

ATM 419/563 – MET and verification of surface forecasts

Fall, 2024 – Fovell

Due Monday, December 2nd, by start of class.

In class, we ran MET6_ALL.sh (along with network_plots.sh and do_station_analysis.sh) to verify forecasts for 10 m wind speed (F10), 2 m temperature (T2M), dewpoint (TD), and relative humidity (RH) for a network-averaged analysis, and F10 and T2M for a station analysis. This verification stations from all available networks, including ASOS, AWOS, RAWS, APRSWXNET, MESOWEST, and the Colorado Agriculture (COAGMET), among others. The analysis suggested the model had a sizable cold and wet bias and considerably overpredicted the sustained winds.

For this assignment, I'd like you to do a few things.

First, note you are also provided with pre-configured scripts performing verification against station **subsets**: MET6_ASOS.sh, for example, just uses ASOS sites, and MET6_WXNET.sh focuses only on APRSWXNET observations. See the demonstration script and PPT for more information. Examine the verifications for these subsets for our common WIND01 case. Consider this: are all observation stations or networks created equal? Are some more trustworthy or higher quality?

Second, you made another simulation for the WINDSTORM experiment with a configuration you selected. Some of you changed the model physics, some changed the resolution, some changed the start time and/or parent model. Call that run WIND02 and perform the MET analysis on it, just like you did for WIND01. **I would create a directory called WIND02, move the wrfout file into it, and redo the steps as outlined in the script.** Do the analyses on ALL stations and on the network subsets for WIND02.

Then, write up a short report, using PowerPoint or Word, including images from your WIND02 analyses and discussion on all of these topics:

(1) You want to use observations to verify and improve your forecast quality. Of the 6 available networks, which would you rely on and which would you neglect? Justify your answer.

(2) How does your WIND02 simulation compare to WIND01 for T2M and F10 (and TD and RH) for the network(s) you have decided to rely on? Is it clear which one is better? Or is one simulation better for some variables and not for others? Discuss this.

(3) What, in your estimation, is the **worst flaw** of your WIND02 simulation? (It could be poorly predicted winds or bad RH forecasts, etc.) Propose a fix. Test and evaluate your hypothesis, calling that run WIND03. What did you alter? Did the fix make it better, worse, or no change? What would be your next step be? There's almost always a next step!

By the end of this exercise, you will have three simulations: our common WIND01 run, your WIND02 run from the WINDSTORM experiment, and WIND03.