

# Radars for Flood Warnings & New Data and Models for Water Forecasts



NCAR

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

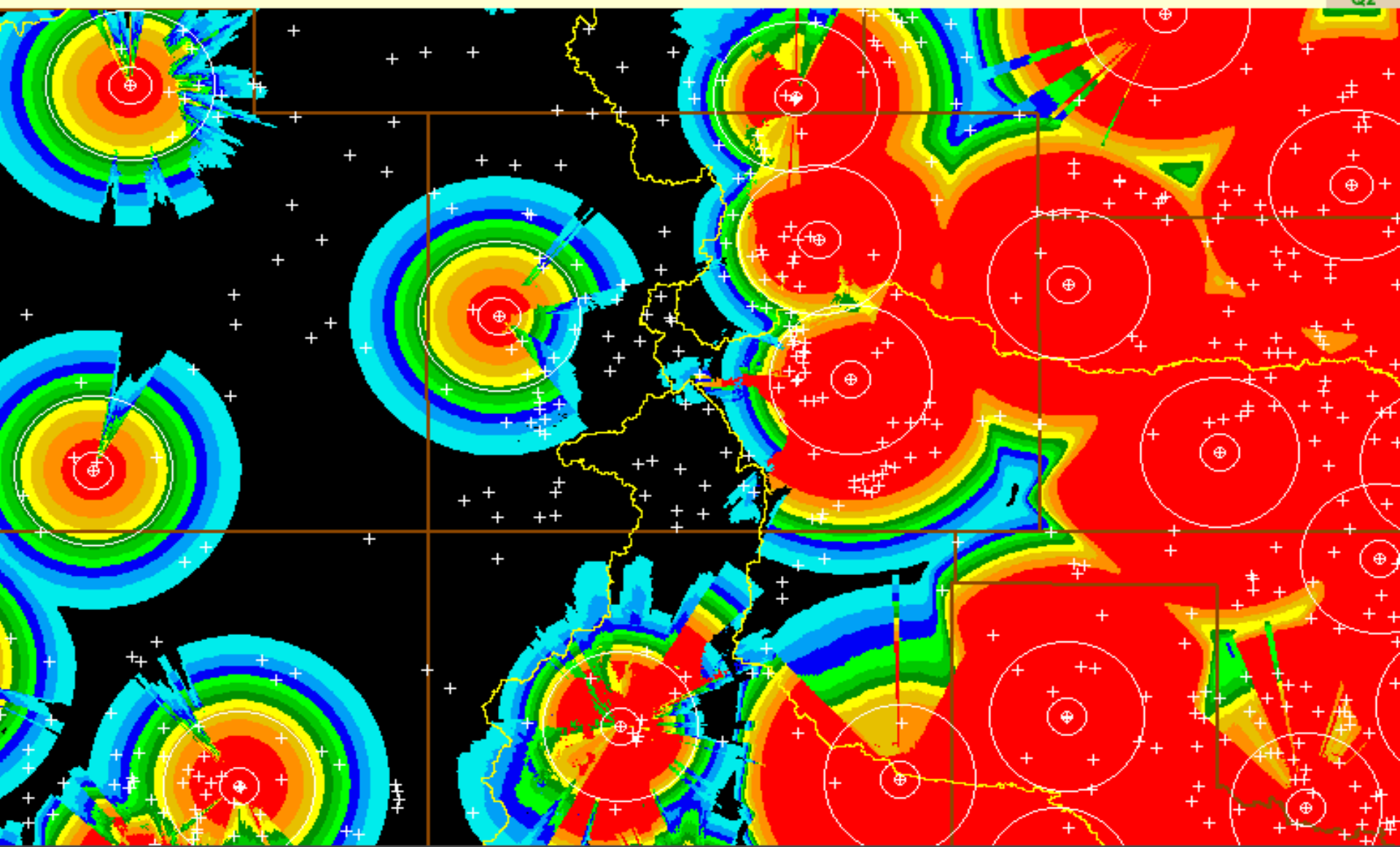


# Radar Quality Index

Derived From Mosaic3D

Valid At:

02/19/2011 20:55:00 UTC



Radar Quality Index

No File Missing



42.00N  
114.00W 97.89W  
34.00N



Figure 12. Photograph of the SR2 radar on Bridge Timber Mountain looking north toward the San Juan Mountains.



