

Improving Short-term Predictions and the Identification of Hazardous Weather using NASA/SPoRT Transitioned Satellite Products

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Project Summary

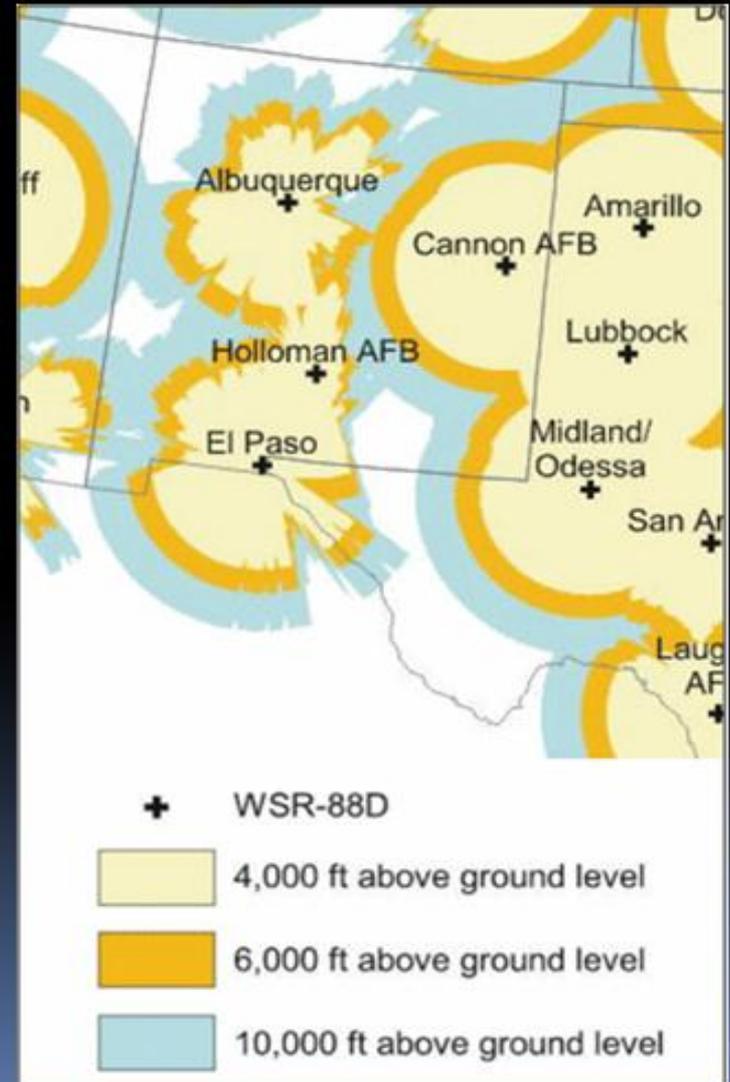
- Starting in January 2008, experimental satellite products from NASA SPoRT were made available to WFO ABQ in support of SPoRT mission “to transition research capabilities to operations to improve short-term forecasts”
- The suite of SPoRT products was based on local forecast challenges

Outline

- A brief description of WFO ABQ forecasting challenges
- Review of initial products received and success stories
- Latest products and results from 2011

Forecasting Challenges in New Mexico

- Large County Warning Area
- Diverse terrain
- Relatively few surface observations
- Poor radar coverage
- Wide range of hazardous weather – fog, winter weather, severe thunderstorms, flash floods, fire weather



Initial Products Evaluated



GOES Imager	Use
Low Cloud Base	Locations of IFR Ceilings
Fog Depth	Fog, Low Clouds, and their depth
Icing and Cloud Top Height	Detection of supercooled clouds



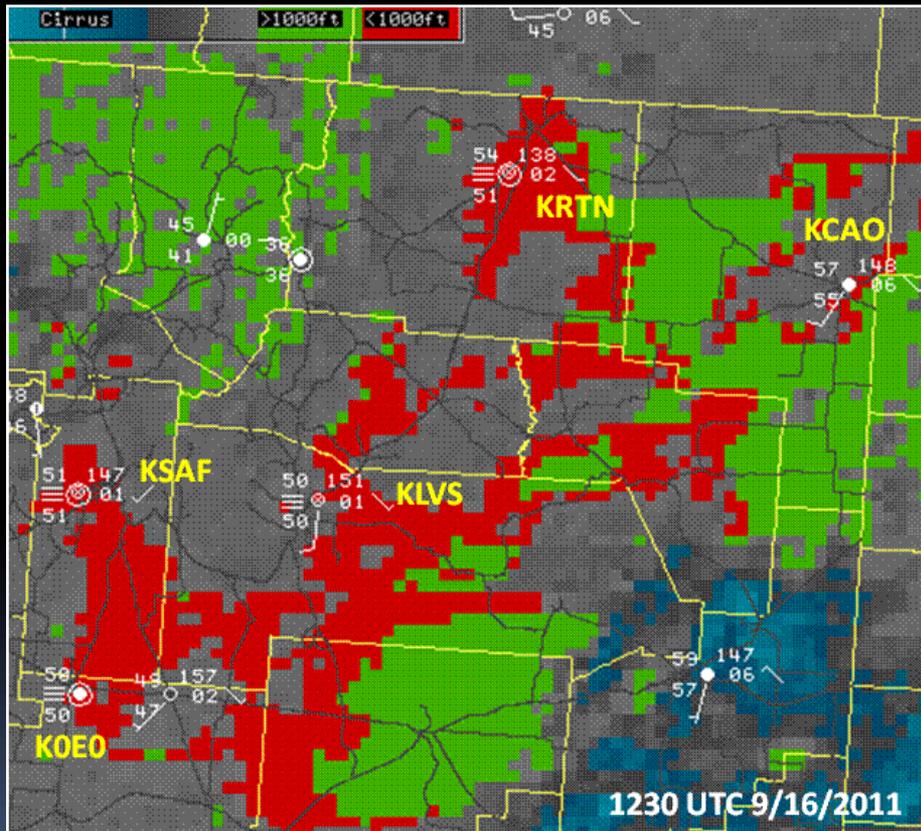
CIRA (Blended) Products	Use
Blended TPW	Multi-source hourly TPW
TPW Percent of Normal	Extreme values or gradients of TPW



