Satellite Data Assimilation and Microphysics Group

The FRDD Satellite Data assimilation and microphysics group covers many different research and engineering topics. One focus is satellite data assimilation into the Warn-on-Forecast (WoF) system to improve high impact weather forecasting. High impact weather may include tornadoes, high winds, flash flooding, and landfalling tropical cyclones. Satellite observations from the recently operational GOES-16 satellite are ideal for WoF applications due to their high spatial and temporal resolution. Assimilated observations include cloud water path (CWP), which represents the total amount of liquid and ice cloud water in a cloud, clear-sky water vapor channel radiances, and atmospheric motion vectors (AMVs). CWP and water vapor radiances are currently assimilated into the WoF experimental real-time system and AMVs will be added in 2019. All data types have shown the ability to increase skill of high impact weather forecasting. Additional areas of interest include cloud microphysics development and validation against model output. The choice of cloud microphysics scheme used in numerical weather prediction (NWP) is vital to correctly analyzing and forecasting clouds and convection (Figure 1). Continued refinement of advanced microphysics schemes is currently underway with concurrent validation efforts against radar and satellite data ongoing.

In addition, members of this team are also involved in Doppler radar radial velocity data quality control and dealiasing techniques. The goal is to improve the quality of the radial velocity observations prior to their assimilation in storm-scale NWP models. Finally, the maintenance and continued improvements in high performance computing aspects of WoF represents an important part of this team's activities.

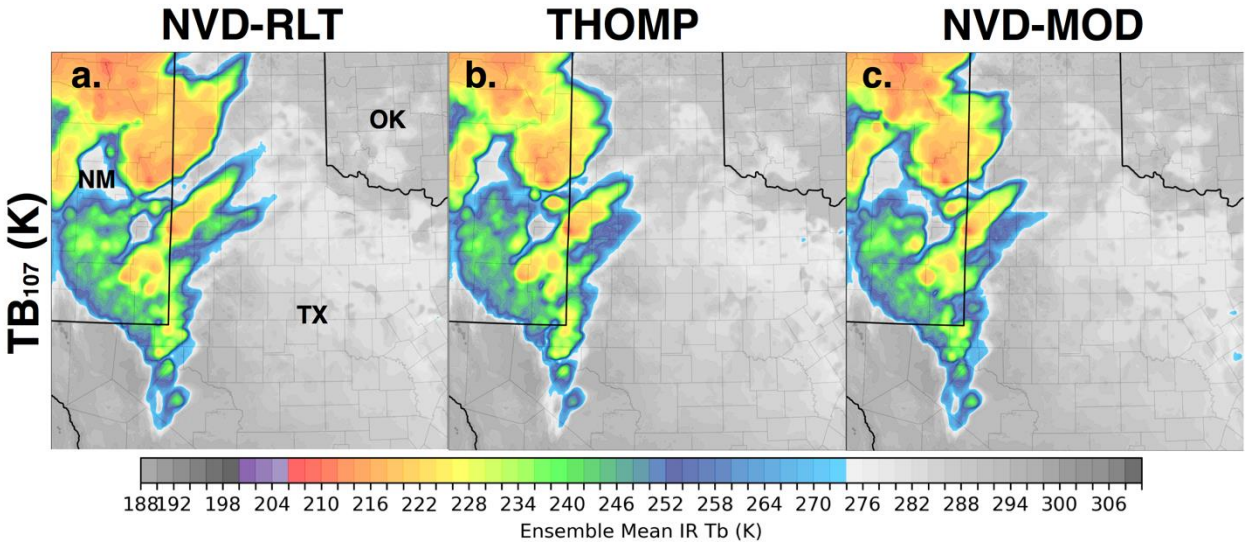

Figure 1. Ensemble mean simulated 10.7 μm brightness temperature (TB_{107}) at 2300 UTC 9 May for the original NSSL 2-moment microphysics scheme (NVD-RLT), the Thompson microphysics scheme (THOMP), and the modified NSSL scheme (NVD-MOD) experiments. Note the greater coverage of TB_{107} < 220 K in the NVD-RLT experiment compared to the others.

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