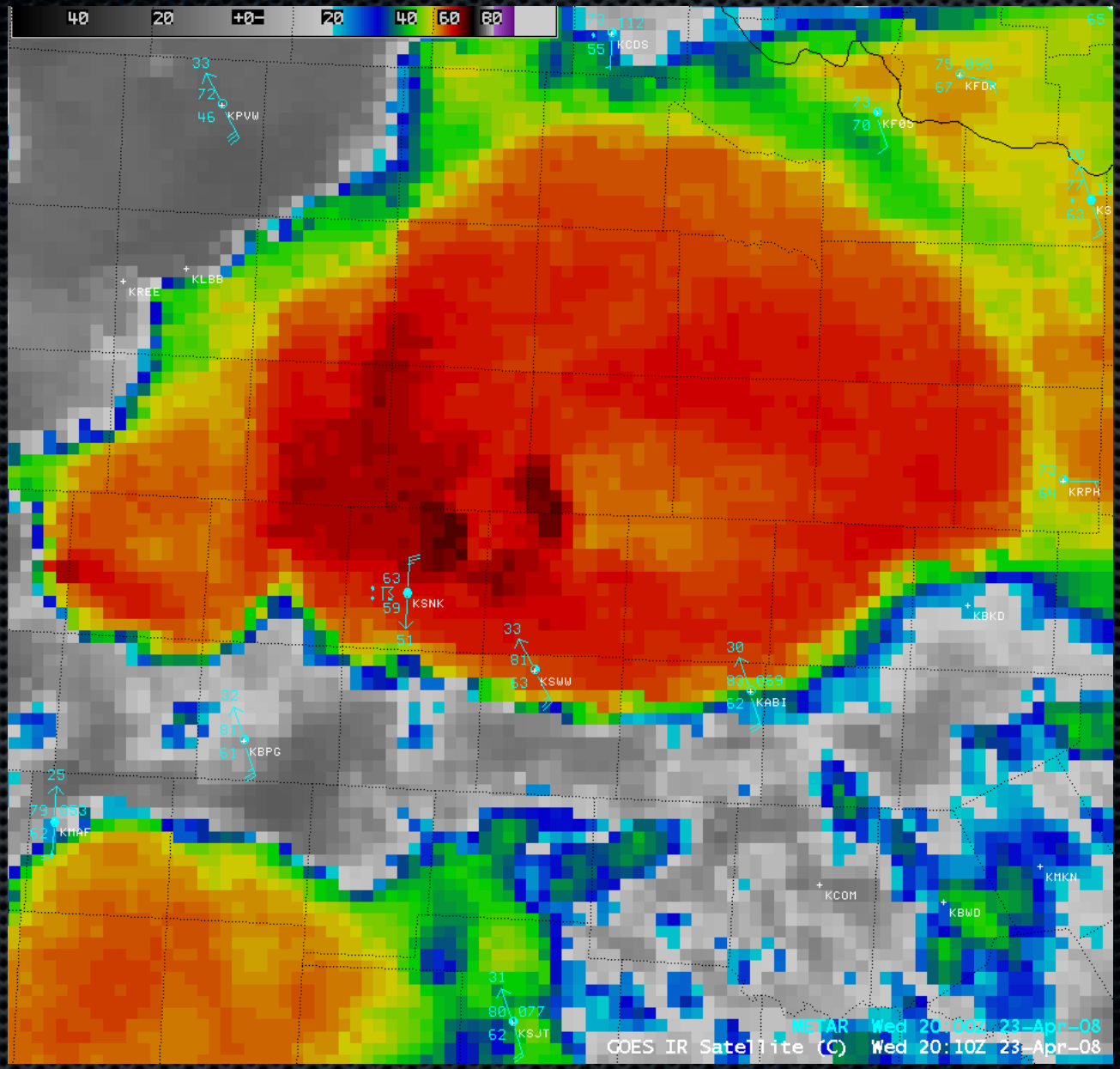
Total Precipitable Water: 4-km resolution

MODIS Products in AWIPS



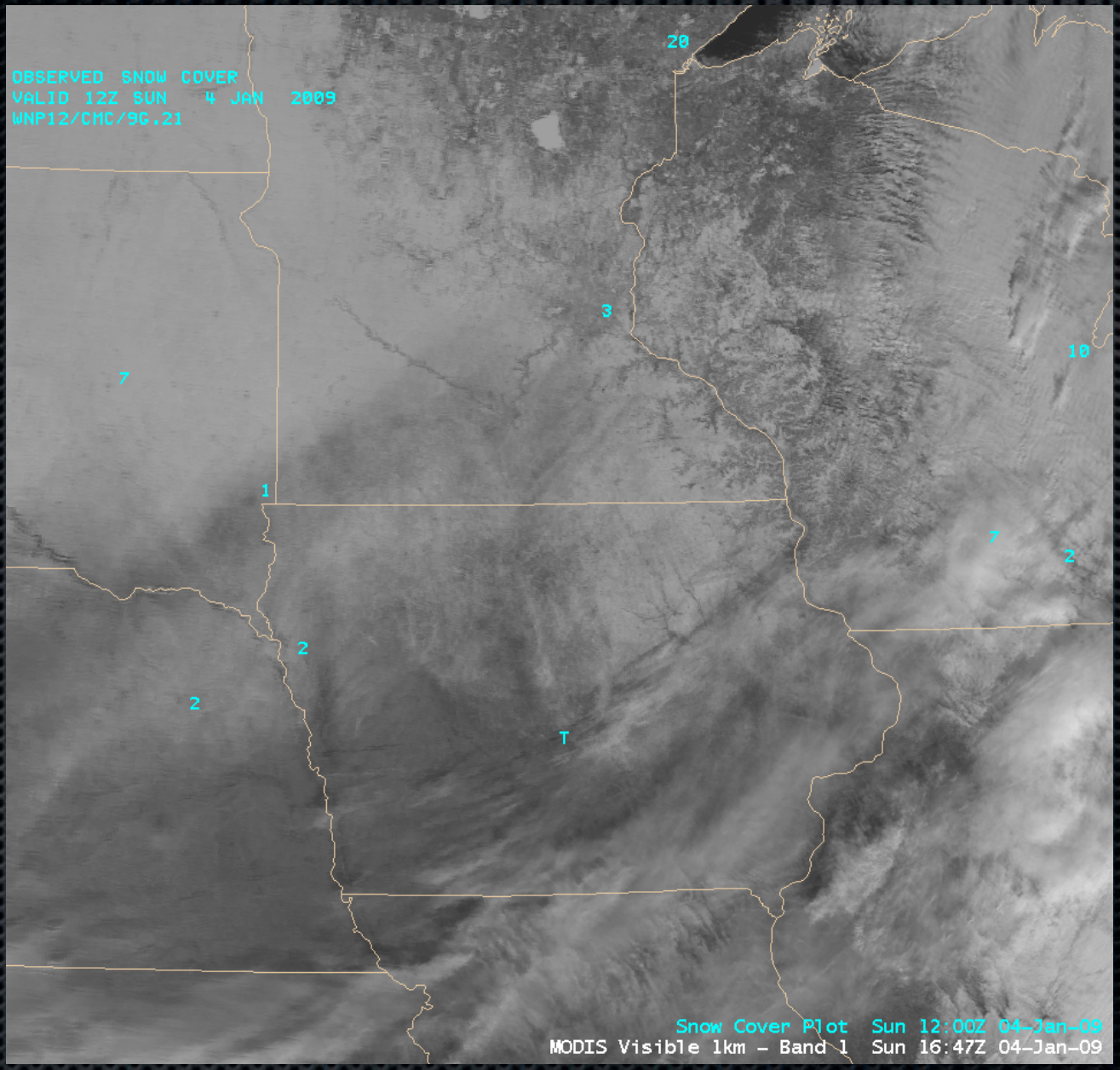
Fog/stratus product: 1-km MODIS vs 4-km GOES

