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Climate variability in the atmospheric moisture supply during meteorological drought episodes over La Plata Basin

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This study aims to analyze variations in atmospheric moisture supply from major remote Brazilian hydrological basins during meteorological drought episodes in the La Plata Basin (LPB). The analyses were conducted for the period 1980-2018, using a Lagrangian diagnostic methodology that estimates the contribution of atmospheric moisture to the water balance in the region. The method relies on the Lagrangian model FLEXPART integrated with ERA-Interim reanalysis data. The technique calculates the difference between evaporation and precipitation by computing temporal variations in specific humidity of air parcels identified over the major Brazilian basins along their trajectories forward in time towards the LPB. During the analysis period, a total of 49 meteorological drought episodes were identified over the LPB through the time series of the monthly SPEI-1 (Standardized Precipitation-Evapotranspiration Index). Linear regression analysis indicates a relationship between variations in atmospheric moisture supply by air parcels traveling from several basins (Amazon, North Atlantic, and Tocantins) and the duration, severity and peak of drought episodes over LPB. This implies that more severe, longer, and higher peak dry episodes in the LPB were associated with a decrease in atmospheric moisture supply from the air parcels traveling from these basins.