



Tropical intraseasonal modulation of summer temperature in Southern South America

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Surface air temperature (SAT) in Southern South America (SSA) exhibits distinct modes of variability during austral summer (DJF) at interdecadal and interannual scales. The main interannual mode (period ~ 3.4 years) is linked to a wave train circulation pattern which presumably originates in the tropical West Pacific and develops over the South Pacific, giving rise to a teleconnection with the climate of Oceania.

To explore the dynamical evolution of these perturbations, we now analyse the intraseasonal summer SAT variability in SSA. In this frequency band and for winter, the impact of tropical activity driven by the Madden-Julian Oscillation (MJO) on extratropical temperature variability has been reported for the Northern and Southern Hemispheres.

We first investigate the relationships between the MJO and regional SAT using the Twentieth Century Re-analysis (20CR). This dataset is validated against daily SAT observations (1957-2010) from 5 Argentinean stations located between 39° and 55° S, supplied by the Argentinean National Weather Service. The MJO signal is retrieved from the century-long (1905-2008) 20CR-based reconstruction by Oliver and Thompson of the bivariate index of Wheeler and Hendon. The detected intraseasonal anomaly amplitude is $\sim 1^{\circ}\text{C}$, larger for maximum than for minimum SAT. Warm anomalies are found over SSA in association with active MJO phases 2, 6, 7 and 8, whereas cold departures are observed for phases 1, 3, 4 and 5.

We then inspect the occurrence of heat waves in Southeastern Patagonia (SEPG: 46°S – 52°S ; 70°W – 65°W). The cases identified in 20CR correspond well with the instrumental records and tend to culminate in MJO phase 8. We describe the intraseasonal development of these events in terms of regional and large-scale circulation anomalies. Finally, using daily rainfall records from Australia and New Zealand, we confirm an intraseasonal teleconnection between SSA and Oceania. Thus, a link between the intraseasonal and interannual timescales is proposed.