

# The Utility of NUCAPS in Operational Forecasting

2015 STAR JPSS Annual Science Team Meeting

*Daniel Nietfeld*

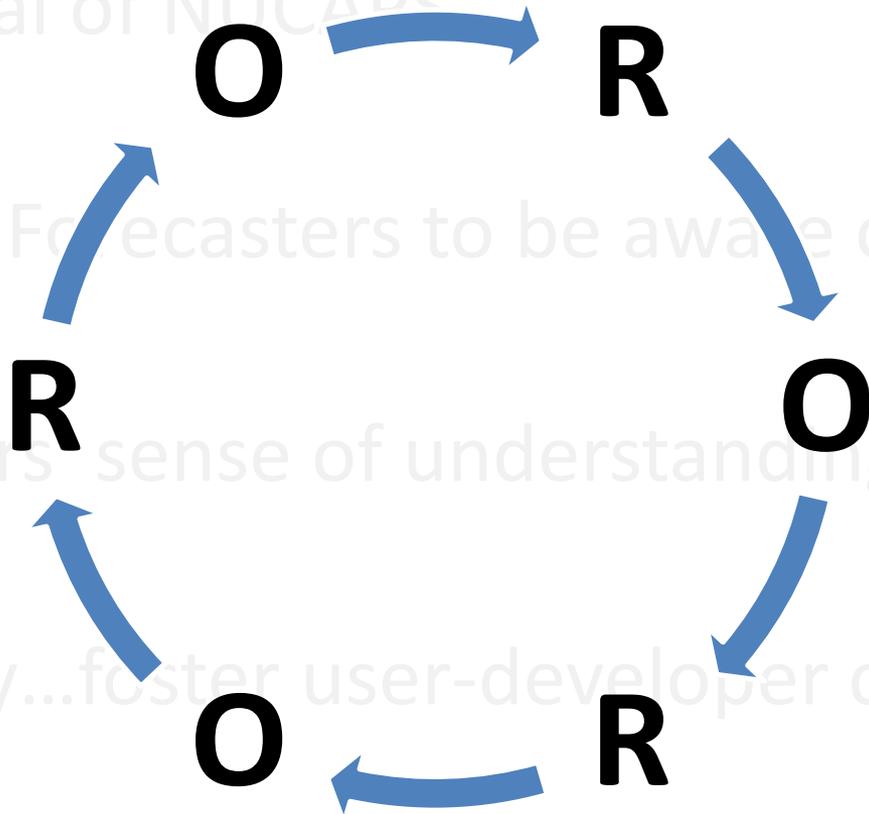
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# Hopeful Takeaways

- The Appeal of NUCAPS
- Issues for Forecasters to be aware of
- Forecasters' sense of understanding “error”
- Ultimately...foster user-developer collaboration
  - R2O
  - O2R

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# Day in the Life of a Forecaster in a Midwest WFO

- Convection is a common forecast problem
- Accustomed to looking at the 12Z RAOB, with density of  $\sim 2$  per state