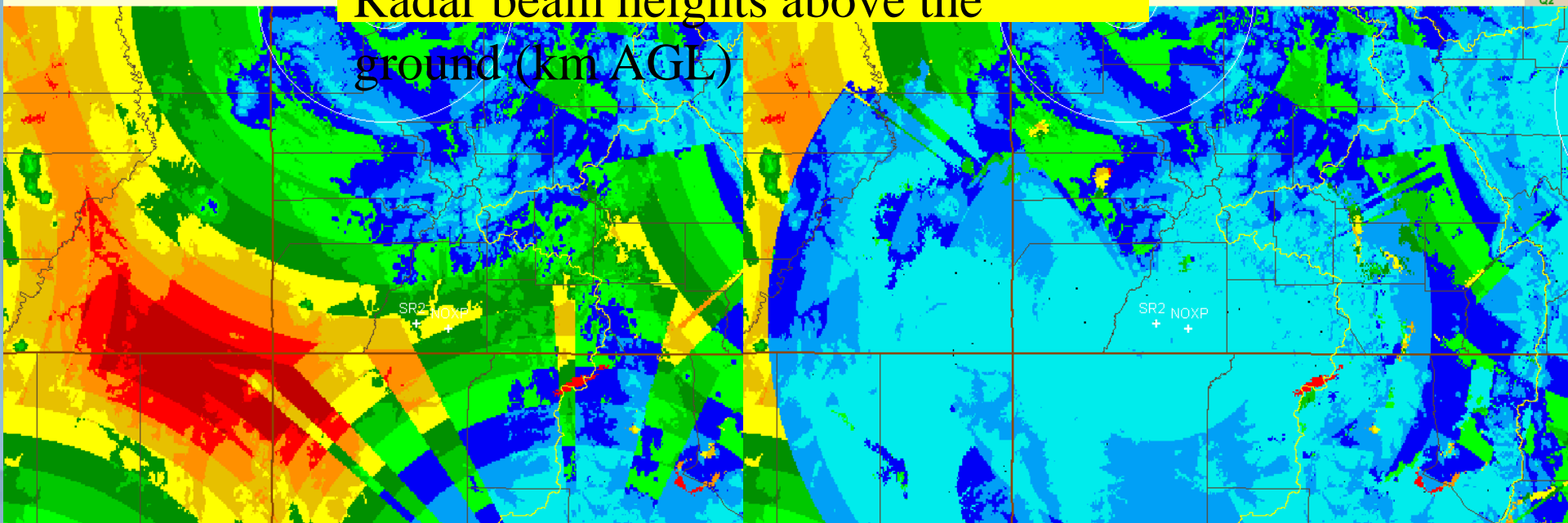
# La Plata County 2010

Hybrid Scan Refl Height - (km AGL)  
Derived From Mosaic3D

Radar beam heights above the  
ground (km AGL)

0.0

Valid At:  
08/05/2010 02:00 UTC



Hybrid Scan Reflectivity Height [km - AGL]

39.00  
111.00W  
36.00

No File Missing

Hybrid Scan Reflectivity Height [km - AGL]

39.00  
111.00W  
36.00

105.00W  
36.00

WSR-88Ds only

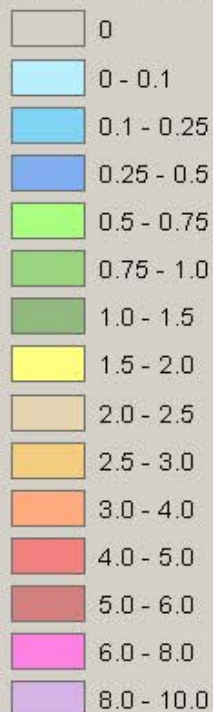
WSR-88Ds with SR2 on Bridge Timber Mtn

# Basin-Averaged QPE Values, SNOTEL Precipitation Measurements, and Water Volume for the 02/20/11 Event in the San Juan Basin

## 24-hr SNOTEL Pcp (in)

- basin of interest
- surrounding basins

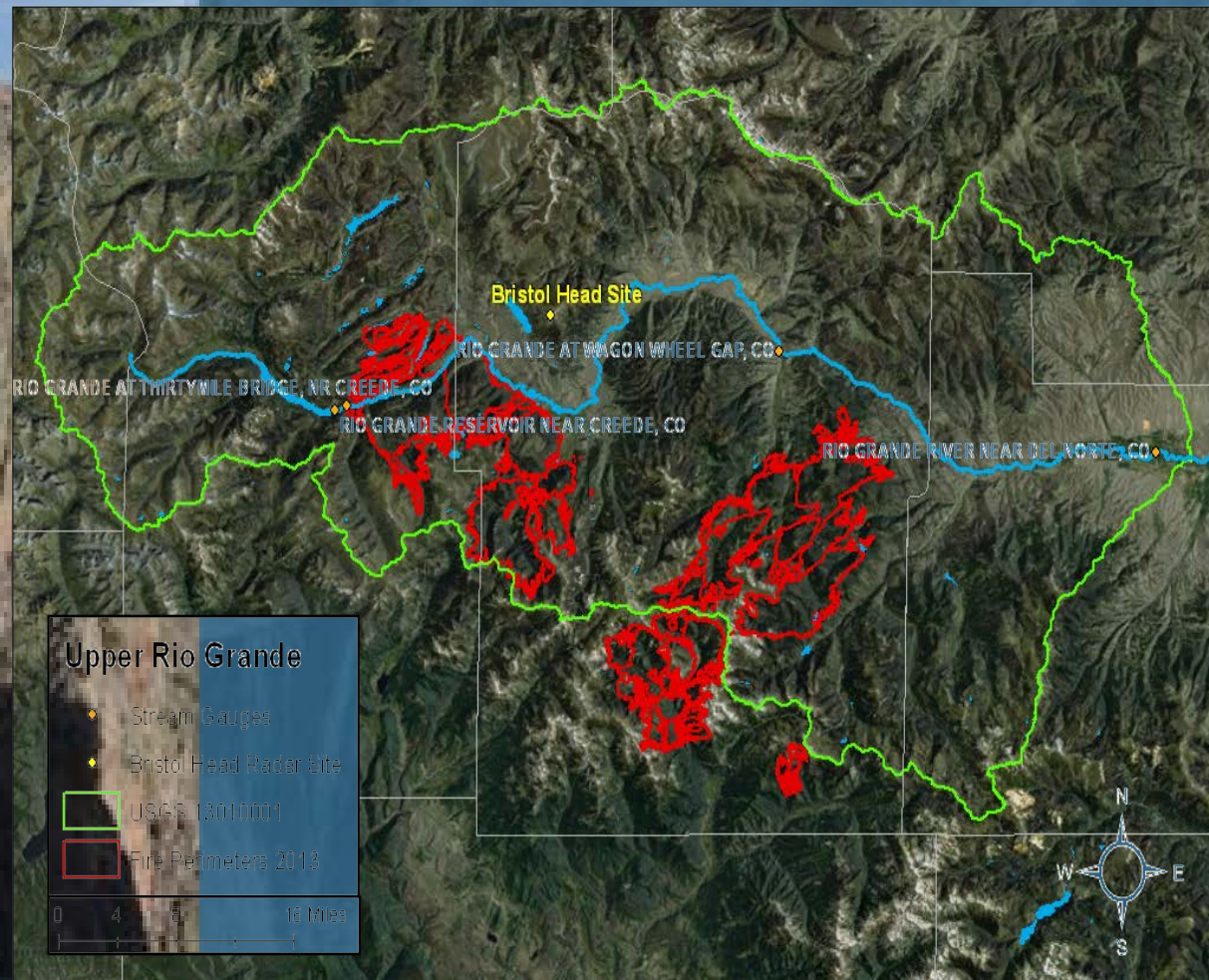
## 24-hr QPE (in)



