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## **The Interconnected Global Climate System—A Review of Tropical–Polar Teleconnections**

This study summarizes advances in research on tropical-polar teleconnections, made roughly over the last decade. Elucidating El Niño-Southern Oscillation (ENSO) impacts on high latitudes has remained an important focus along different lines of inquiry. Tropical to polar connections have also been discovered at the intra-seasonal timescale, associated with Madden-Julian Oscillations (MJO). On the timescale of decades, changes in MJO phases can result in temperature and sea ice changes in the polar regions of both hemispheres. Moreover, the long-term changes in SST of the western tropical Pacific, tropical Atlantic, and North Atlantic Ocean have been linked to the rapid winter warming around the Antarctic Peninsula, while SST changes in the central tropical Pacific have been linked to the warming in West Antarctica. Rossby wave trains emanating from the tropics remain the key mechanism for tropical and polar teleconnections from intraseasonal to decadal timescales. ENSO related tropical SST anomalies affect higher latitude annular modes, by modulating mean zonal winds in both the subtropics and mid-latitudes. Recent studies have also revealed the details of the interactions between the Rossby wave and atmospheric circulations in high latitudes. We also review some of the hypothesized connections between the tropics and poles in the past, including times when the climate was fundamentally different than present day especially given a larger than present-day global cryosphere. In addition to atmospheric Rossby waves forced from the tropics, large polar temperature changes and amplification, in part associated with variability in orbital configuration and solar irradiance, affected the low-high latitude connections.