Analysis of Variation in Thermodynamic and Kinematic Properties within Supercell Inflow using Balloon Borne Radiosondes (Poster)

Nicholas Camp – University of North Dakota

Catherine Finley – University of North Dakota

Jake Mulholland – University of North Dakota

Bruce Lee – University of North Dakota

David Delene – University of North Dakota

Differences between tornadic and non-tornadic pre-storm environments have been the subject of a large volume of research. This research, in turn, has allowed for the development of numerous forecasting tools, such as the supercell composite and significant tornado parameters (Thompson et al. 2002, Thompson et al. 2003, Thompson et al. 2004). While this avenue of research has proved useful, much less research has been done in investigating how a storm itself modifies it's environment. Two recent studies were conducted (Parker 2014; Wade et al. 2018) that analyzed these storm-modified environments between tornadic and non-tornadic storms, but had conflicting results on how storm-relative helicity changed within the inflow region of tornadic and non-tornadic supercells.

Over the Summer of 2023, radiosonde mesaurements were collected at various distances from supercell core with the goal of measuring storm inflow. Using these radiosonde observations, analysis is present of how a significantly tornadic supercell in Wyoming and a non-tornadic supercell in North Dakota modified their inflow environments. Initial results show that the significantly tornadic case substantially modified its kinematic environment as proximity to the core increased such that the 0-1 km shear vector became nearly perpendicular with the storm relative inflow winds, indicating that the storm modified its SRH significantly. In addition, LCL noticeably decreased with increasing proximity to the tornadic core. In addition to presenting the kinematic and thermodynamic environments of the inflow of these two storms, three radiosondes in the significantly tornadic case ended up traveling within the storm, and thus kinematic and thermodynamic properties within the storm are be presented.