RAMS simulation of the MJO extratropical response in the Antarctic Peninsula

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Previous studies have shown that the extratropical response of the Madden-Julian oscillation manifests as a wave train propagating in mid and high latitudes of both Hemispheres. Particularly during the Southern Hemisphere (SH) winter, when the polar and subtropical jets are stronger, these wave trains propagate toward mid and high latitudes in the SH, reach the Antarctica Peninsula and move northeastward near South America. These wave trains are associated with anomalies in geopotential height and circulation with barotropic structures. These features in turn, modulate surface wind stress and sea surface temperature (SST) anomalies on intraseasonal time-scales. Spectral density of temperature and sea ice over the western Antarctica Peninsula show peaks on intraseasonal time-scales. In this study, the Regional Atmospheric Mesoscale Modeling System (RAMS) is used to simulate mesoscale features associated with the occurrence of extreme temperature anomalies over the western Antarctica Peninsula forced by intraseasonal activity. The period of simulation is selected based on observations of temperature at Arturo station. The model is forced with reanalysis every 6 hours during 6 days. Extreme cold and warm temperature events are investigated separately. The variability of sea ice cover is indirectly represented by SST below freezing point. We show that the model realistically simulates the diurnal cycle of temperature on both sides of the Peninsula and the variability of synoptic systems embedded in the intraseasonal disturbance envelope. The success in simulating mesoscale features in ice covered oceans in high latitudes with RAMS indicate an important potential of application of this model to enrich our understanding about regional impacts of the MJO in the extratropics with scarce density of stations.