**Impact of Upstream Tropopause Polar Vortex Observations on the Evolution of Twin Arctic Cyclones in June 2020**

**Tomer Burg,** Steven M. Cavallo, *School of Meteorology, University of Oklahoma, Norman, OK*

Tropopause Polar Vortices (TPVs) are coherent vortices along the tropopause, with cyclonic TPVs identified by a local minimum in temperature and local maximum in potential vorticity along the dynamic tropopause. TPVs are most often found in high latitudes poleward of 60ºN but can be transported into the midlatitudes. TPVs are important features in midlatitude and polar synoptic meteorology, associated with cyclogenesis, cold air outbreaks, and Rossby Wave initiation. Arctic Cyclones (ACs) are an additional important phenomenon in polar meteorology, which per observational evidence significantly contribute to sea ice loss, and their development is often facilitated by TPVs. Furthermore, previous studies show that the representation of ACs in numerical weather prediction (NWP) models can, at times, be sensitive to key observations of upstream TPVs. Consequently, improving our understanding of TPV-AC linkages and forecast skill benefits synoptic midlatitude and polar numerical weather prediction. We hypothesize that upstream TPV observations in Alaska had a significant impact on the downstream evolution of twin ACs in June 2020.

A notable TPV-AC linkage case occurred on 19 June 2020, with two TPVs and associated ACs in close proximity in the Arctic Ocean north of Nunavut. One of these ACs was not as well-represented in operational NWP model analyses, and its associated TPV can be observationally traced backward in time to Alaska where it slowly tracked over three radiosonde sites over the course of three days. The impact of these radiosondes on the evolution of this case will be investigated with an Observing System Experiment (OSE) using the Model for Prediction Across Scales (MPAS), with Ensemble Kalman Filter (EnKF) data assimilation applied from the Data Assimilation Research Testbed (DART). Two sets of ensemble simulations, one control set and one set withholding these radiosonde observations, are compared between each other and with the ERA5 reanalysis to quantify the impact of the radiosondes on the error and spread of the TPV and AC track and intensity.