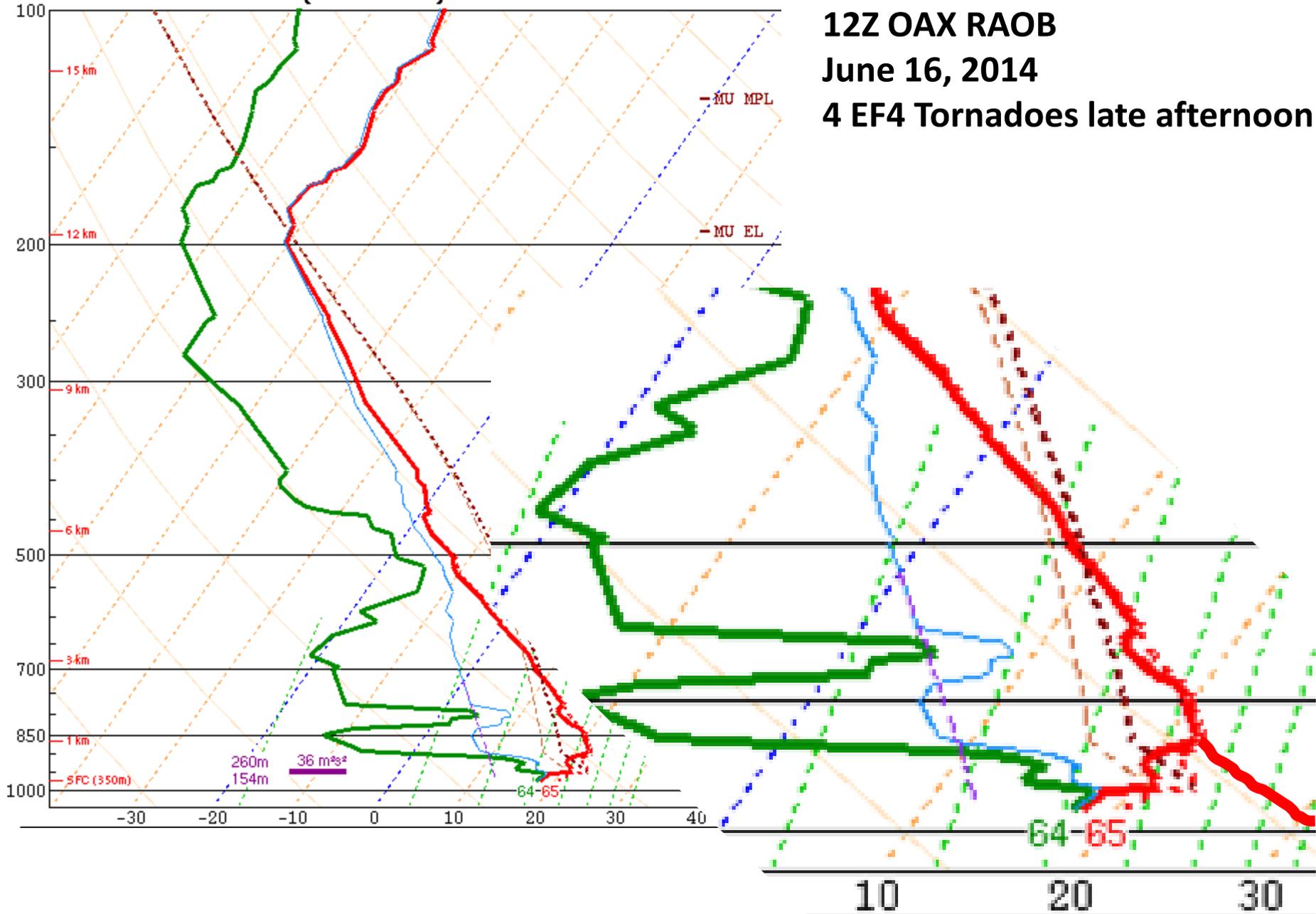




# Day in the Life of a Forecaster in a Midwest WFO

- Convection is a common forecast problem
- Accustomed to looking at the 12Z RAOB, with density of  $\sim 2$  per state
- During the pre-convective, early afternoon, I modify the 12Z RAOB for current surface conditions, and try to modify it for any changes in the airmass (from upstream)