MODIS Products in AWIPS



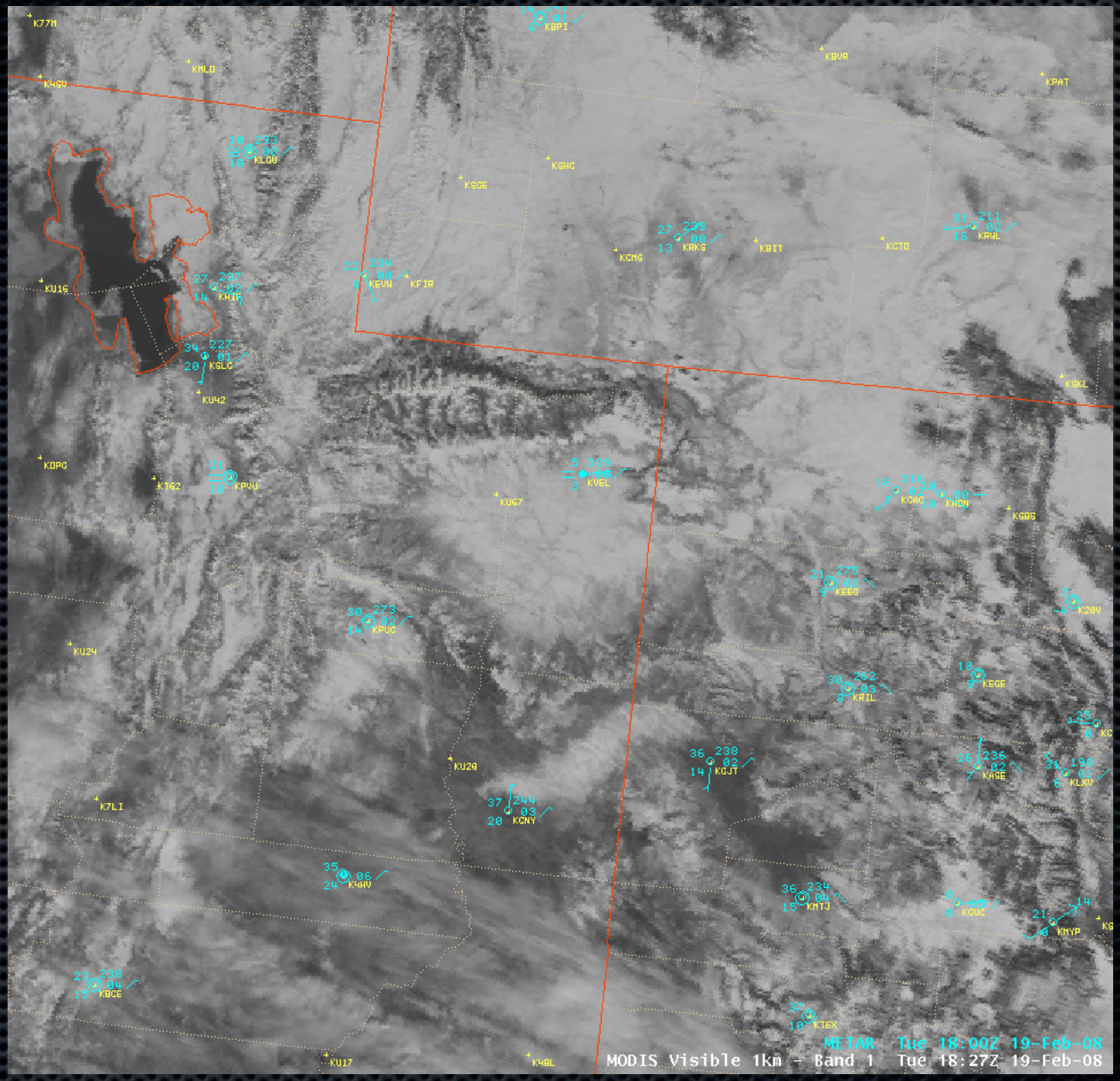
MODIS 1-km IR window + GOES 4-km IR window