We mapped  
snow with  
NOXP

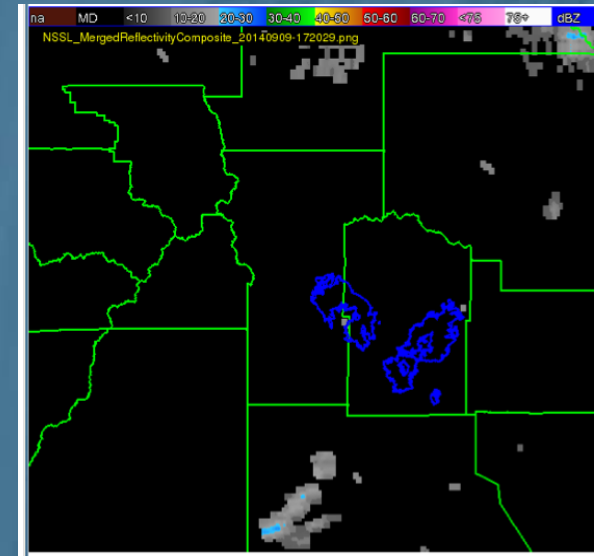


# Bristolhead Mountain up the road from Creede summer 2013



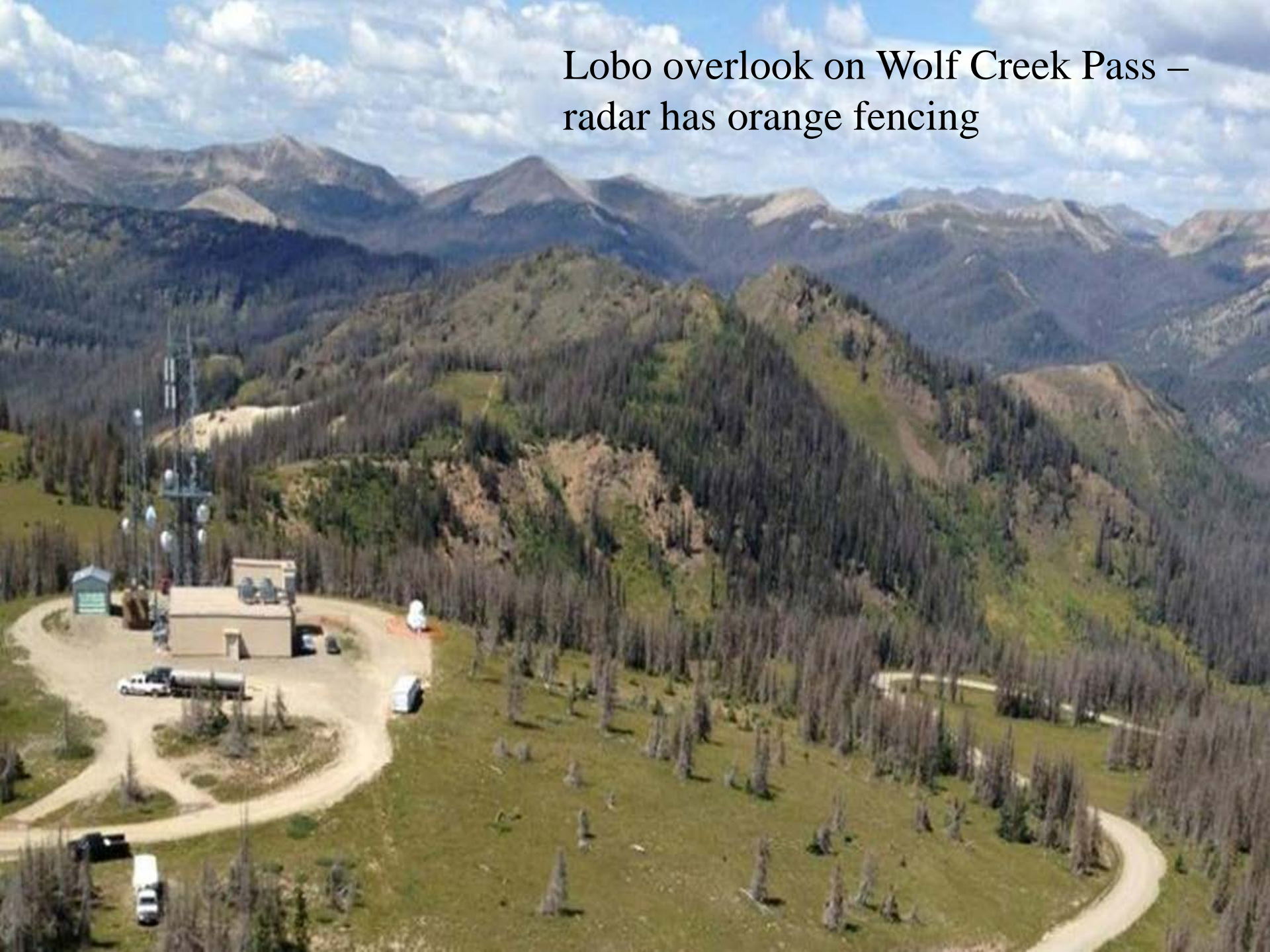
# Oklahoma U. - PX-1000 radar

## Colorado field campaigns 2014 & 2015





Lobo overlook on Wolf Creek Pass –  
radar has orange fencing





# Comparing NASA ASO WRF-Hydro Mobile Radar SNOTEL lites SNODAS

RIO-SNO-FLOW SUMMARY REPORT

## Upper Rio Grande Basin Snowfall Measurement and Streamflow (RIO-SNO-FLOW) Forecasting Improvement Project



**COLORADO**  
Division of Water Resources  
Department of Natural Resources



**COLORADO**  
Colorado Water  
Conservation Board  
Department of Natural Resources



January 4, 2016

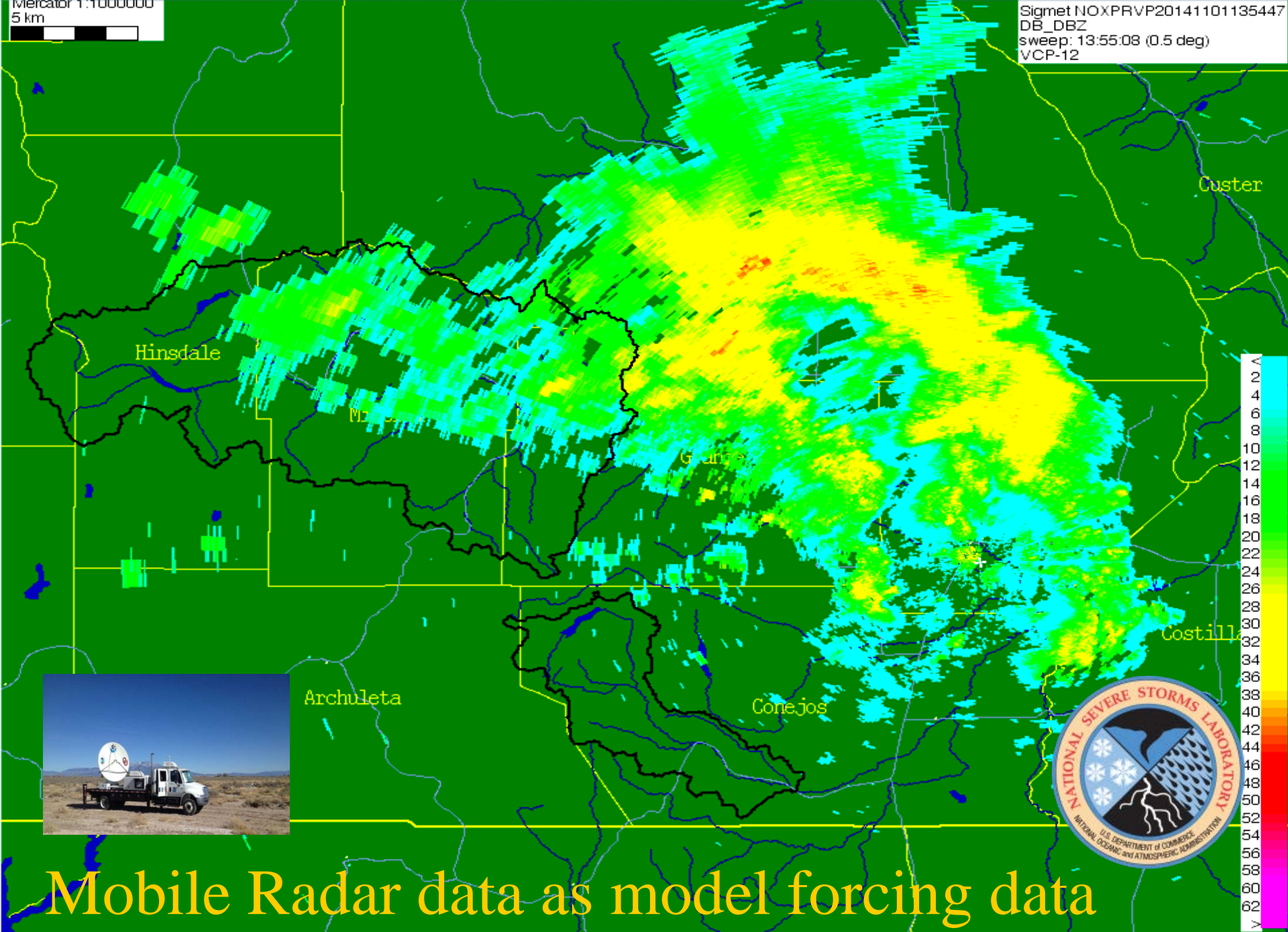
$$170,000 \text{ AF} \times \$250/\text{AF} = \$42.5\text{M}$$