# OAX 140616/1200 (Observed)

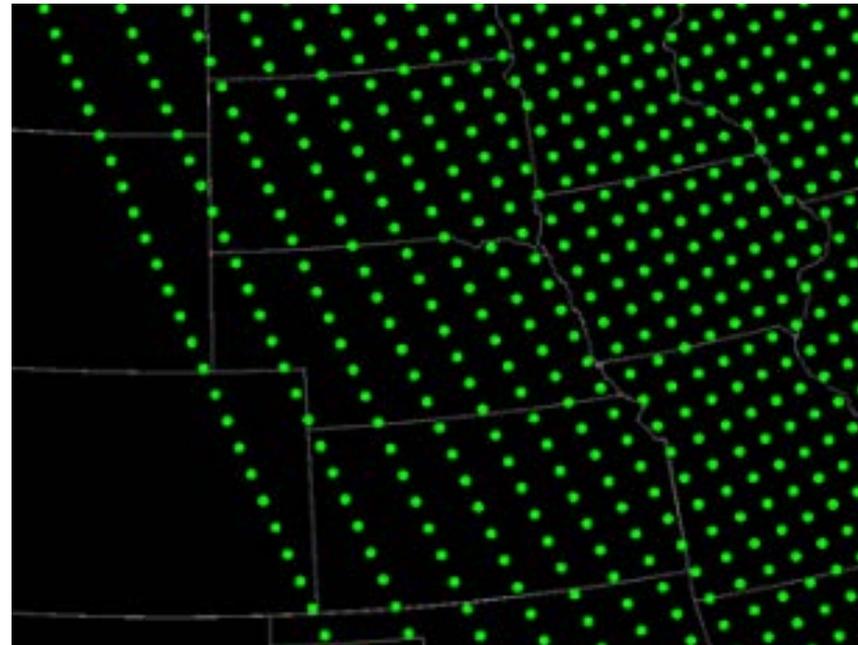


# Day in the Life of a Forecaster in a Midwest WFO

- 18Z Special RAOB is a *rare* luxury (a few per year)
  - I don't have to guess about the airmass changes
  - I typically still need to tweak the surface conditions due to the sensitivity to dewpoint
- We occasionally get an Aircraft observation
- I look at all of my data with some sense of the margin of error (*and I try to learn what that margin of error is*).
  - Observations from instrumentation
  - NWP

# Quote from a Forecaster:

- “Last year some really smart people gave me 23 satellite sounding retrievals over my area in the 18Z-19Z timeframe!”
  - Using a new polar orbiter satellite
  - With a hyperspectral IR sounder and microwave sounder