MODIS Products in AWIPS



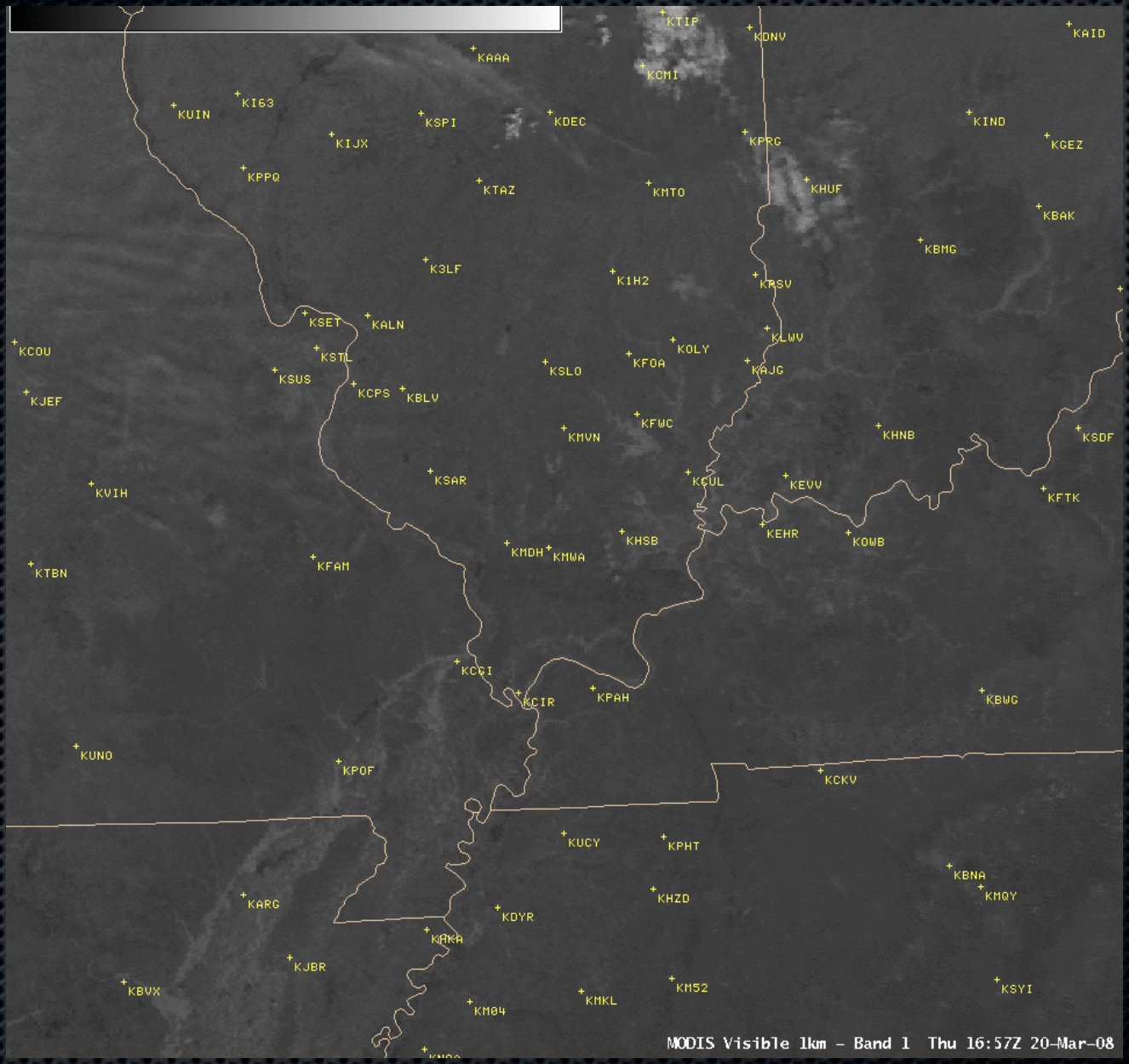
Visible + “Snow/Ice” channel images

MODIS Products in AWIPS



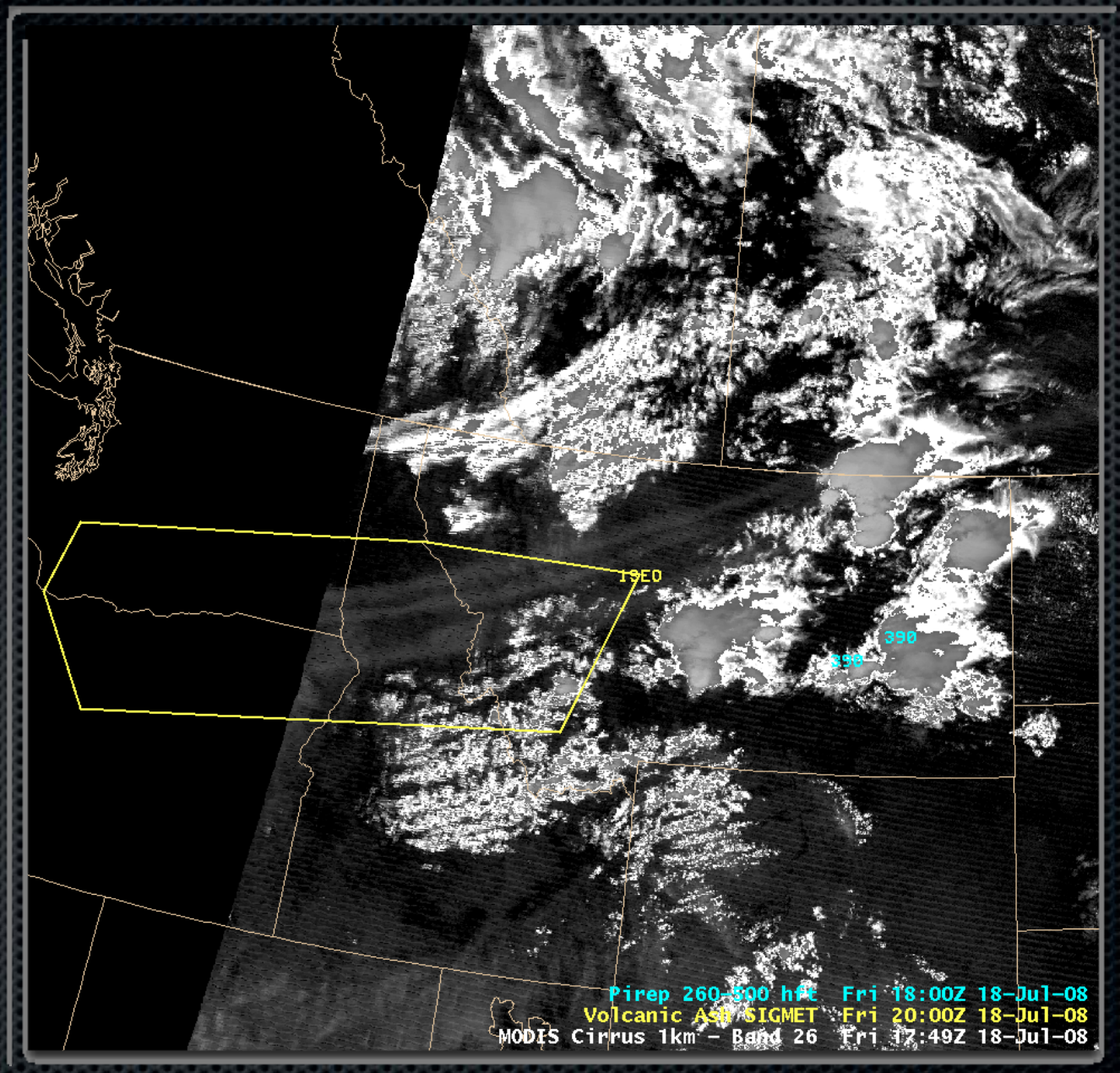
Visible + “Snow/Ice” + IR window channel images