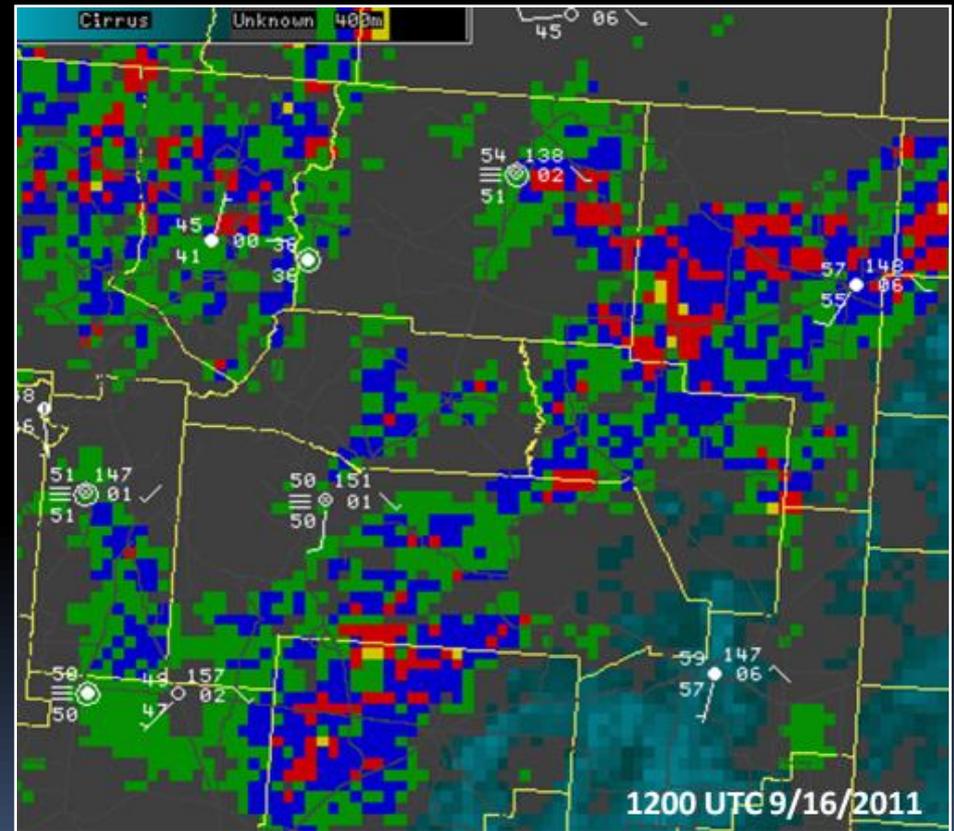
MODIS (1km and 4km)	Use
Visible, IR, WV	Higher resolution, GOES-R preview
False Color Composite	Identify regions of snow/ice
Natural Color	True color visible
3.9 μm	Fire hot spots
11-3.9 μm	Spectral difference fog depiction
Lifted Index	Stability at cloud free pixels
Cloud Phase	Define state of the water in cloud

Low Clouds and Fog GOES and Modis

GOES Low Cloud Base

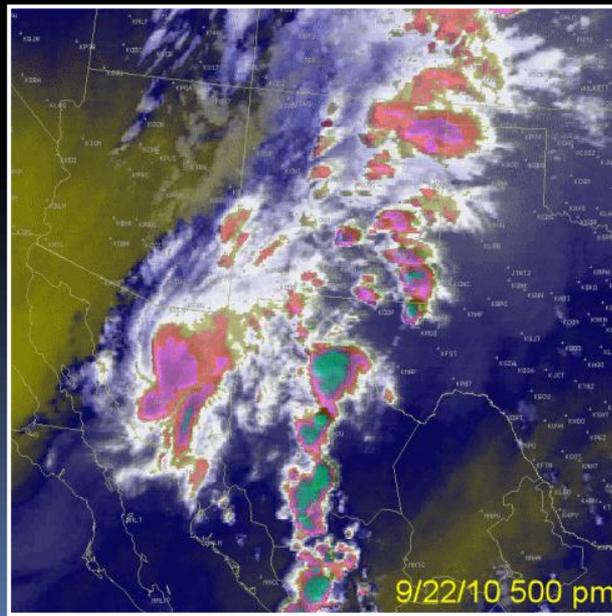
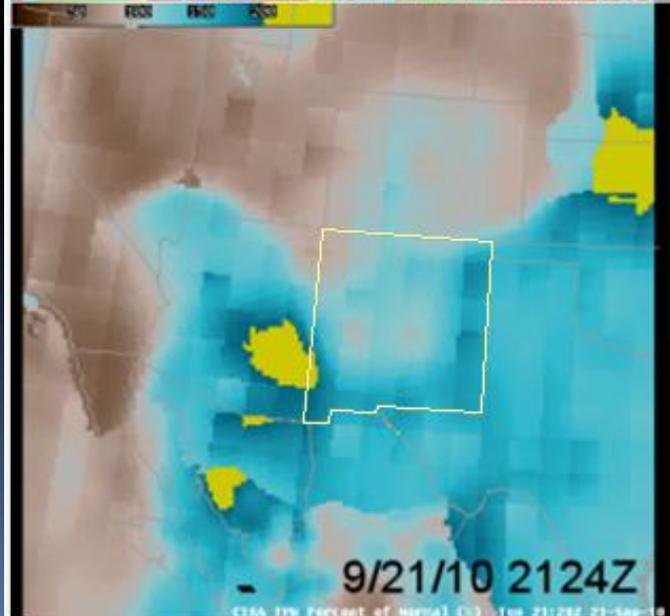
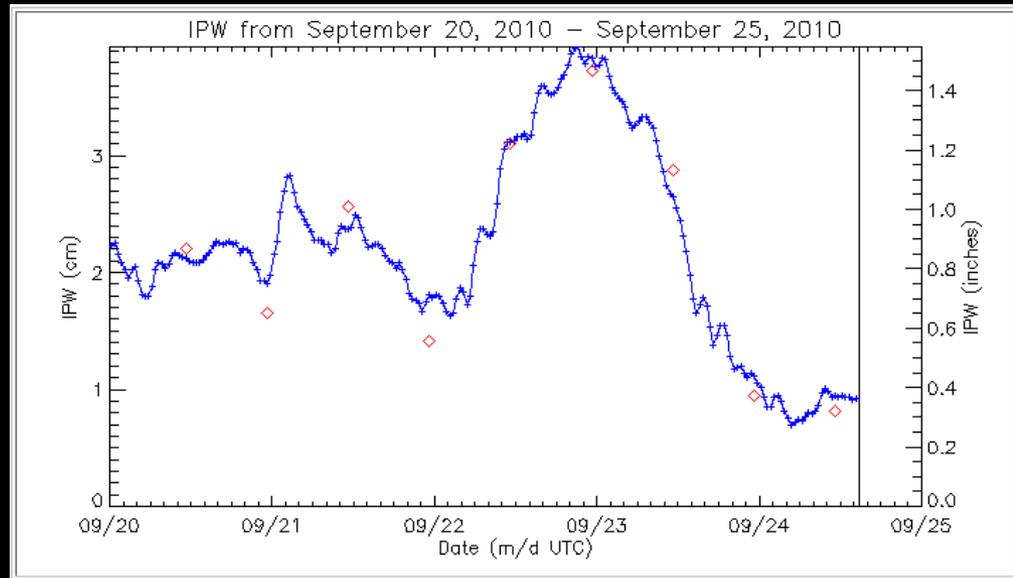
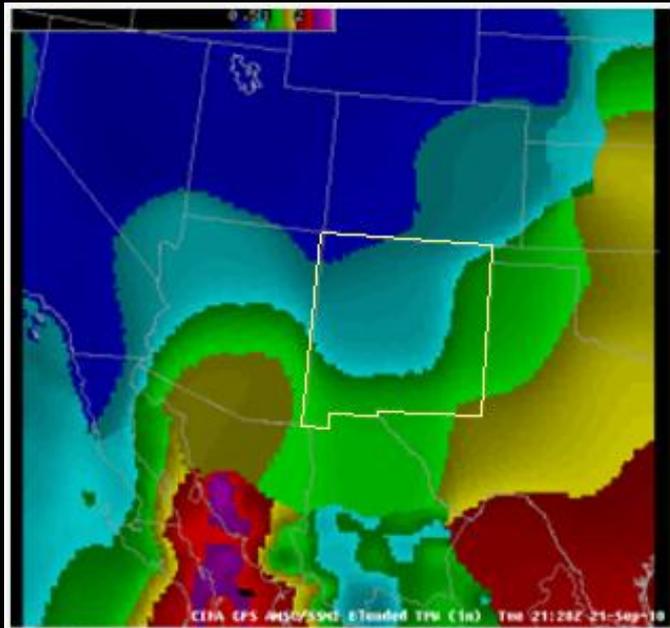