<b>Rio Grande at Del Norte</b>	<b>June Forecast Water Supply April-Sept. [ac-ft]</b>	<b>Actual Water Supply April-Sept. [ac-ft]</b>	<b>Forecast Error June Forecast – Actual [ac-ft]</b>
<b>WY 2005</b>	<b>795,000</b>	<b>683,000</b>	<b>+112,000 (16%)</b>
<b>WY 2006</b>	<b>350,000</b>	<b>412,000</b>	<b>-62,000 (-15%)</b>
<b>WY 2007</b>	<b>450,000</b>	<b>593,000</b>	<b>-143,000 (-24%)</b>
<b>WY 2008</b>	<b>655,000</b>	<b>623,000</b>	<b>+32,000 (5%)</b>
<b>WY 2009</b>	<b>490,000</b>	<b>513,000</b>	<b>+23,000 (5%)</b>
<b>WY 2010</b>	<b>485,000</b>	<b>455,000</b>	<b>-30,000 (-6%)</b>
<b>WY 2011</b>	<b>435,000</b>	<b>415,000</b>	<b>-20,000 (-5%)</b>
<b>WY 2012</b>	<b>352,000</b>	<b>328,000</b>	<b>-24,000 (-7%)</b>
<b>WY 2013</b>	<b>230,000</b>	<b>344,000</b>	<b>+114,000 (50%)</b>
<b>WY 2014</b>	<b>420,000</b>	<b>519,000</b>	<b>+99,000 (24%)</b>
<b>WY 2015</b>	<b>385,000</b>	<b>555,700</b>	<b>170,700 (31%)</b>