MODIS Products in AWIPS



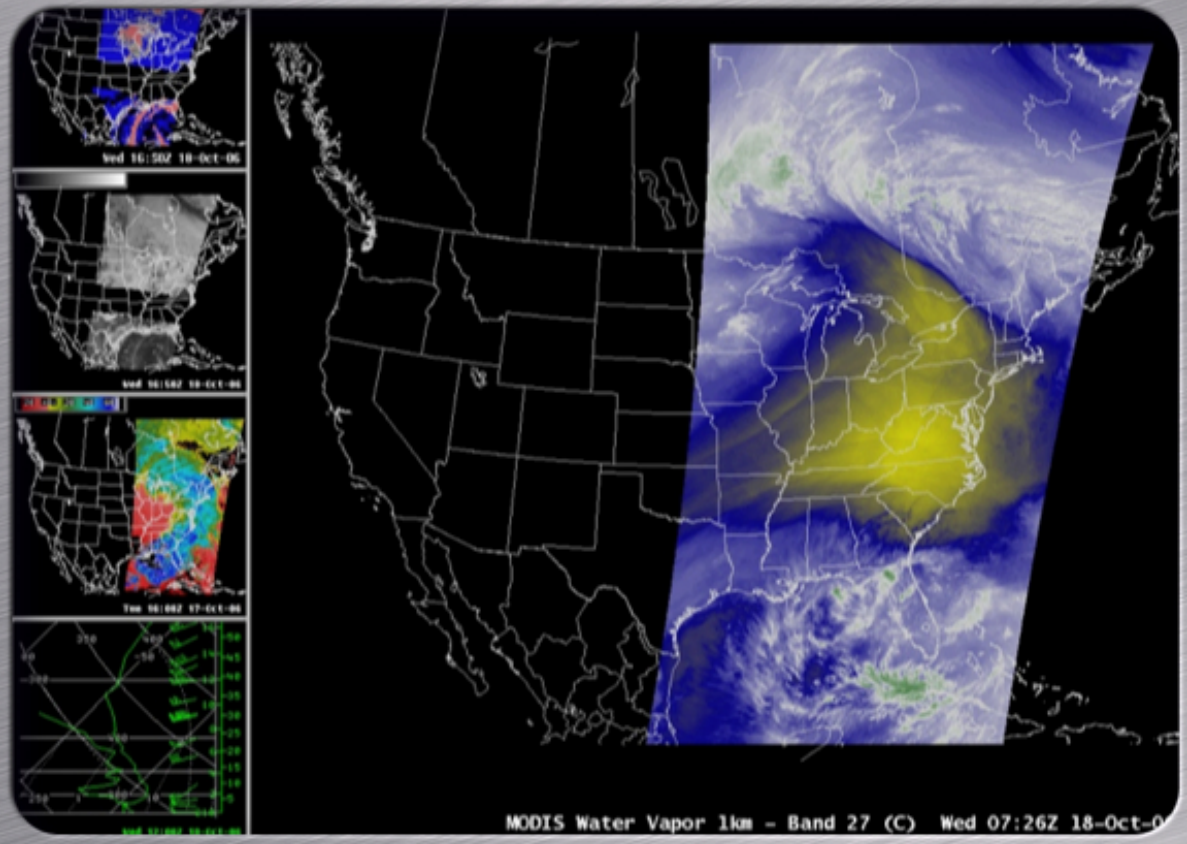
Visible + “Snow/ice” channel images

MODIS Products in AWIPS



MODIS Cirrus channel: locating volcanic plumes

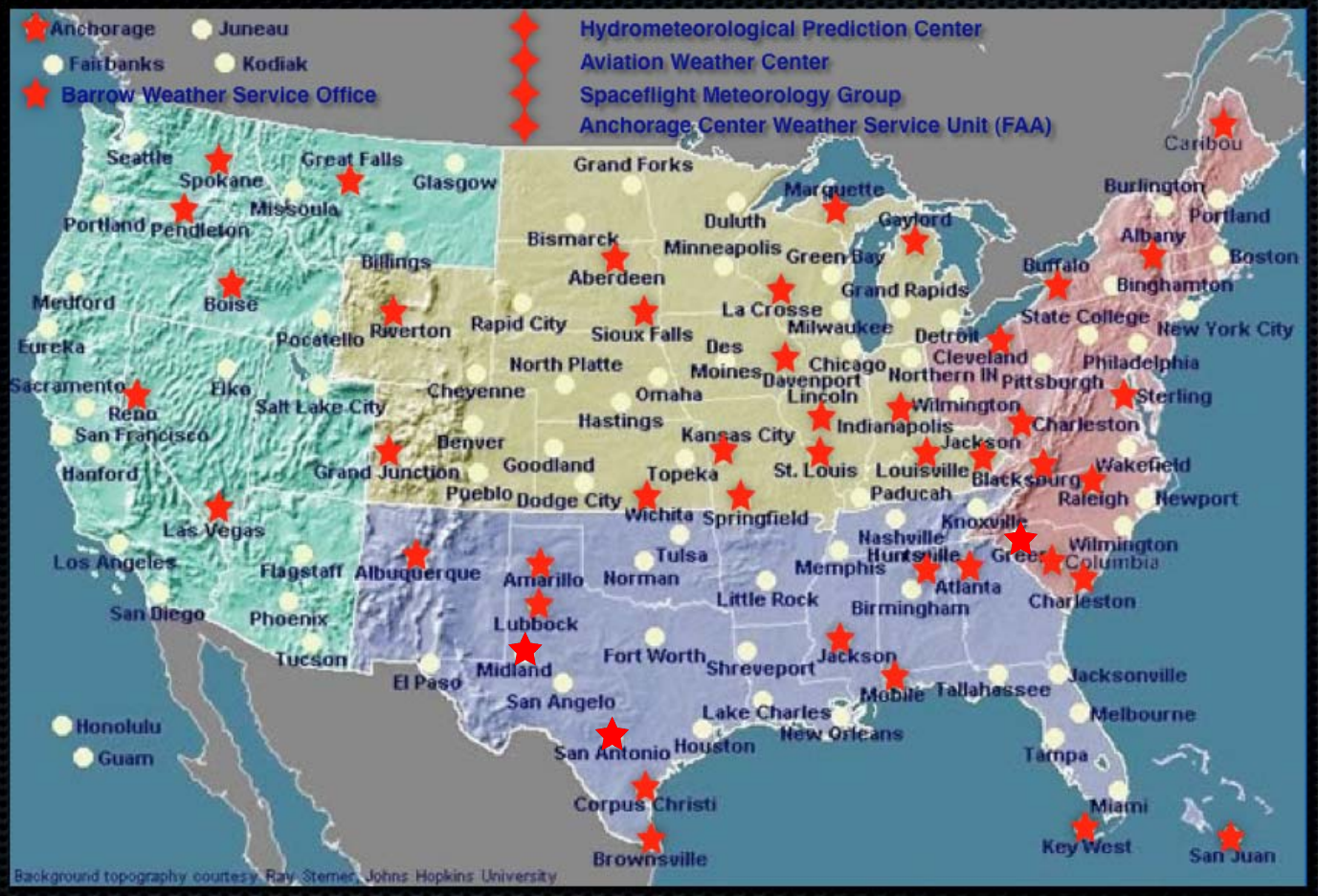
MODIS Products in AWIPS



National Weather Service • Integrated Sensor Training Professional Development Series