GOES Combined Fog Product



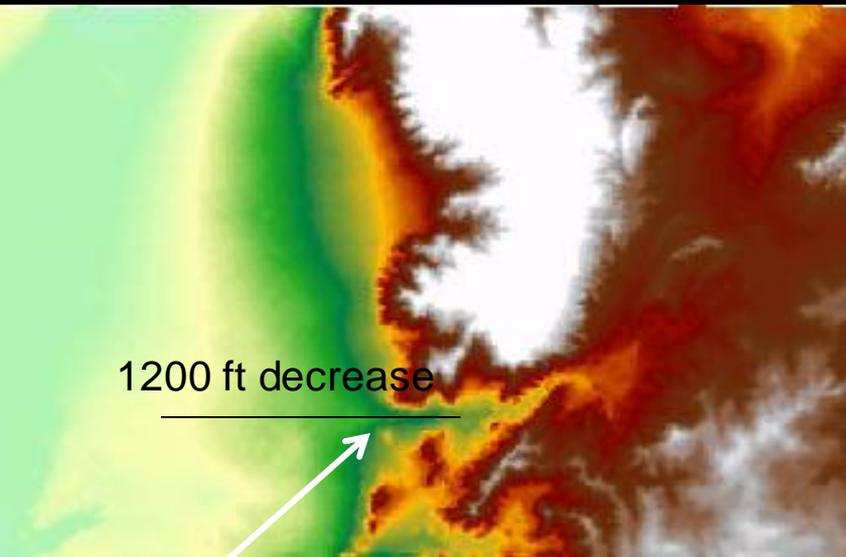
9 September 2011 – Low clouds and fog following
back door front into Northeast New Mexico

CIRA Blended TPW and PON TPW

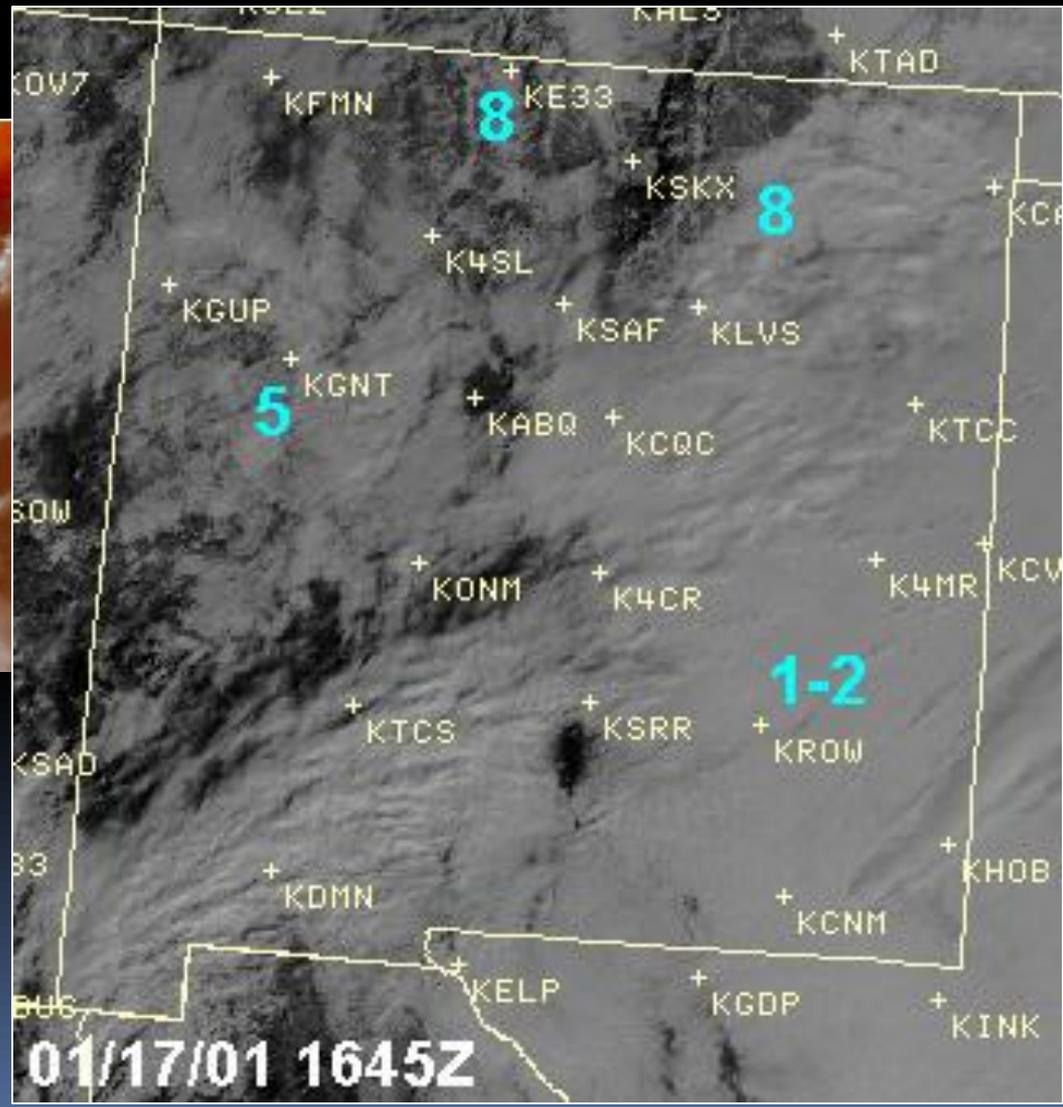


Location	Amount (inches)
Gladstone	6.42
House	3.51
Clayton	3.20
Espanola	3.20
Tesuque 2 W	2.63
Albuquerque	2.35
Santa Fe	2.00
Albuquerque Sunport	1.86
Rio Rancho 2 S	1.94
Fort Sumner	1.40