mercator 1:1000000  
5 km

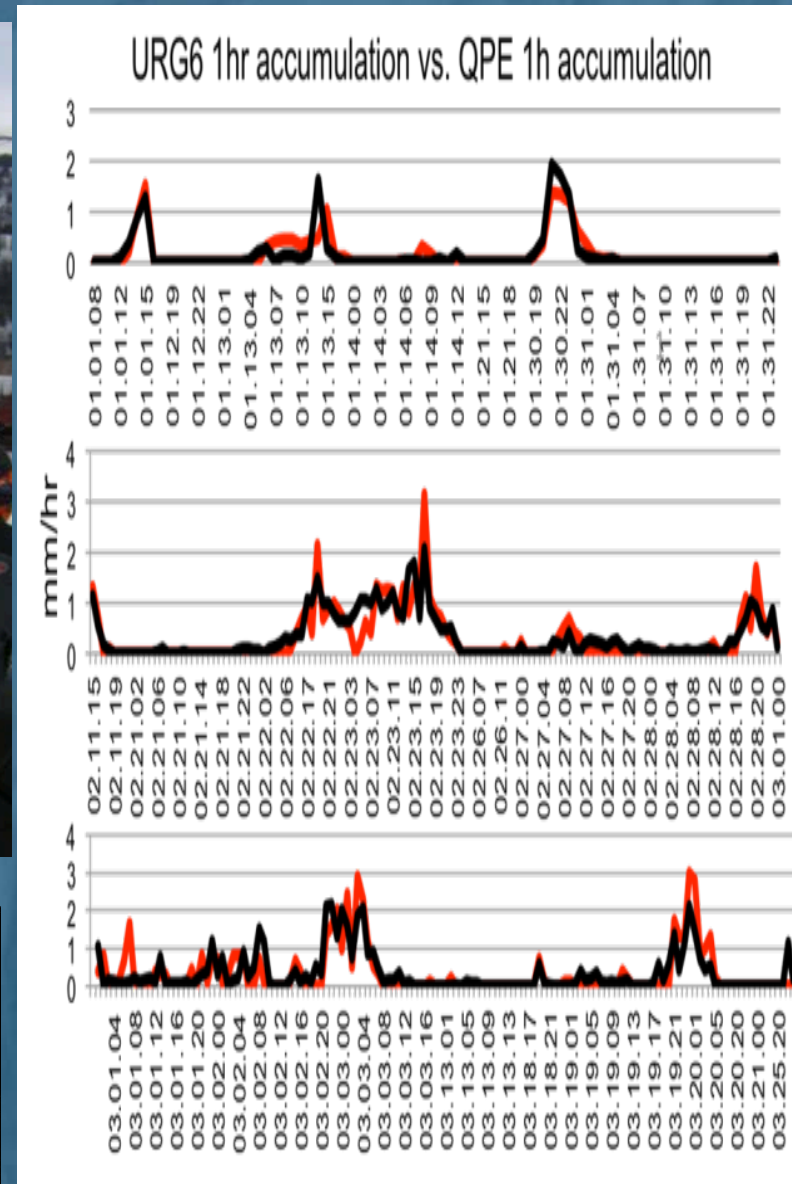
Sigmat NOXPRVP20141101135447  
DB\_DBZ  
sweep: 13:55:08 (0.5 deg)  
VCP-12