Virtual Institute for Satellite Integration Training

Virtual Institute for Satellite Integration Training (VISIT) lesson - offered since October 2006

MODIS Products in AWIPS

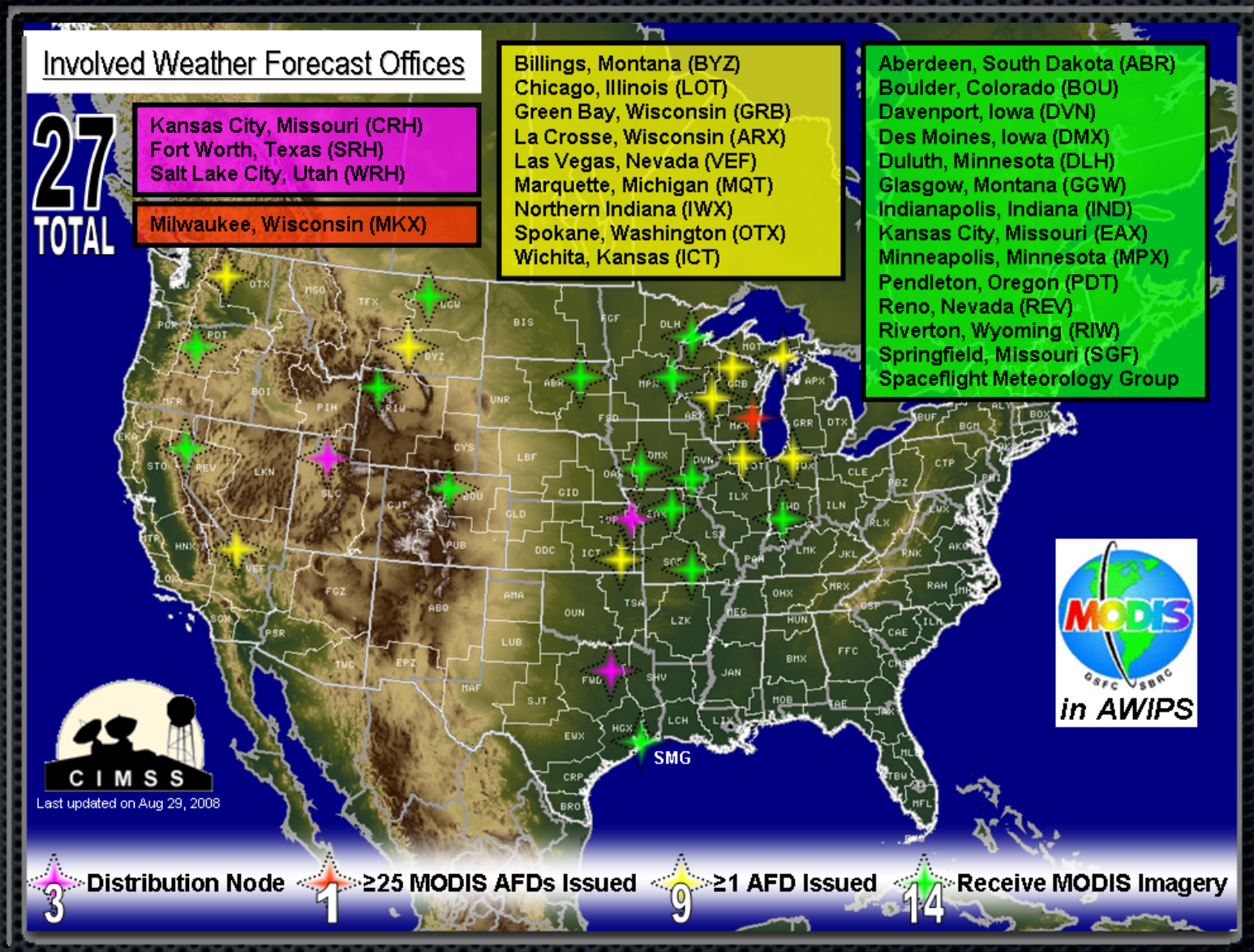


"MODIS Products in AWIPS" VISIT Lesson Participation

(October 2006 - December 2008)