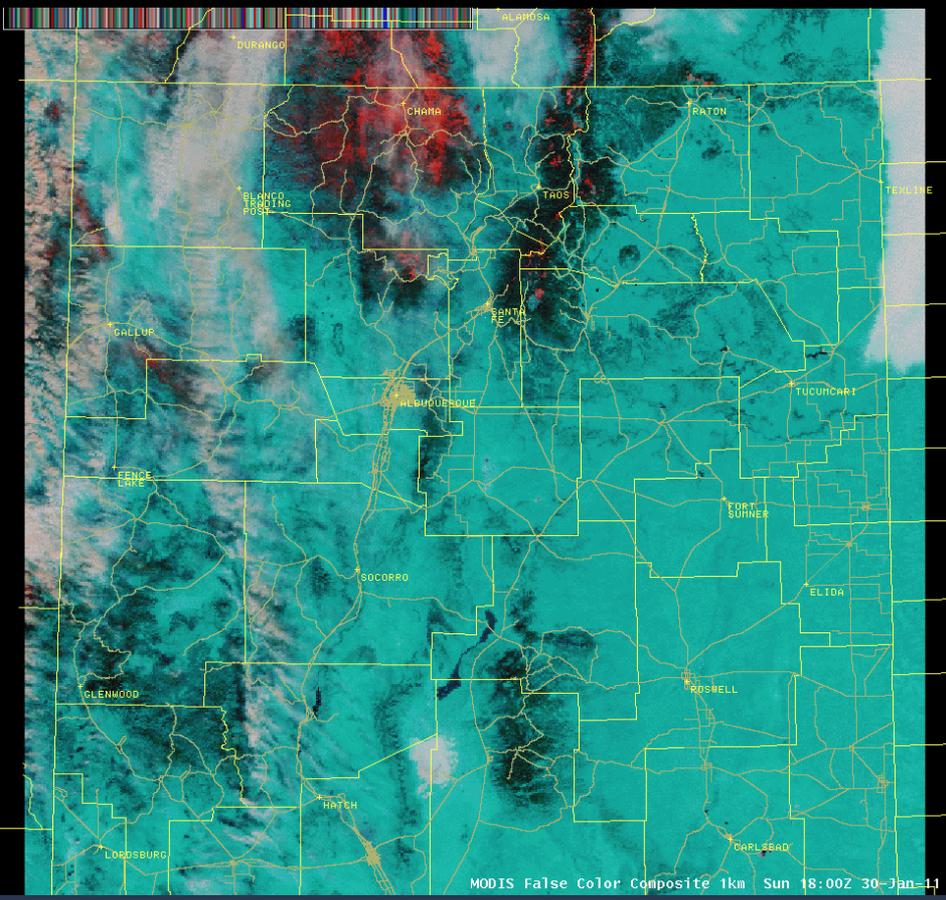
Products Evaluated And Successes: MODIS



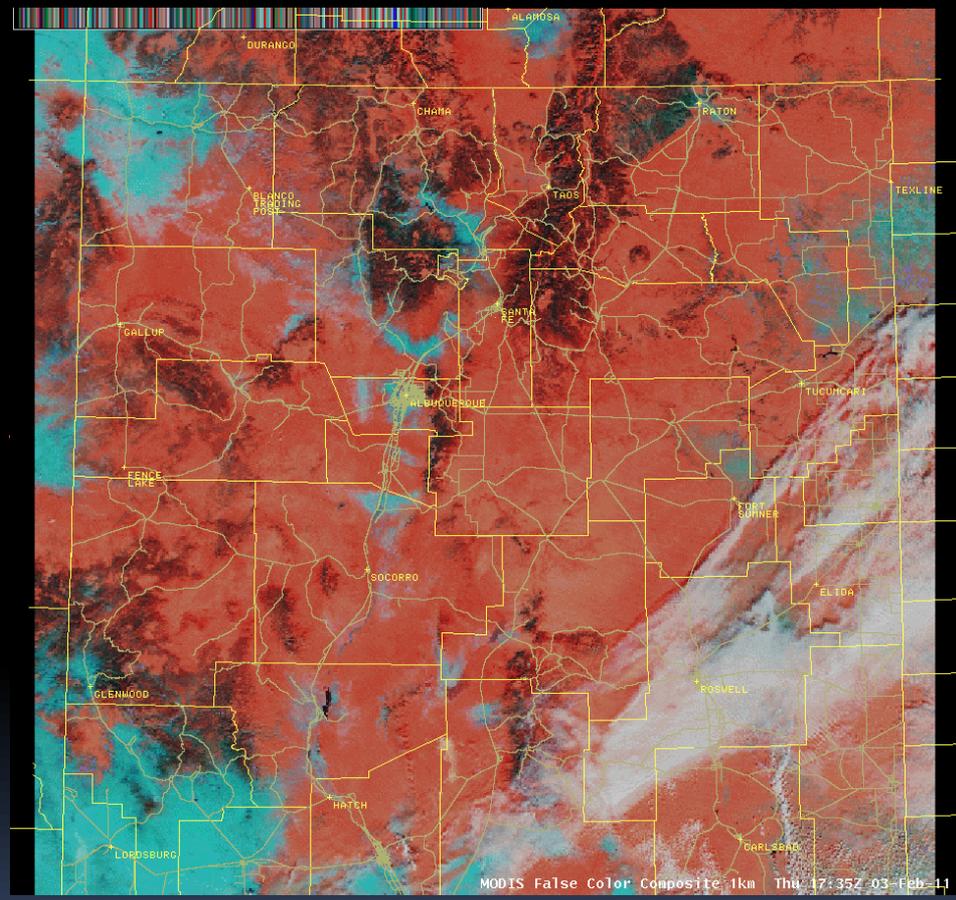
Tijeras Canyon: East of the Albuquerque Metro area



