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Development of Digital Thermosonde Instrument for Quantification of Relative Cn2 Estimation Error between NWP Analysis and Thermosonde Measurements

Optical turbulence is the distortion of light waves due to density variation in the atmosphere, and the refractive index structure parameter is a common representation of the optical turbulence in an atmospheric layer. Members of the Space Studies, Atmospheric Sciences, and Electrical Engineering departments at UND are developing a thermosonde to measure this atmospheric optical turbulence, which is caused by temperature differences in a layer. This NASA-funded student instrument project involves the design and development of the thermosonde instrument, the launching of multiple student-built thermosondes on high-altitude balloons at various locations across North Dakota, and the analysis of the thermosonde data to calculate the refractive index structure parameter for each flight. Comparisons of the thermosonde temperature profiles will be made with forecasted temperature profiles from the National Center for Atmospheric Research (NCAR) Weather Research Forecast (WRF) model to determine the accuracy of the model at predicting optical turbulence.