# How can we take advantage of these observations???

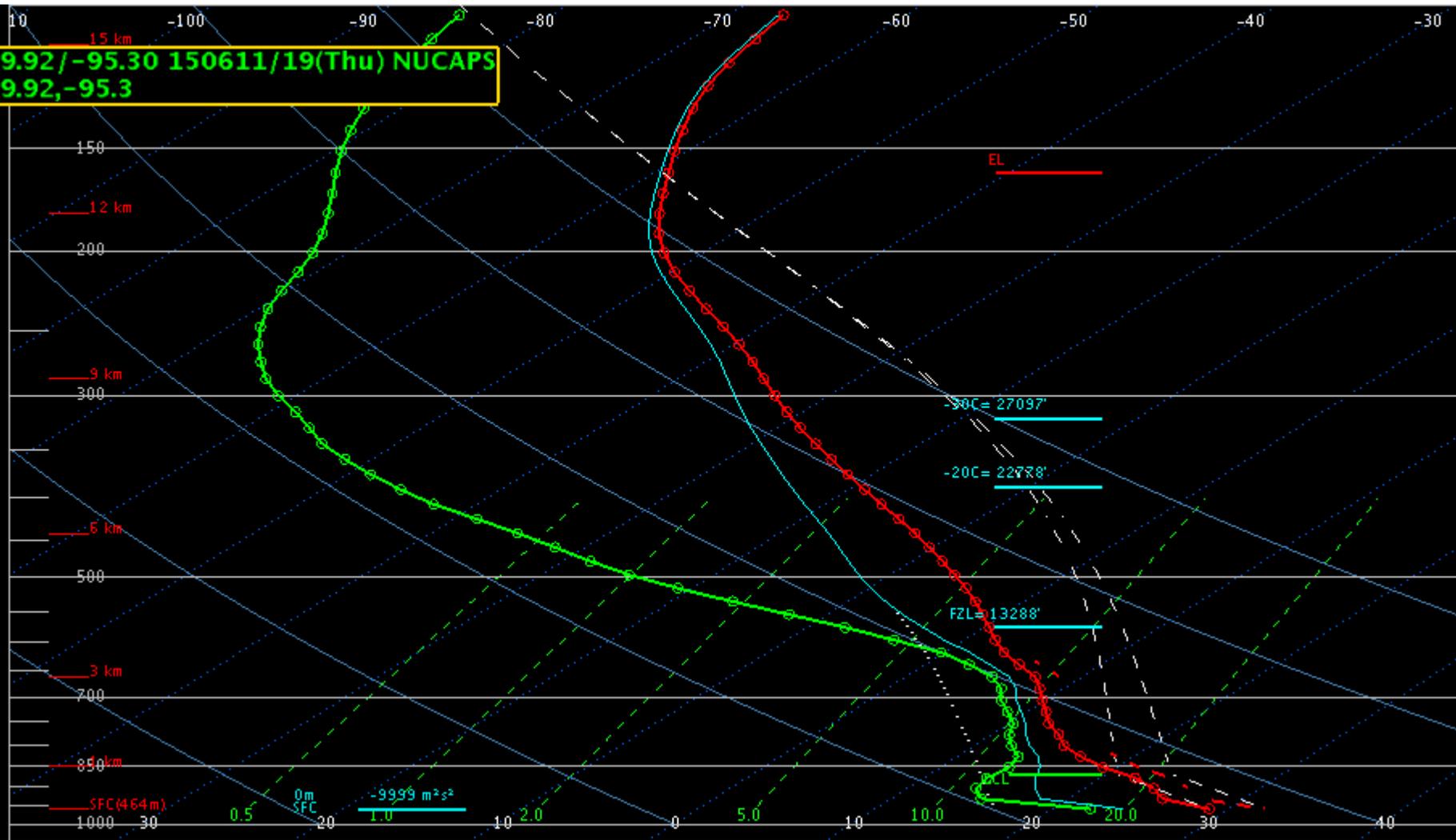
*(Over one year later... )*

- Learned a lot from Chris Barnett and Antonia Gambocorta about the details of how the retrievals are obtained/created
  - Strengths (benefits)
  - Weaknesses (limitations)
- Beneficial training material has been developed
- Great interaction between developers and field forecasters *(and through the Hazardous Weather Testbed...)*

# Issue #1: Smoothing

- Vertical resolution is a bit coarse
  - ~20 temperature layers
  - ~10 moisture layers
- Significant smoothing
- Identification of warm capping layers
- Identification of dry layers aloft (downburst potential)