Products Evaluated And Successes: MODIS False Color Composite



30 Jan 2011

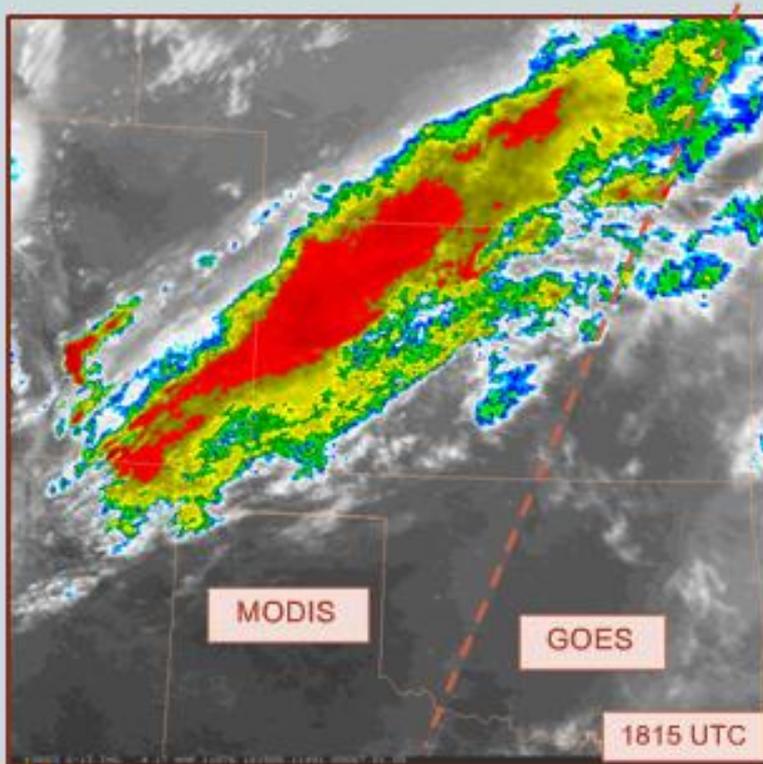


3 Feb 2011

Note the snow free areas associated with downslope gap winds

Products Evaluated And Successes: MODIS-GOES Hybrid Imagery

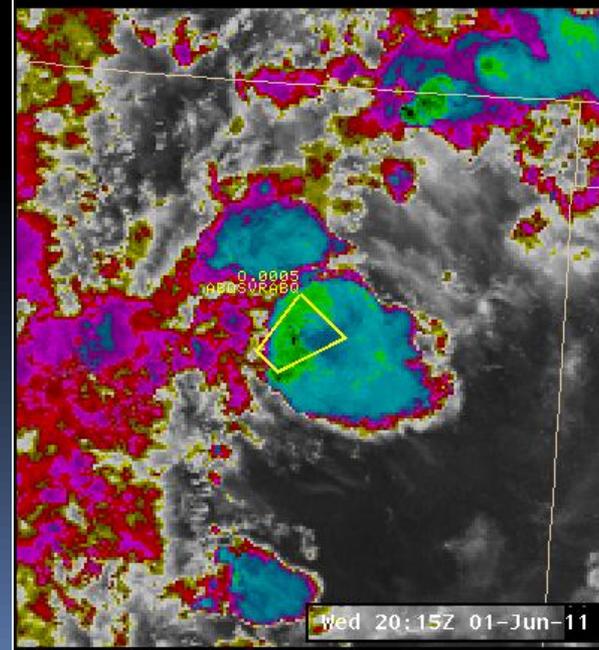
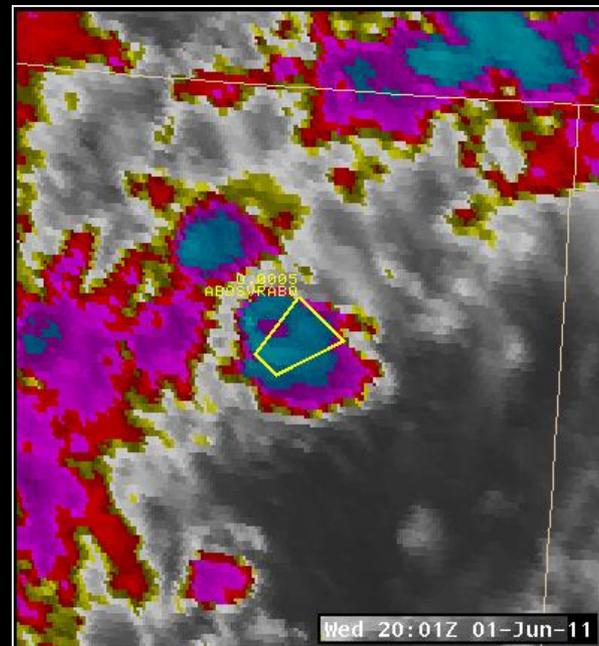
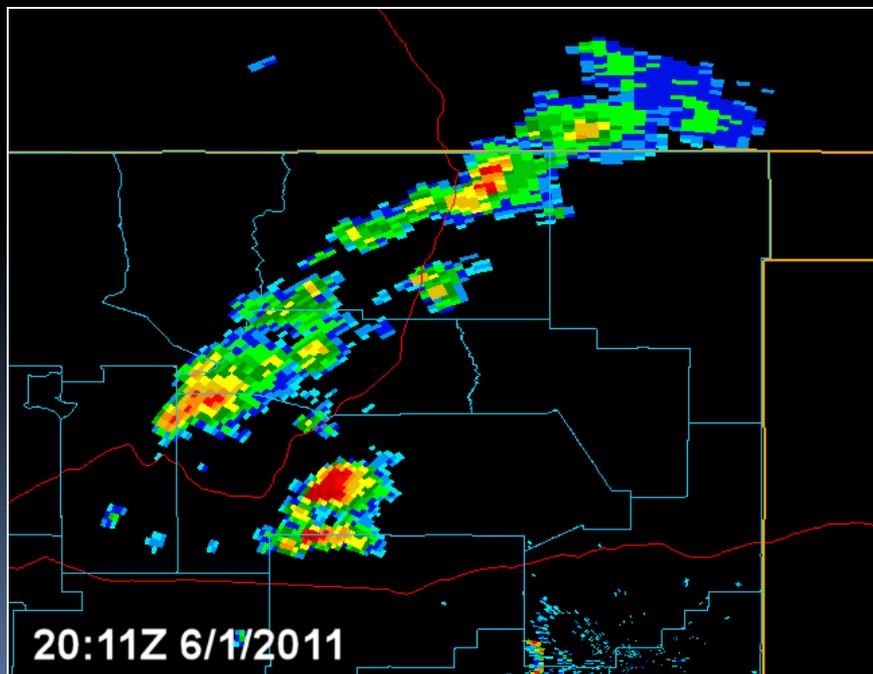
MODIS-GOES Hybrid Imagery



- Combination of high-resolution imagery from MODIS and standard GOES.
- MODIS swath replaces GOES whenever it is available while GOES fills time periods between MODIS overpasses.
- Four hybrid channels (MODIS/GOES):
 - Longwave IR (11 micron)
 - Shortwave IR (3.9 micron)
 - Water Vapor (6.7 micron)
 - Visible (0.6 micron)

Products Evaluated And Successes: GOES Hybrid

- April/May 2011 – no severe weather events, 2 warnings
- June 1, 2011 moisture increases east with a dry line
- First warning of the day issued at 2001Z



Operational Enhancements during the Fire Events of June/July 2011

- The Wallow Fire started in SE Arizona on May 29, 2011
- On the evening of June 2, a huge smoke plume driven by strong SW Winds reached central and northern New Mexico
- Visibilities dropped to 1-2 miles in Albuquerque on numerous occasions
- Air quality was poor over large areas of the state

National Weather Service Weather Forecast Office
Albuquerque, NM

Home Site Map News Organization Search for: NWS AI

Top News of the Day

- Smoke Measurements from the Air Force Research Lab
- Wind and Precipitation Reports for June 3rd
- Dept of Health Advises Residents to Take Precautions with Smoke from Wildfires
- Additional News Headlines

Tonight Weekend

TONIGHT
SCATTERED STORMS ACROSS THE EAST
SMOKE FROM FIRES WILL CAUSE LOW VISIBILITIES CENTRAL AND WEST

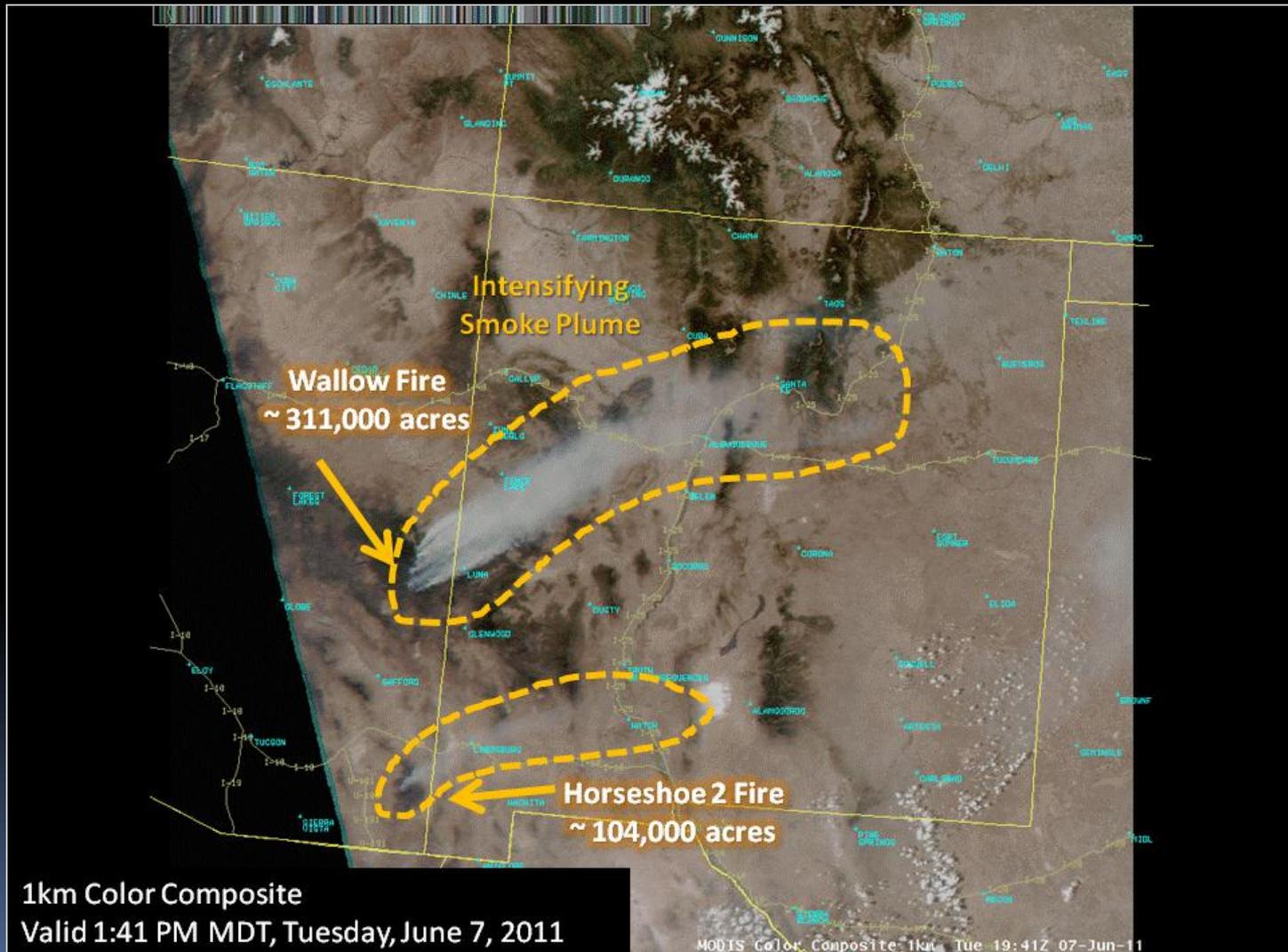
TAKE SPECIAL HEALTH PRECAUTIONS DUE TO THE SMOKE!
TURN OFF SWAMP COOLERS AND CLOSE WINDOWS.
REDUCE TIME OUTSIDE AS MUCH AS POSSIBLE.
CHECK ON THE ELDERLY AND THOSE WITH RESPIRATORY ILLNESS.

