Evaluation of NUCAPS products in AWIPS-II: Results from the 2017 HWT

Ashley Wheeler 1, Nadia Smith 1, Chris Barnet 1, Antonia Gambacorta 1, Mitch Goldberg 2

1 STC, 2 NOAA/JPSS

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WHAT IS NUCAPS?

• NOAA Unique Combined Atmospheric Processing System (NUCAPS) is a heritage algorithm derived from the Atmospheric Infrared Sounder (AIRS) Science Team algorithm
• NOAA operational algorithm for the CrIS/ATMS and IASI/AMSU sounder pairs since 2002
• Designed to be instrument independent as a NOAA enterprise algorithm
• Retrieval product: temperature, moisture, trace gases (O3, CO, CO2, SO2, N2O, HNO3), cloud properties (cloud fraction, cloud top pressure), quality flags

WHAT IS THE NOAA HWT?

• The NOAA Hazardous Weather Testbed (HWT) is a joint project between the National Weather Service (NWS) and the National Severe Storm Laboratory (NSSL), Hosted at the National Weather Center in Norman, Oklahoma
• Forecasters, along side developers/researchers, test and evaluate emerging technologies for National Weather Service operations
• NUCAPS products have been evaluated within AWIPS (Advanced Weather Interactive Processing System) during the HWT Experimental Warning Program (EWP) for the past 3 years
• In 2017 forecasters tested the following NUCAPS products: Operational NUCAPS Skew-T’s, Surface Adjusted Skew-T’s, Gridded NUCAPS plan view & vertical cross sections (CAPE, lapse rate, theta-e, etc.)

WHAT MAKES THIS EFFORT SUCCESSFUL?

• Forecasters are evaluating products in real-time operations
• HWT live blog allows forecasters to document their successes/struggles in detail
• Provides the unique opportunity for forecaster and developers to interact, provide feedback, and learn from one another
• Products, such as NUCAPS, can be invited back to assess if you have met user suggestions from the previous year

700-500mb Lapse Rate Comparison to Models

700-500mb Lapse Rate Comparison

Lead the forecaster to consider that there may be "similar" forecast development in this region, than the model data alone imply"

700-500mb Lapse Rate Comparison

Observation Sparse Regions

A forecaster noticed that in the western US Rocky Mountain region NUCAPS QC consistently indicated lots of "yellow" (WM-only) soundings, even when there is relatively clear skies (image)

Could be a result of over simplified emissivity, first guess over dry desert?

Here is an example where forecasters in data sparse regions would not opt to still use NUCAPS soundings regardless of being tagged "yellow" QC (WM only). The forecaster explains, "A (yellow) sounding from the Black Hills, seems meteorologically reasonable" (shown in skew-T on left)

CONCLUSIONS

• By observing forecasters in their work setting we have a better appreciation and understanding of their needs…
• Forecasters have difficult jobs in a fast paced and stressful environment that requires products be delivered in the simplest most efficient way, while still providing the maximum information content...
• This can only be accomplished in interactive settings like the HWT and by LISTENING to forecasters so that we can find the balance between what the need and what NUCAPS can realistically provide