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Anomalies of continental precipitation associated with El Niño Southern Oscillation: the role of moisture contribution from oceanic and terrestrial sources

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The regional and global precipitation pattern is highly modulated by the influence of El Niño Southern Oscillation (ENSO), which is considered the most important mode of climate variability on the planet. In this study was investigated the asymmetry of the continental precipitation anomalies during El Niño and La Niña. To do it, a Lagrangian approach already validated was used to determine the proportion of the total Lagrangian precipitation that is of oceanic and terrestrial origin. During both, El Niño and La Niña, the Lagrangian precipitation in regions such as the northeast of South America, the east and west coast of North America, Europe, the south of West Africa, Southeast Asia, and Oceania is generally determined by the oceanic component of the precipitation, while that from terrestrial origin provides a major percentage of the average Lagrangian precipitation towards the interior of the continents. The role of the moisture contribution to precipitation from terrestrial and oceanic origin was evaluated in regions with statistically significant precipitation anomalies during El Niño and La Niña. Two-phase asymmetric behavior of the precipitation was found in regions such the northeast of South America, South Africa, the north of Mexico, and southeast of the United States, etc. principally for December-January-February and June-July-August. For some of these regions was also calculated the anomalies of the precipitation from other datasets to confirm the changes. Besides, for these regions was calculated the anomaly of the Lagrangian precipitation, which agrees in all the cases with the precipitation change. For these regions, it was determined which component of the Lagrangian precipitation, whether oceanic or terrestrial, controlled the precipitation anomalies. A schematic figure represents the extent of the most important seasonal oceanic and terrestrial sources for each subregion during El Niño and La Niña.