39.92 / -95.30 150611/19(Thu) NUCAPS  
39.92, -95.3

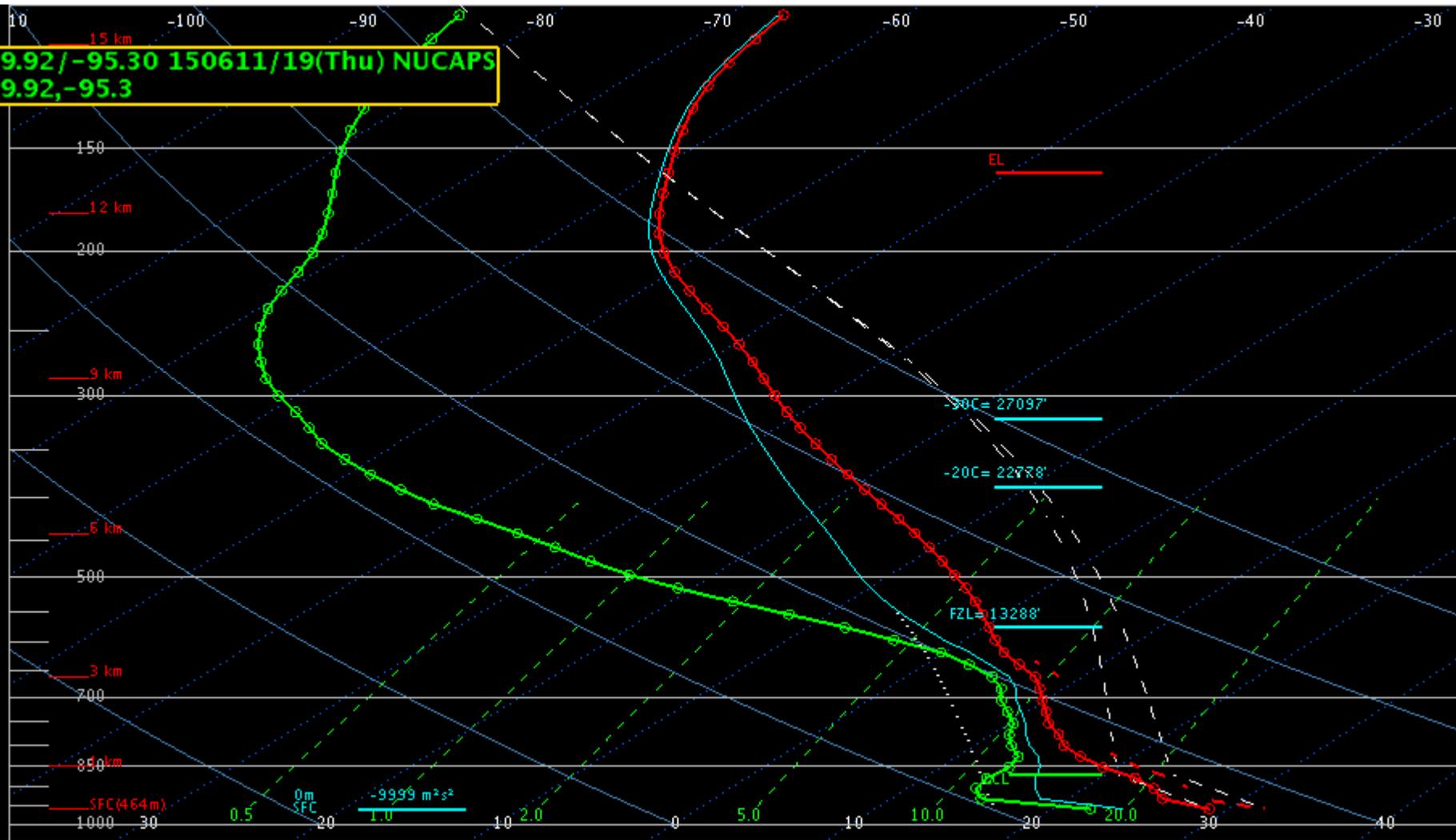


# Issue #2: Surface/BL Modification

- Modification is necessary 99+% of the time due to errors in surface T and Td
- Techniques, such as SPC's SFCOA, have been used to objectively modifying the low levels of a sounding (RAP) using METARs
- Automation of Sounding Modification at the Surface and in the BL

**“Improving NUCAPS Soundings for CONUS Severe Weather Applications via Data Fusion”  
- Dan Lindsey PI**

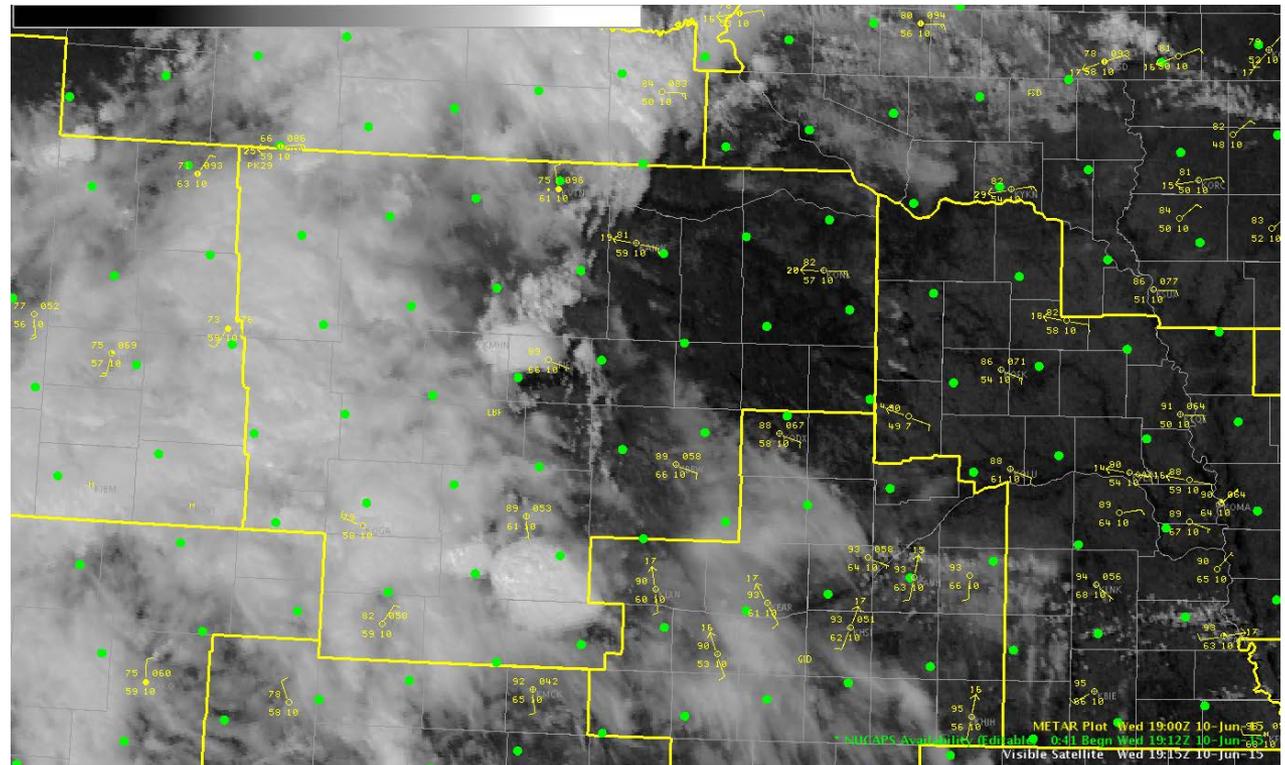
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# Issue #3: Clouds/Rain Errors