52 NWS forecast offices participating so far

MODIS Products in AWIPS



27 NWS forecast offices have added CIMSS MODIS imagery to their local AWIPS

MODIS Products in AWIPS

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE MILWAUKEE / SULLIVAN WI
436 AM CDT WED JUL 16 2008

WEAK BOUNDARY VCNTY OF KMTW EXPCD TO SAG SLOWLY SOUTHWARD THIS MORNING WITH LIGHT SOUTHWEST WINDS BECOMING NORTHEAST AND THEN SOUTHEAST. WIND SPEEDS SHOULD BE MOSTLY LIGHT...LESS THAN 10 KNOTS...HOWEVER BRIEF GUSTINESS POSSIBLE AS BOUNDARY MOVES THROUGH. PER LATEST MODIS SST IMAGES...NEARSHORE HAS WARMED SEVERAL DEGREES FROM EARLIER UPWELLING EPISODE...NOW GENERALLY IN THE LOWER TO MIDDLE 50S. WITH INLAND DEWPOINTS IN THE MIDDLE 60S...WILL NEED TO WATCH FOR PATCHY FOG AS WINDS TURN ONSHORE.

MODIS has been mentioned in 70 NWS Area Forecast Discussions so far

MODIS Products in AWIPS

AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE SPOKANE WA
249 AM PST WED FEB 20 2008

MAIN FORECAST PROBLEM FOR TODAY WILL BE WHAT TO MAKE OF FOG. THUS FAR...FOG FORMATION HAS BEEN SOMEWHAT MINIMAL...AT LEAST ACCORDING TO THE CONVENTIONAL 4KM FOG PRODUCT. FORTUNATELY THE 1KM FOG PRODUCT FROM THE MODIS POLAR ORBITER DEPICTED A MUCH NICER PICTURE WITH AREAS OF FOG OVER THE VALLEYS IN NORTH IDAHO EAST OF COEUR D'ALENE AS WELL AS SOME BY PRIEST LAKE AND NORTH OF DEER PARK. THERE WAS ALSO ANOTHER POCKET OF FOG BETWEEN RITZVILLE AND SPRAGUE IN THE EASTERN COLUMBIA BASIN.

MODIS has been mentioned in 70 NWS Area Forecast Discussions so far

MODIS Products in AWIPS

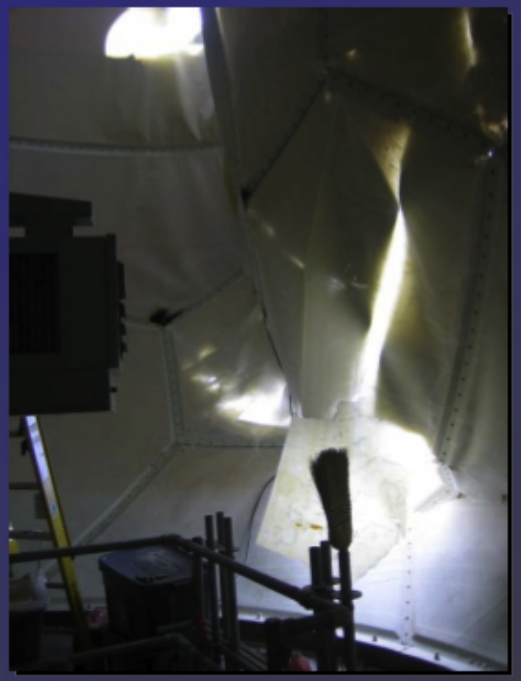
AREA FORECAST DISCUSSION
NATIONAL WEATHER SERVICE RENO NV
337 AM PST TUE NOV 4 2008

ANOTHER BIG STORY WITH THIS LOW HAS BEEN THE WINDS WITH MANYLOCATIONS REMAINING QUITE WINDY OVERNIGHT AS THE COLD FRONTPASSED. HIGH RES MODIS WATER VAPOR IMAGERY SHOWS GOOD MOUNTAIN WAVE ACTIVITY ALONG THE SIERRA AS THE SUPPRESSED TROPOPAUSE MOVED THROUGH OVERNIGHT. THIS UPPER FEATURE LIKELY HELPED TO DUCT STRONGER WINDS ALOFT DOWN TO THE SURFACE IN THE STABLE PRE-FRONTAL ENVIRONMENT SOUTH OF THE RENO AND TAHOE AREAS.

