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# A Survey of North American Polar–Subtropical Jet Superposition Events: Development, Impacts, & Future Changes

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1-2 PM (MT) FL2-1022 or Virtual | [Watch Live](#)

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The polar and subtropical jet streams are among the most recognizable structures within the Earth's atmosphere and are responsible for modulating near-surface weather conditions at midlatitudes. The polar and subtropical jets typically remain separate from one another but occasionally merge on synoptic time scales to form a “polar–subtropical jet superposition”. A jet superposition features strong wind speeds that can exceed  $100 \text{ m s}^{-1}$ , a single-step pole-to-equator tropopause structure, and a consolidation of the pole-to-equator baroclinicity into a narrow zone of contrast within the near-jet environment. Consequently, a particularly potent dynamical and thermodynamic environment is assembled during jet superpositions that supports the development of extreme weather events, such as anomalously strong surface cyclones and extreme precipitation.

This presentation discusses the dynamical and thermodynamic processes that lead to the development of jet superposition events over North America, with a specific focus on the respective roles of tropopause polar vortices and moist diabatic processes equatorward of the jet and highlight mechanisms that favor the occurrence of extreme weather in their vicinity. Motivated by the historical linkage between jet superpositions and high-impact weather, we also utilize a suite of CESM simulations to investigate how jet superposition frequency and characteristics may evolve under future climate change scenarios. Finally, we will introduce the NASA-sponsored North American Upstream Feature-Resolving and Tropopause Uncertainty Reconnaissance Experiment (NURTURE), which provides an opportunity to observe the properties of jet superposition events in unprecedented detail. [Event Website](#)