EXPECTED LOW TEMPERATURES
GUSTY WINDS LIKELY WITH THE STORMS
STORMS WILL END BY MIDNIGHT

The map displays a weather forecast for Albuquerque, NM, for the evening of June 3, 2011. It shows a smoke plume originating from the Wallow Fire in southeastern Arizona and moving westward. Other fires are marked near Bear and Horseshoe 2. Temperature readings are shown across the region, with a low of 38 and a high of 68. A storm system is depicted with a cloud and lightning bolt icon, with a note that storms will end by midnight. The map also includes a list of health and safety precautions related to the smoke.

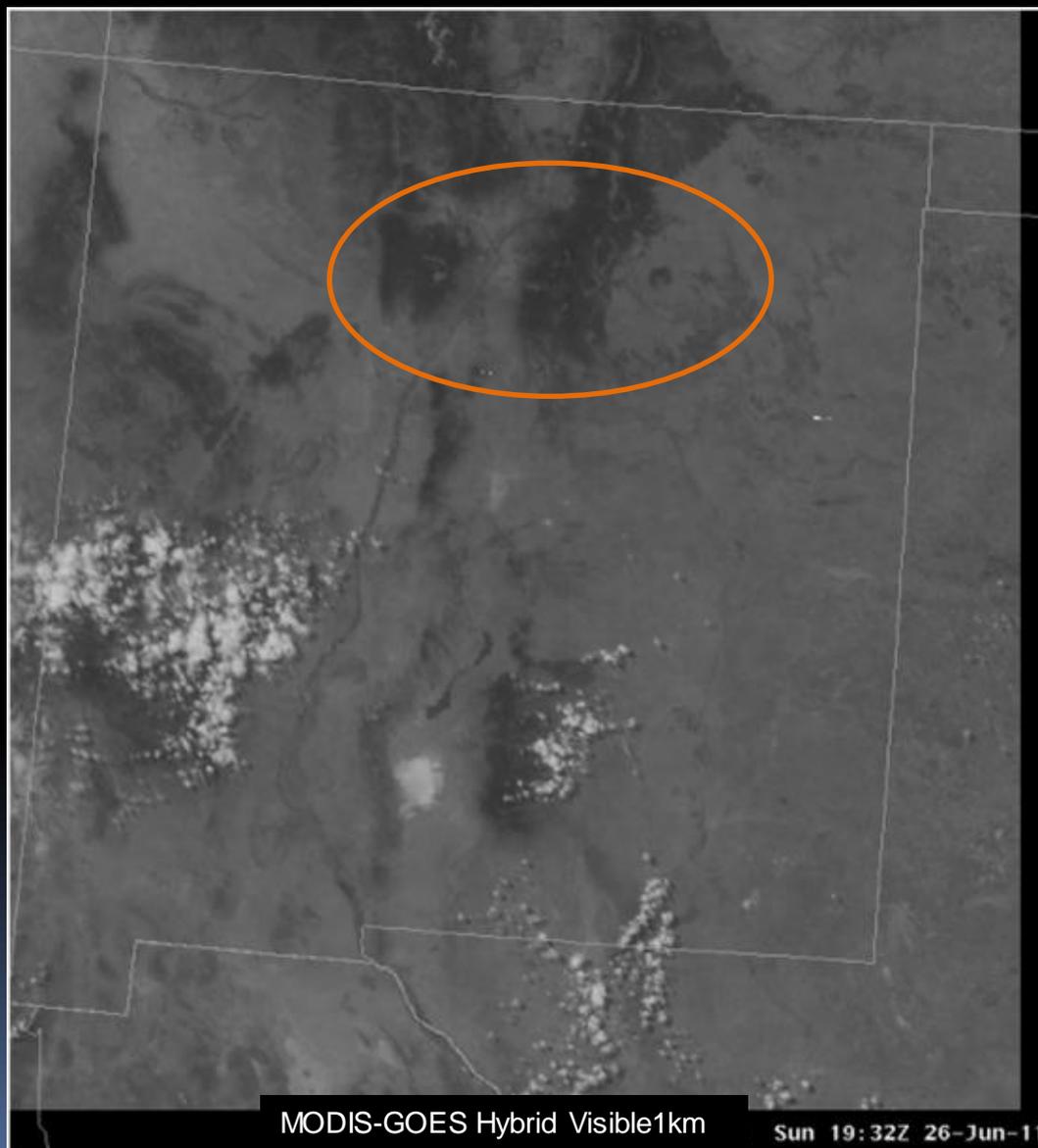
6:29 PM MDT
Fri Jun 3 2011
National Weather Service
Albuquerque, NM