MODIS has been mentioned in 70 NWS Area Forecast Discussions so far

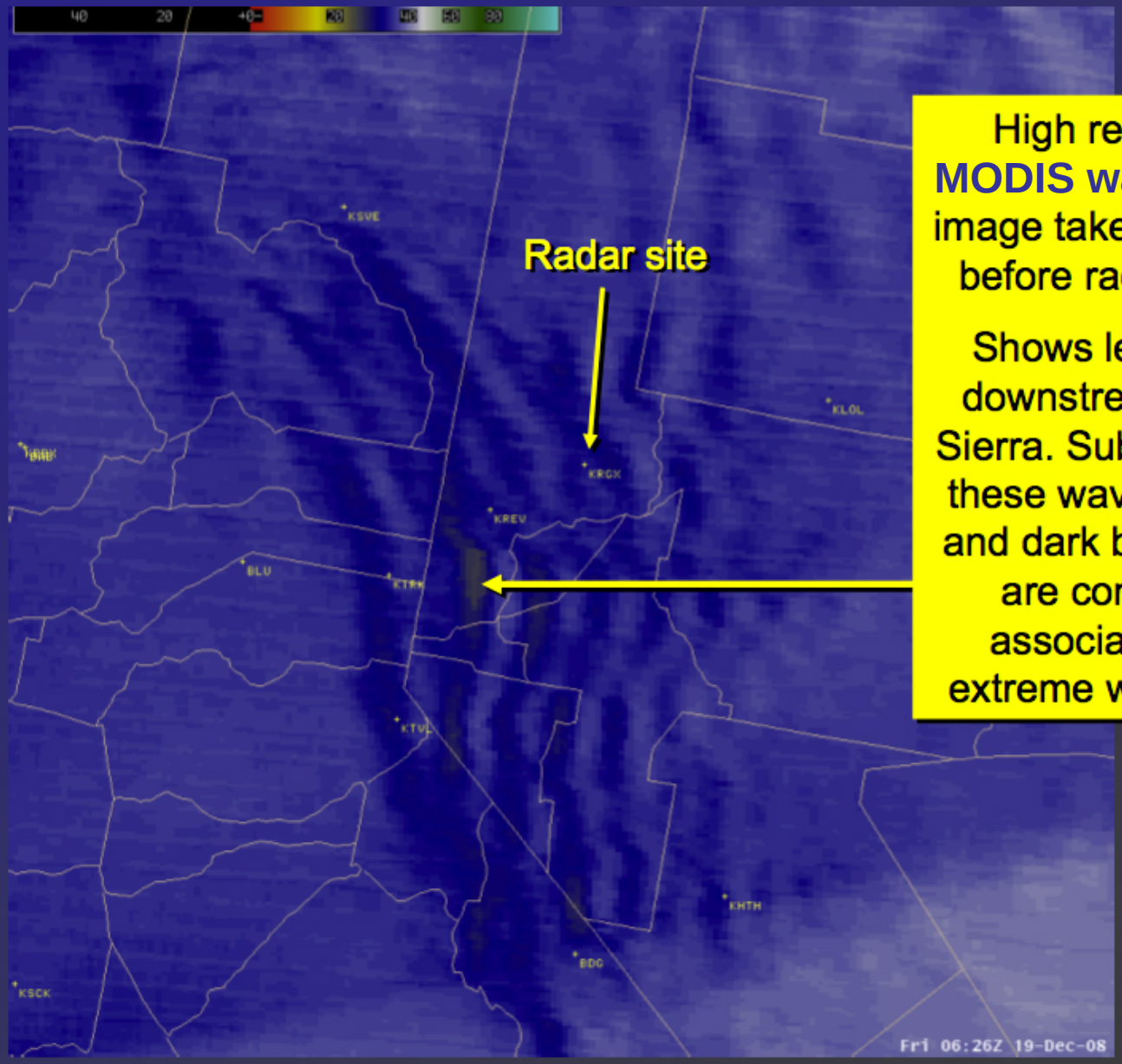
Photos

Photos taken by NWS Reno electronics team, on first visit to radar after dome failure (19 Dec.).



(credit: NWS forecast office, Reno NV)