- Extra caution/scrutiny is needed

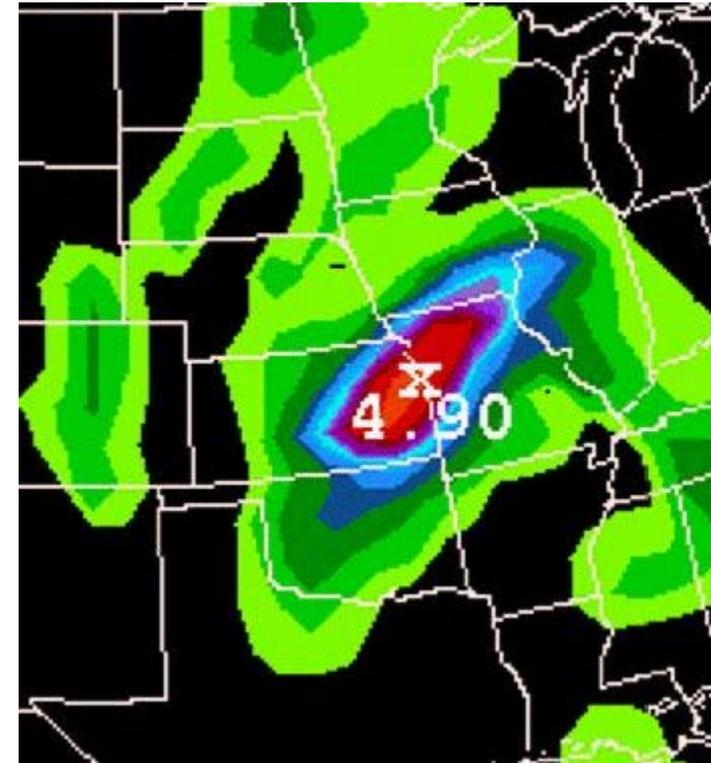
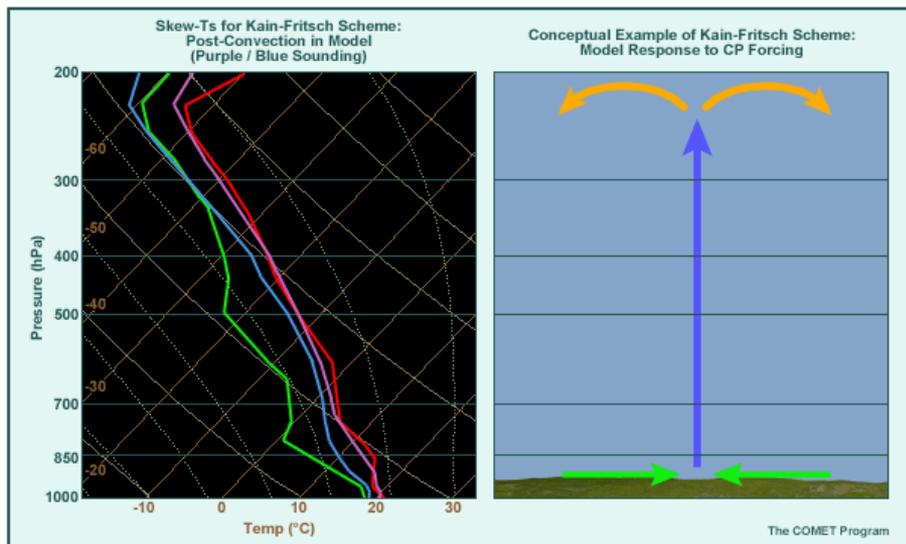
***Excited about  
the recent  
improvements!***