MODIS Color Composite for use in Graphiccast



Las Conchas Fire – 26 Jun 2011

1932Z to 2232Z



3.9 μ m Comparison on Day 5 of the Las Conchas Fire



MODIS-GOES Hybrid 3.9 μ 4km

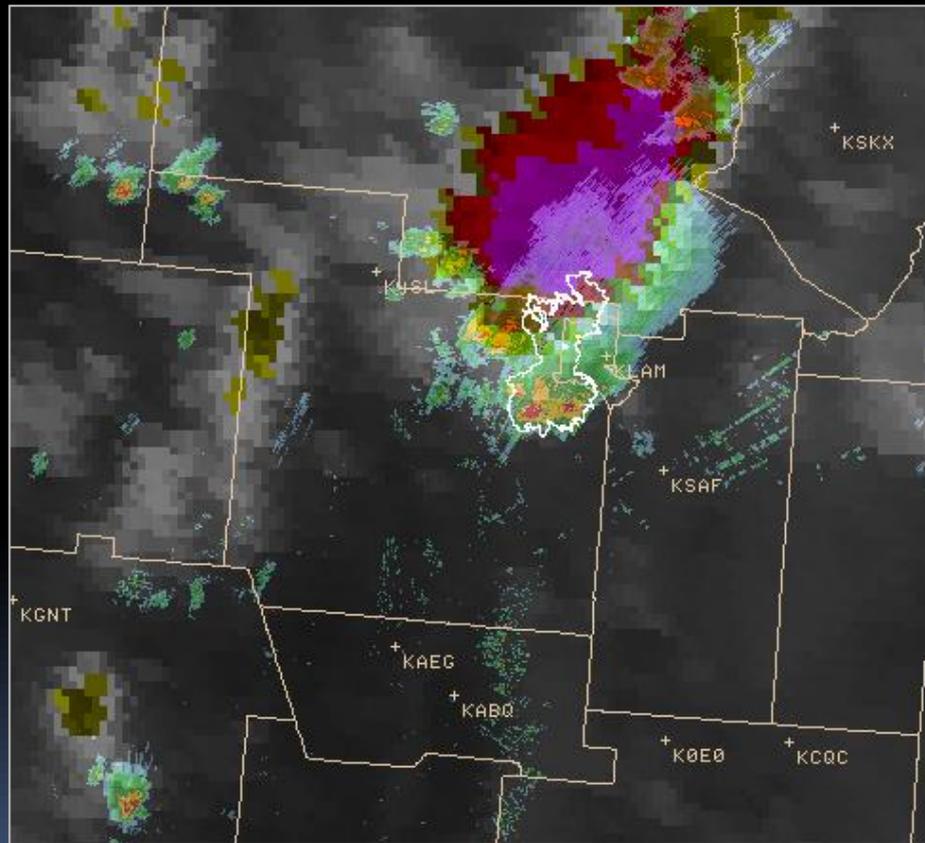


MODIS-GOES Hybrid 3.9 μ 1km

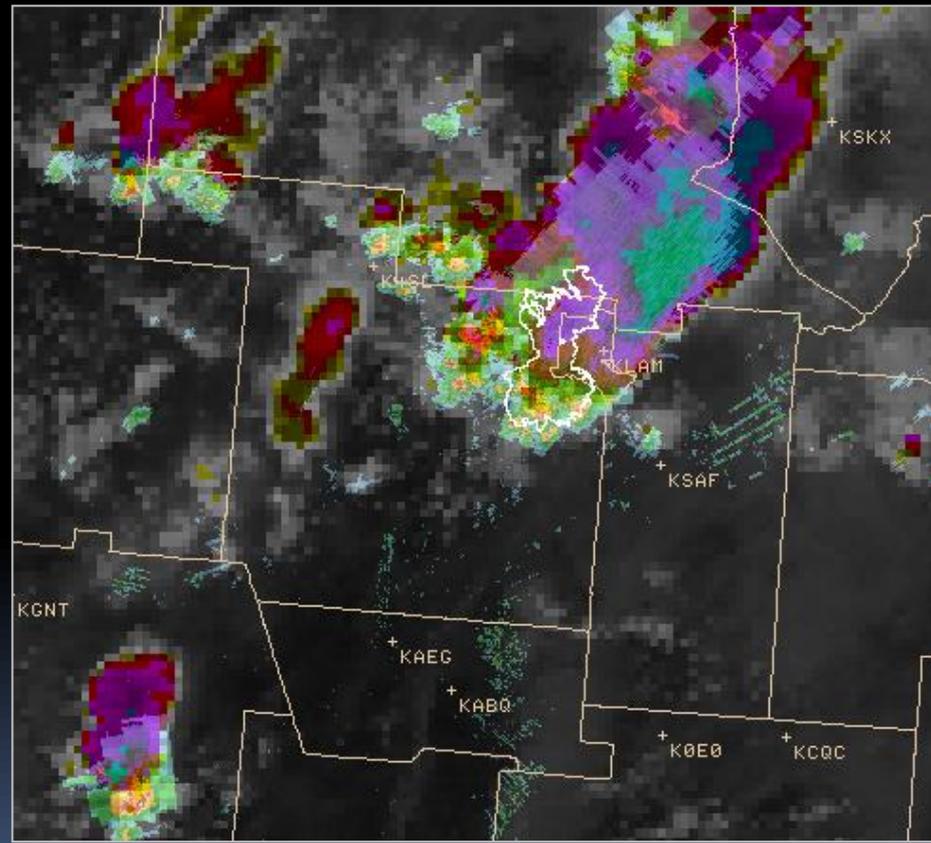
Burn Scars and Flash Flooding

- The Las Conchas Fire burned over 150,000 acres
- The resulting burn scar supports a greatly enhanced flash flood threat
- Over areas of intense burning, runoff increases from the normal 2% to 75%
- Ash and debris combined with flows 100x normal result in unprecedented flash floods