Lee Waves

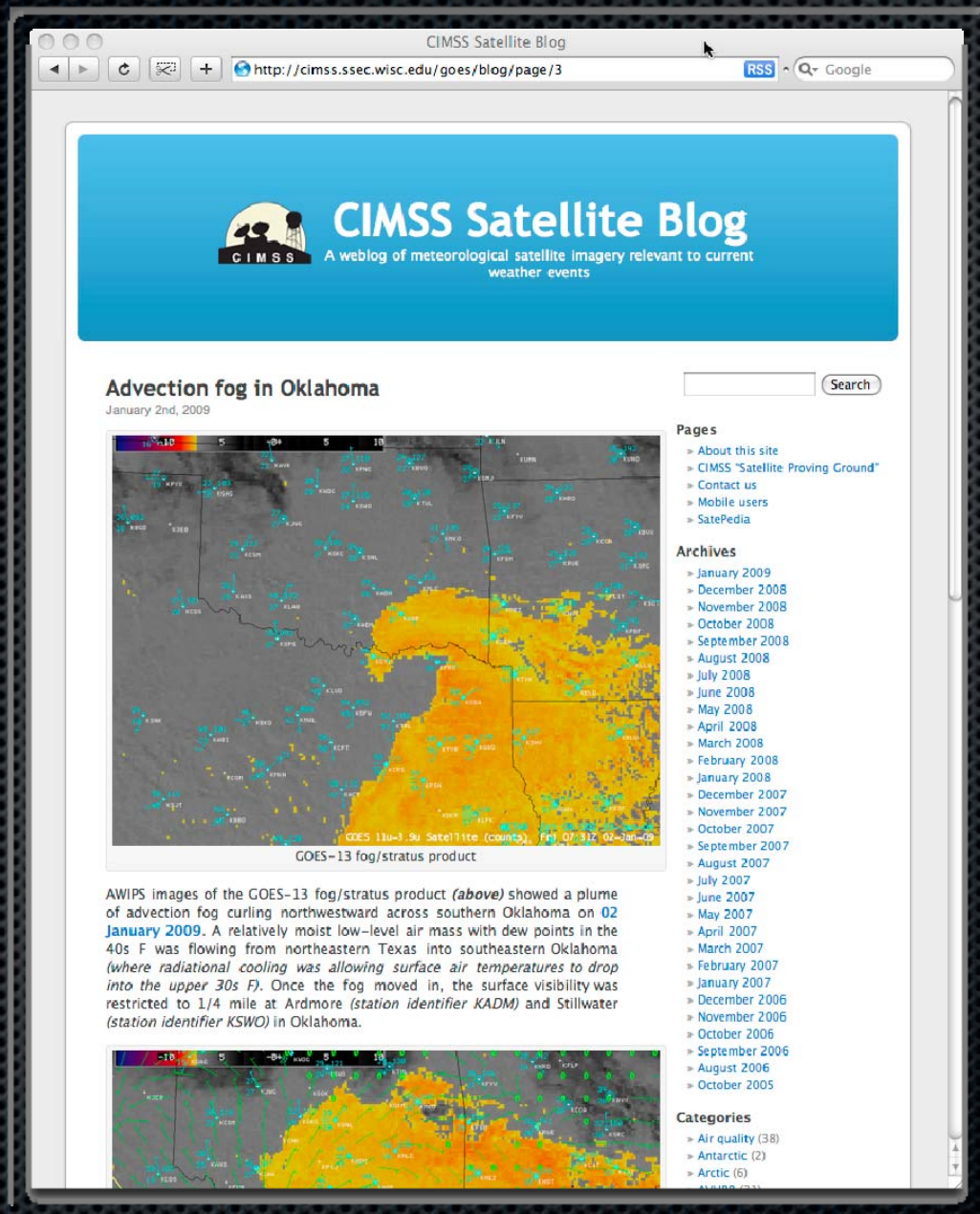


High resolution **MODIS water vapor** image taken ~4 hours before radar failed.

Shows lee waves downstream of the Sierra. Subsidence in these waves (yellow and dark blue areas) are commonly associated with extreme wind gusts.

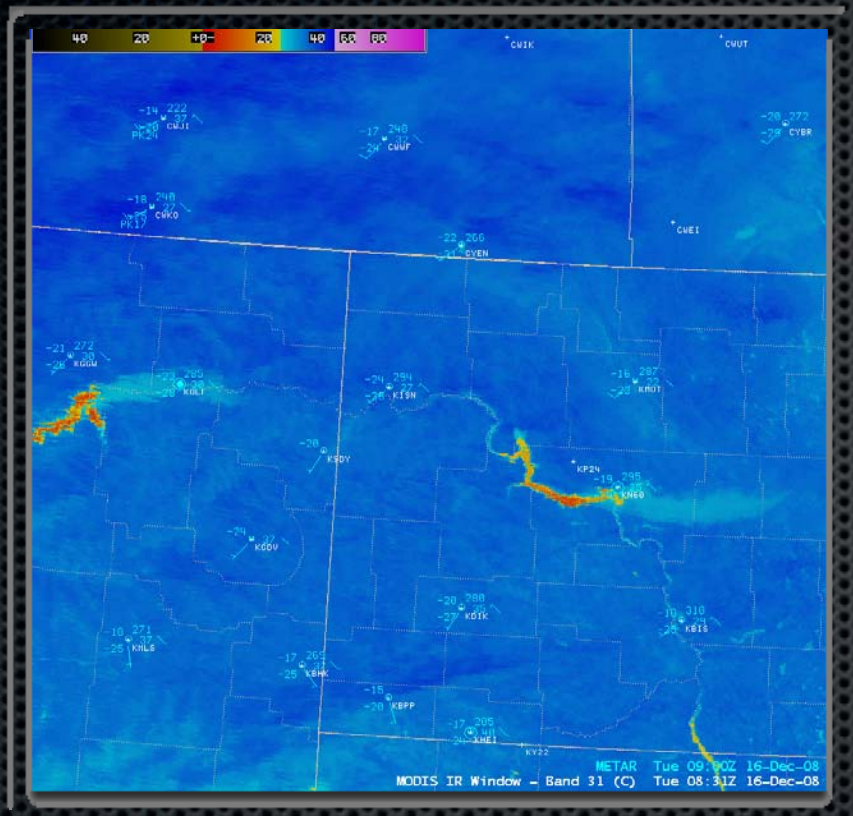
(credit: NWS forecast office, Reno NV)

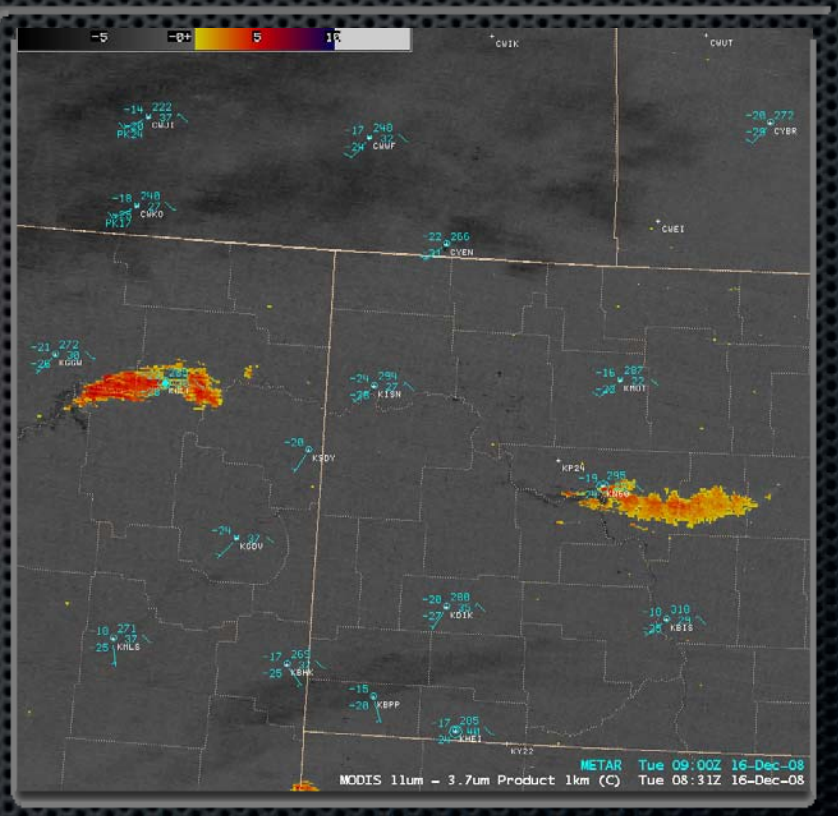
CIMSS Satellite Blog



cimss.ssec.wisc.edu/goes/blog

Satellite Training Activities at CIMSS: Helping to Prepare Forecasters for the GOES-R and NPOESS Era





Scott Bachmeier
scott.bachmeier@ssec.wisc.edu

T=300 SMOC