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Intraseasonal teleconnections between South America and southern Africa

Alice Grimm
Federal University of Paraná, Physics, Curitiba, Brazil (grimm@fisica.ufpr.br, 55 41 3361-3418)

Teleconnections are detected for different seasons in the intraseasonal precipitation variability of South America and southern Africa. Observed daily precipitation data from both continents in the period 1979-1999 are gridded to 1°, and a bandpass Lanczos filter is applied to each grid point, retaining only intraseasonal oscillations. Correlation analysis is carried out between filtered precipitation series in each 1° x 1° grid box with data over South America and precipitation averaged over several relatively homogeneous regions in southern Africa. Lags from 0 up to 5 days are applied to the African data, in order to disclose convective anomalies over South America that could produce atmospheric perturbations associated with the precipitation anomalies over southern Africa. The atmospheric conditions associated with the beginning of a positive (or negative) phase of intraseasonal oscillations in each selected region in southern Africa are assessed through the composites of 200 hPa streamfunction anomalies observed in the first days of these phases, when the daily precipitation anomaly starts exceeding 1 standard deviation in the filtered series. These composite fields show wavetrains connecting both continents, with strongest cyclonic anomaly centered southwest of the African regions under focus, as expected. An influence function analysis of the target points in the center of these cyclonic anomalies indicates that perturbations of the upper level divergence associated with anomalous convection over South America are able to produce the atmospheric circulation anomalies associated with enhanced precipitation in those regions of southern Africa. Simulations with a vorticity equation model that includes the divergence of the basic state and the vorticity advection by the anomalous divergent wind confirm the observed connection. Therefore, although internal atmospheric variability may be associated with the intraseasonal oscillations of precipitation in South America and southern Africa, the anomalous convection over South America can enhance these oscillations. Strongest contributions seem to occur in transition seasons by convection anomalies in the beginning or demise of the South American summer monsoon.