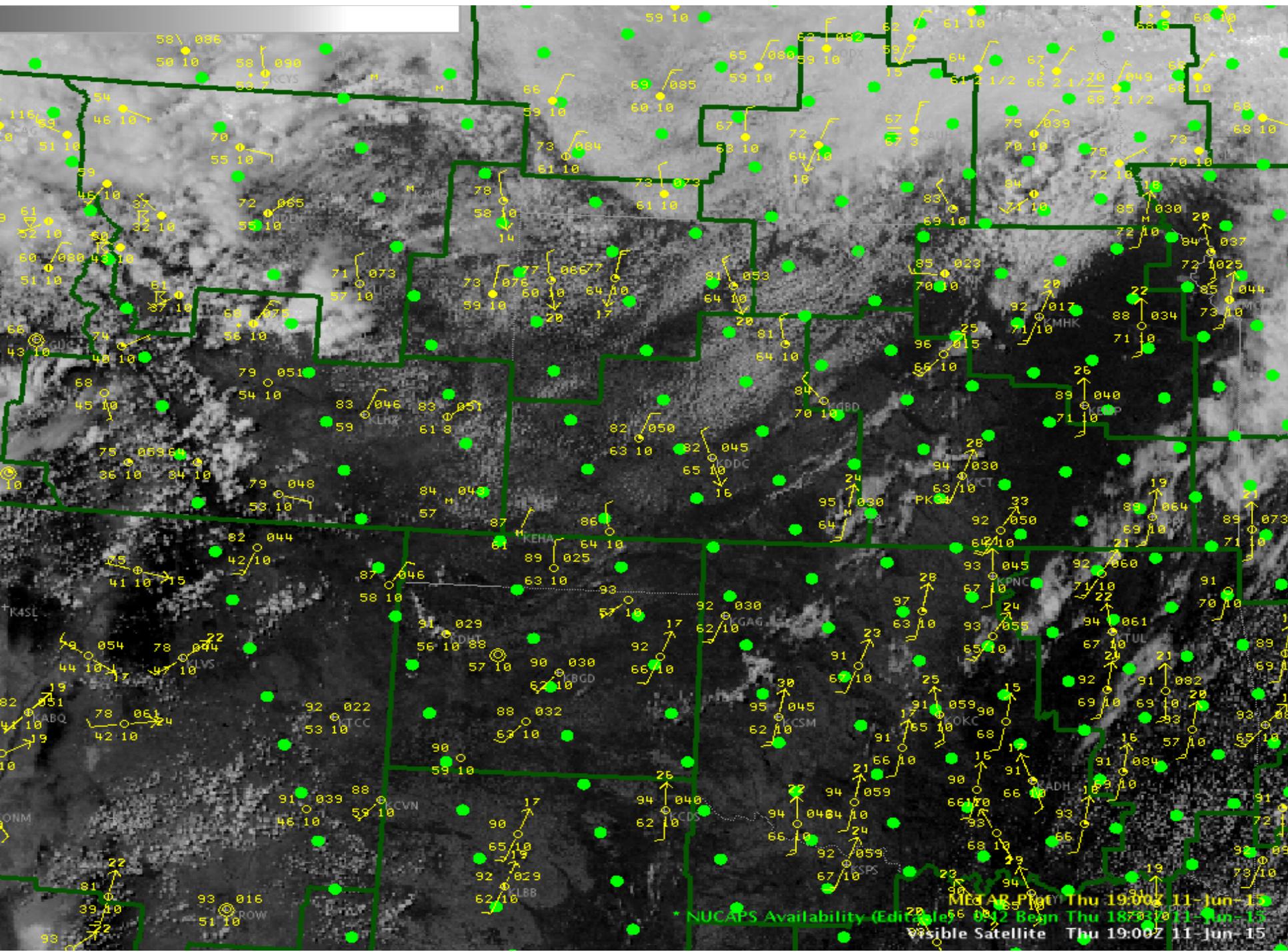
# Why not use the NWP sounding?

- Sometimes do, but subject to NWP issues/errors
- Soundings within model convection

***Convective Parameterization Schemes result in unrealistic profiles***

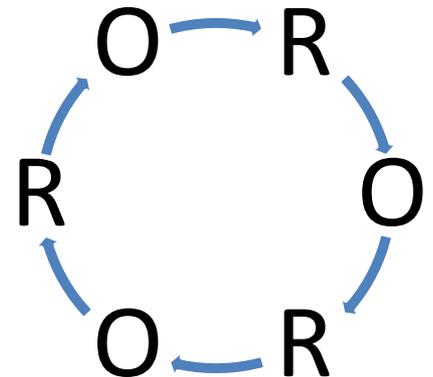






# A Case for O2R/R2O

- Forecasters are difficult to predict
- Generally, good things come from interaction between forecasters and researchers/developers
  - What the users' needs are
  - What the developers can provide
    - Bias Tuning
    - Sources of error and improvements
- We won't know if we can't explore



***THANK YOU for this opportunity  
and for this technology!***

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