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Teleconnections between the tropics and the middle and high latitudes of the Southern Hemisphere on the subseasonal time scale

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Recent work has found robust connections between the tropics and extratropics. For example, the latent heat release and subsequent mass response from planetary-scale regions of above-normal tropical convective activity has been shown to drive a Rossby wave response that extends from the tropics to the middle and high latitudes. One of the leading modes of variability of the tropical atmosphere, and indeed the leading mode on the subseasonal (30-60 day) time scale, is the Madden-Julian Oscillation (MJO). Rossby wave trains excited by MJO convection have been identified as a key "bridge" in the atmospheric system, linking not only the extratropics with the tropics on spatial scales, but also linking weather with climate on the subseasonal time scale. The focus of this study is the MJO's subseasonal modulation of the mid- and high-latitude atmosphere and cryosphere. To establish and analyze those links, two publicly available datasets were examined: first, hourly anomalies of the atmospheric state of temperature, circulation, and pressure (at the surface and lower and upper troposphere) from the just-released ERA5 reanalysis were composted by phase of the active MJO. The MJO state was determined using the daily revised Real-time Multivariate MJO (RMM-r) index provided by Stony Brook University. Second, daily anomalies of change in sea ice concentration were also composited by MJO phase. Preliminary results suggest that the mid- and high-latitude atmospheric circulation is different when MJO convection is centered in the Indian Ocean versus when it is centered in the western Pacific Ocean. Furthermore, preliminary results suggest regional differences in sea ice variability surrounding Antarctica, depending on the geographic location of the MJO convection. Physical mechanisms responsible for those differences will be explored in more depth in the presentation.