Mobile Radar data as model forcing data

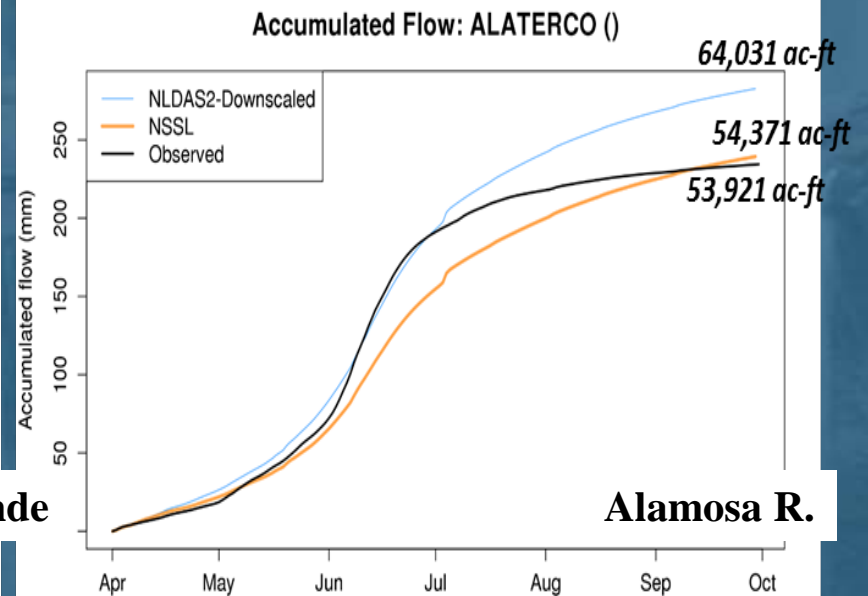
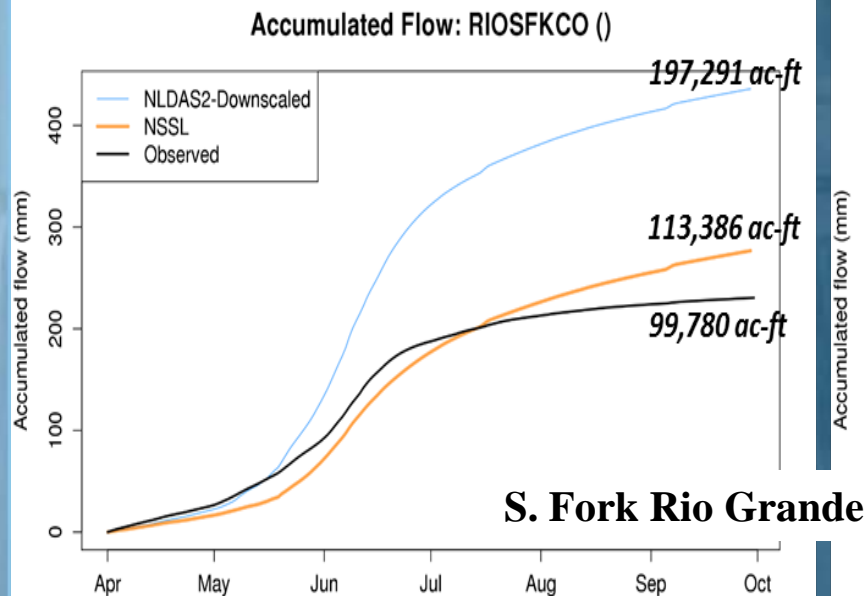
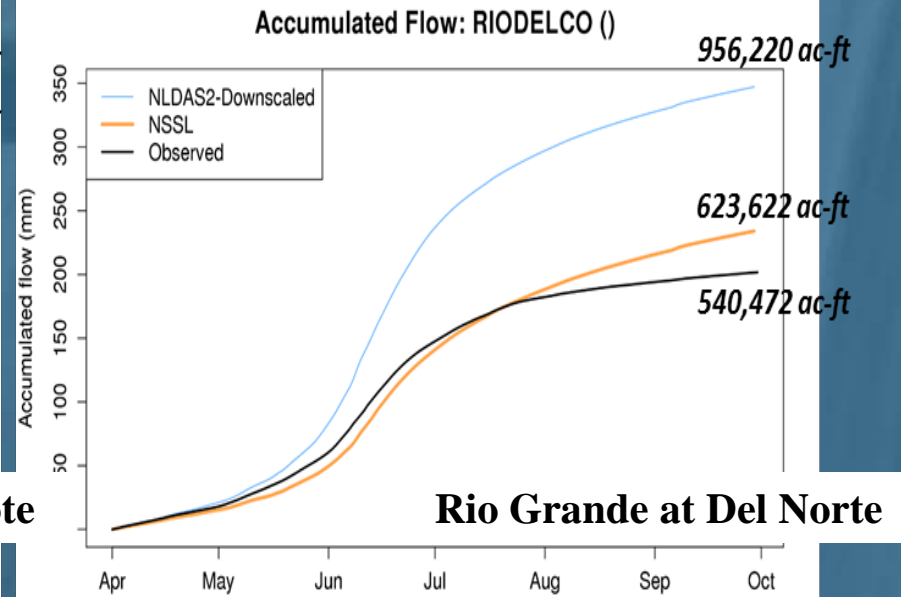
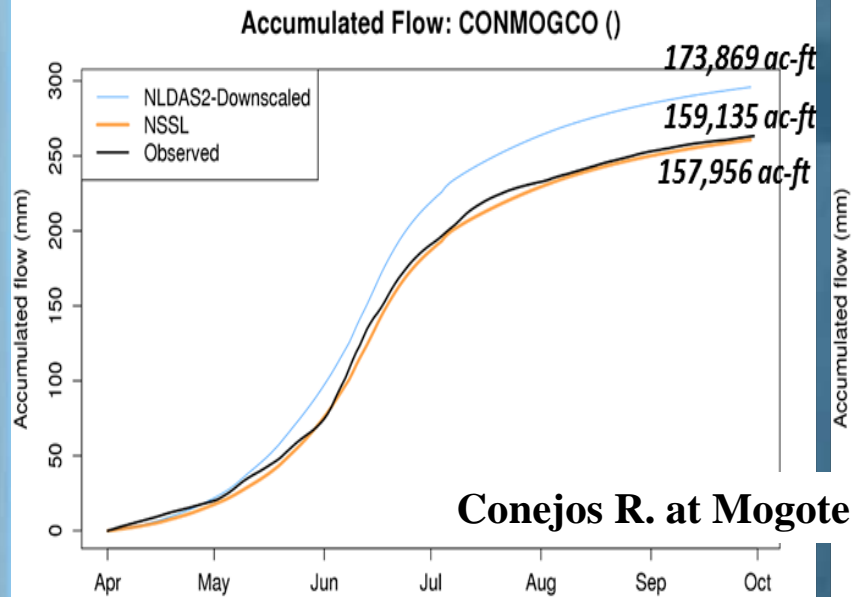
Cursor at : {37.619 -105.469}. Plus to cursor: 58.94 39.82 km