August 22, 2011: GOES Hybrid IR and 0.5 Reflectivity

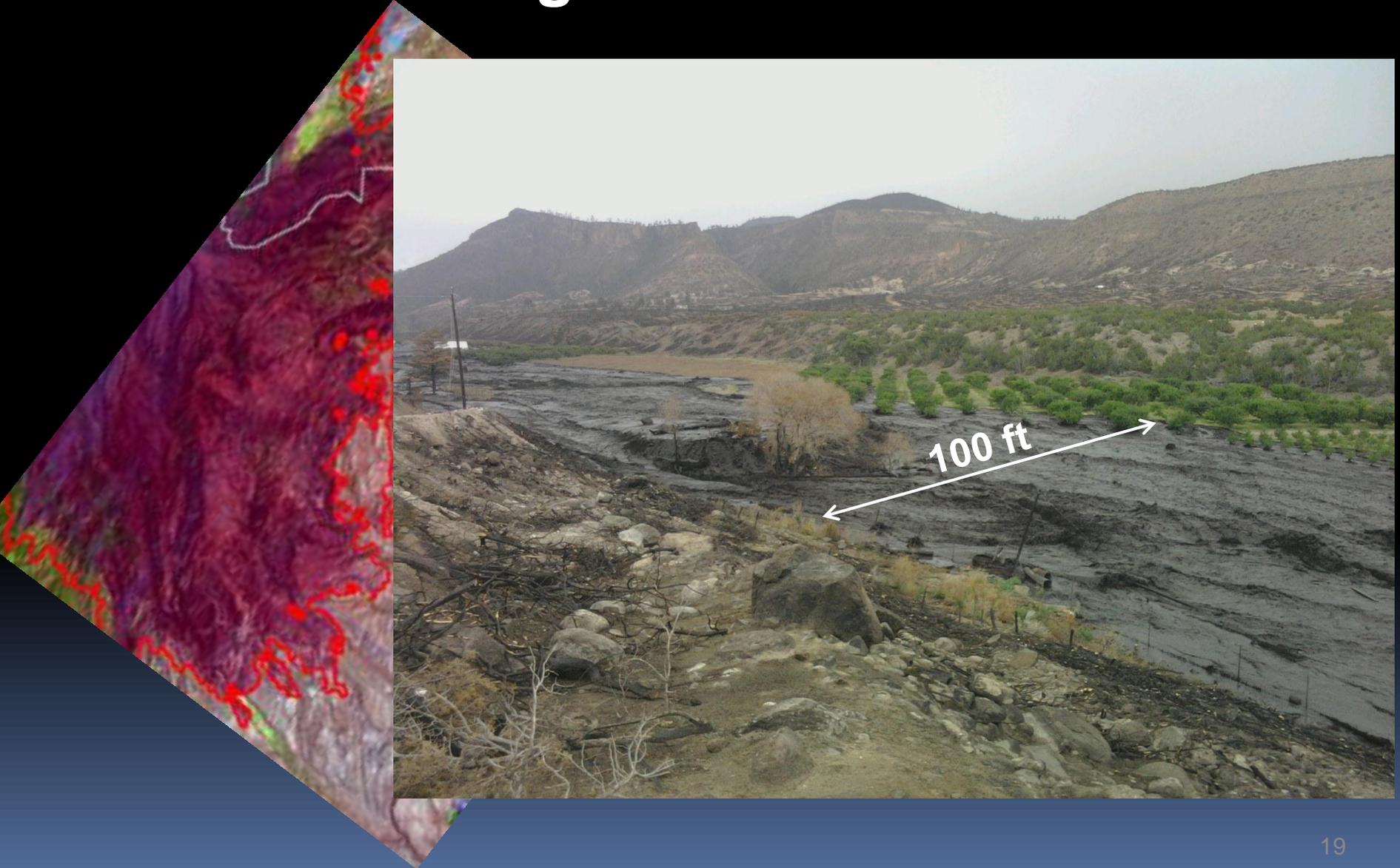


1945Z



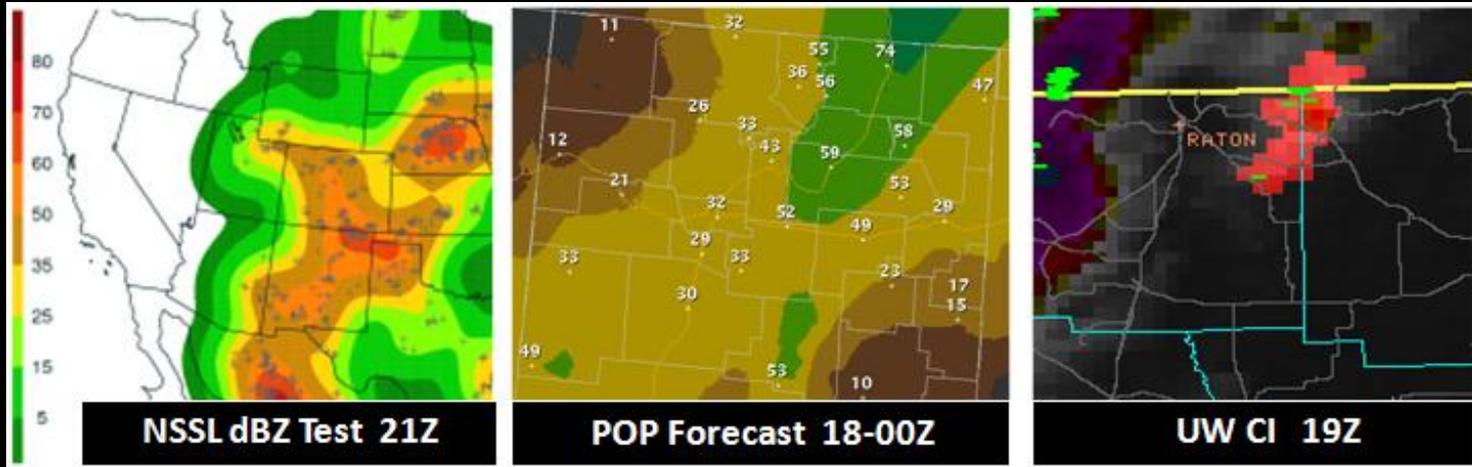
2002Z

August 22, 2011: Historic Flooding Downstream of Burn Scar



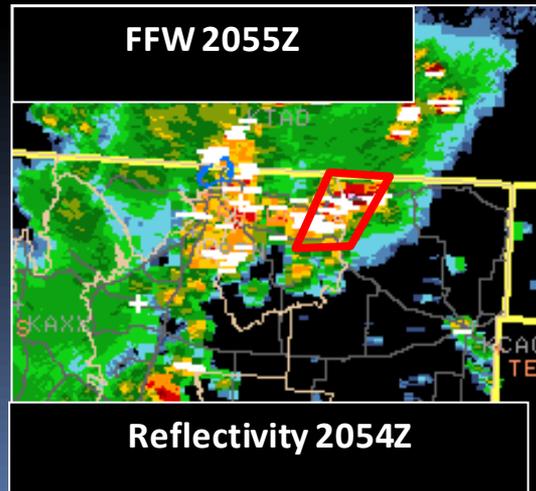
Convective Initiation Evaluation (P4.20)

July 28, 2011 Flash Flooding



60-70% chance of CI at 21Z over northeast NM

UW/CIMMS CI detection at 19Z 95 minutes prior to issuance of FFW.



Flash flooding on the Dry Cimarron River.

Folsom, NM

Project Summary:

The operational use of the SPoRT Transitioned Products

- Have improved the decision making process by supplementing data void areas and enhancing our current satellite analysis techniques
- Provide an excellent platform for GOES-R training, however the latency of the products limits operational use
- Enhance our decision support products and general customer products

Thanks to SPoRT for Outstanding Support!

■ NASA SPoRT Blog

The screenshot shows the NASA SPoRT blog homepage. At the top, there are navigation links for "Home" and "Mission Statement", and a search bar. The main header reads "THE WIDE WORLD OF SPoRT" with the tagline "Fostering interaction between product developers and end users". Below this is a large banner image with the SPoRT logo and the same tagline. To the right of the banner, there are social media icons for "Feeds", "Posts", and "Comments". Below the banner, there are two article teasers: "« Total Lightning Data in AWIPS II" and "Experimenting with RGB Color Enhancements in AWIPS ». The main article featured is "Record Precipitable Water and New Mexico Heavy Rain Event" by dmkann, dated September 28, 2010. On the right side, there is a "CATEGORIES" section listing various satellite and instrument categories like AIRS, AMSR-E, AWIPS II, CALIPSO, CIRA Products, and CloudSat.

■ Training Modules

The screenshot shows a training module slide titled "NASA SPoRT Hybrid PG Imagery Intro". The slide features the SPoRT logo and a profile picture of Kevin Fuell, a Research Scientist at the University of Alabama. A table of contents is visible on the left, with the current slide being "5. ABI-like Example for Real-time Apps." The main content area shows an "Example of future GOES-R Imagery" with a satellite image of a storm system. The image is annotated with yellow dashed boxes labeled "Hybrid" and "GOES", and a blue dashed circle. A list of bullet points describes the hybrid imagery: "Near real-time proxy to future ABI on GOES-R to detect:", "outflow boundary", "convective clouds", and "wave-like clouds from topographic and pressure-induced forcing". It also notes that "MODIS imagery used in hybrid is remapped to match the ABI resolution of 2 km (IR, SW, WV) and 0.5 km (Visible)". A caption at the bottom of the image reads: "Alternating hybrid and GOES visible imagery for 13-March-11 at 1845 UTC over north-AL & GA and southern TN (WFO borders in yellow)". The slide is part of a presentation by articulate, and the current slide is 5 of 13.