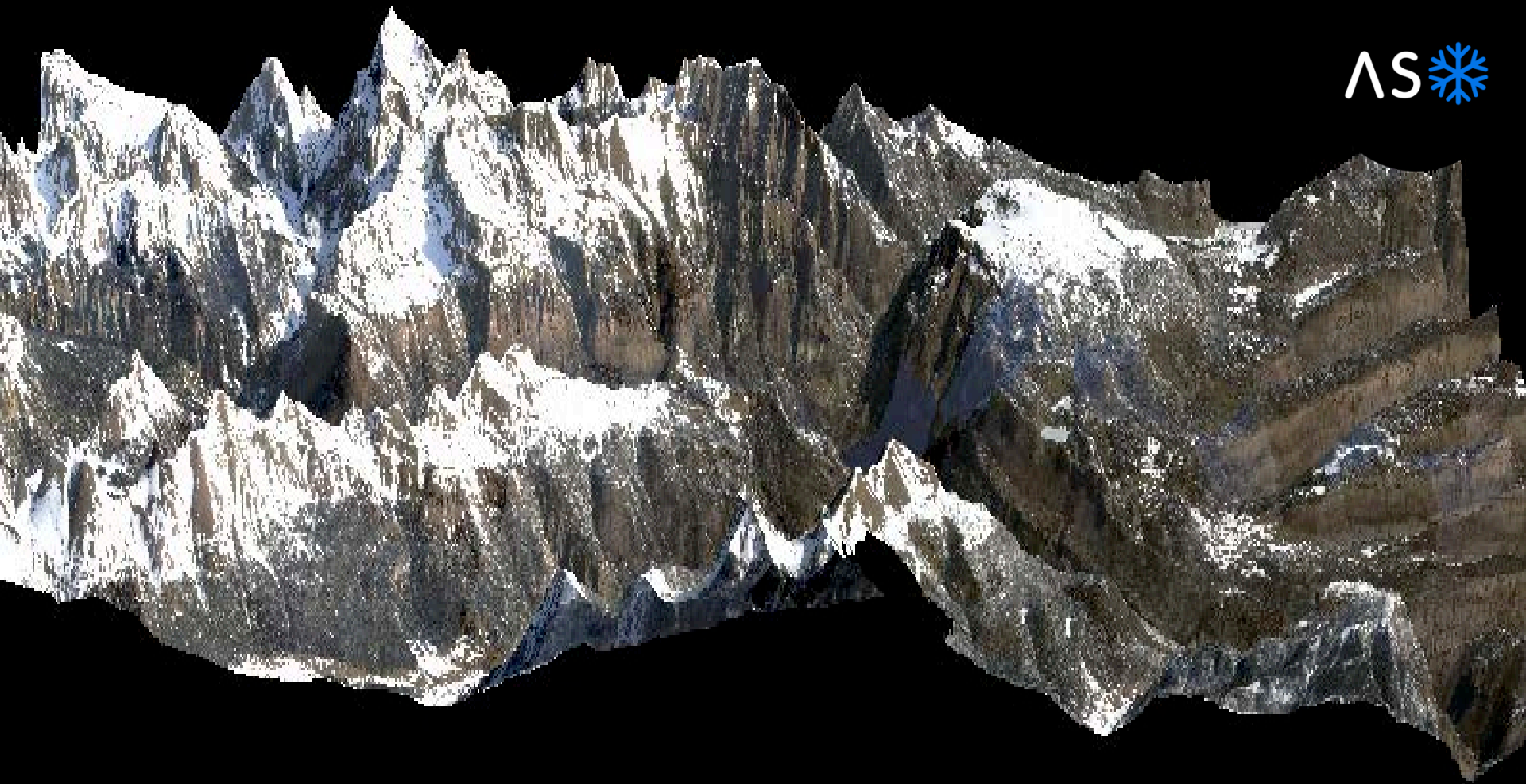
# Radar 25 miles from snow gauge at Platoro





# Mobile Radar made great water forecast

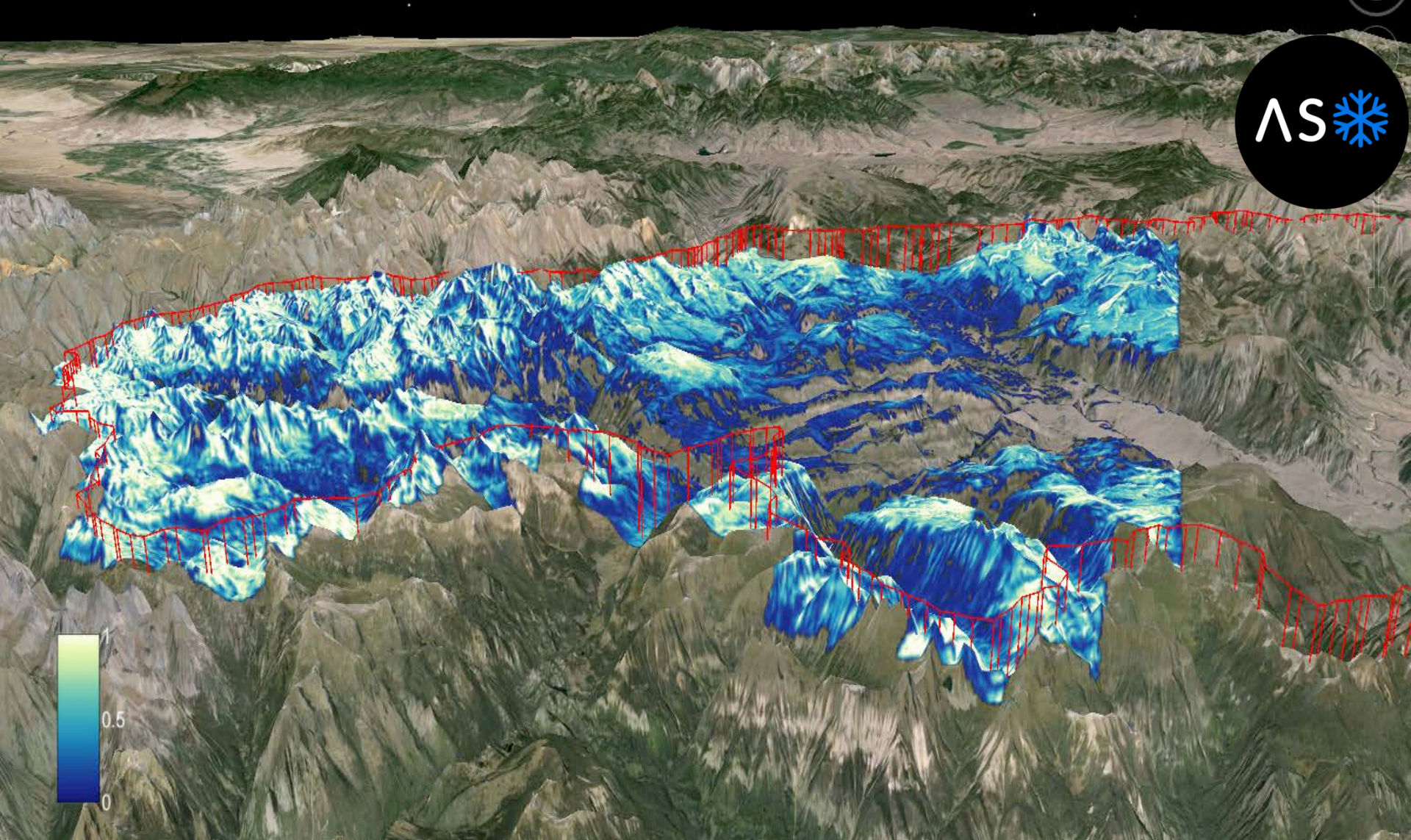




## **RG20150407.png**

Upper Rio Grande headwaters on April 7 2015 - red, green and blue bands extracted from the spectrometer data, expressed as a true-color composite image, and overlaid onto the lidar-derived terrain.

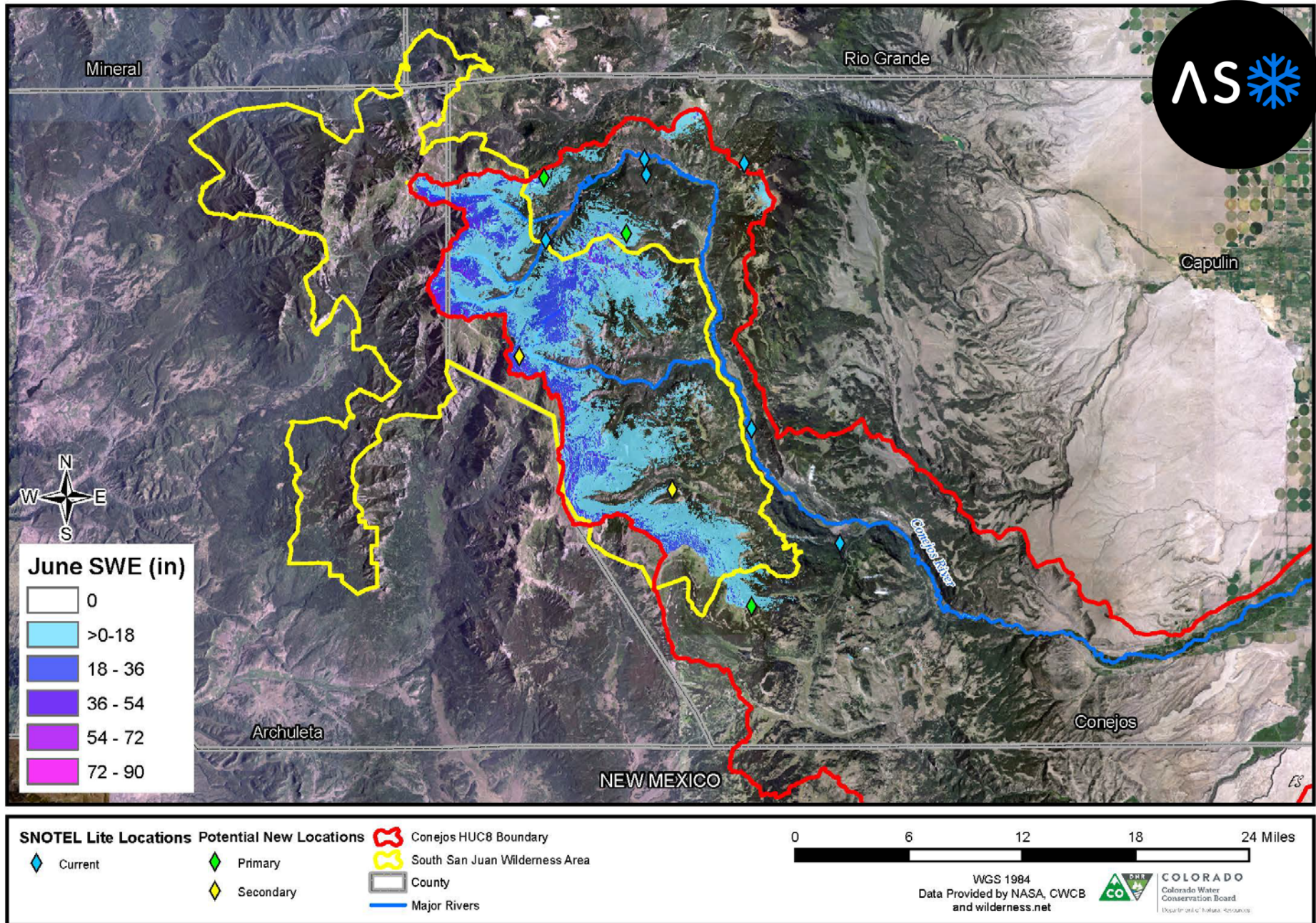




**Spatially distributed snow depth from fusion of spectrometer and lidar retrievals over the upper Rio Grande headwaters on April 7 2015 overlaying the GoogleEarth imagery. The red boundary delineates the hydrological basin outline for reference and the color bar refers to snow depth**



# Current and Potential New SNOTEL Lite Locations for the Conejos Basin





# Closing

- Radar + WRF Hydro was 7% off official forecast was 31% off, NASA 2015 data being tested too
- ASO flights in East River, Conejos and Rio April 2016
- Rio Grande radar moved to next winter for GOES-R
- Proposal for \$545K for unmanned mobile radar
- FLASH Project focused on Larimer County
- SNOTEL – Lites in upper Taylor (NRCS&NCAR)
- SNOTEL lites in Conejos hardening & permitting
- New CWCB forecasting partnerships authorization
- Built a business case for radars in water community

