



Probabilistic rainfall anomalies over Amazonia associated with ENSO events

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ENSO extreme events are associated with climatic extremes over many regions of the globe. Over Amazonia, El Niño and La Niña events are respectively associated with below and above normal rainfall anomalies in the wet season (Sept – May). Correlations and regressions are the methods commonly used for composite analyses. They assume linear interactions between SST anomalies and the expected climatic anomalies, no inter-events differences, symmetries between El Niño and La Niña climatic impacts, and normality of rainfall anomalies, assumptions not found in some regions. A simple and robust alternative method uses contingency tables to assess the influence of an independent variable (El Niño/La Niña) on the probability of a predefined climatic event (e.g. rainfall anomaly tercil). Monthly rainfall data in 30 stations distributed over the region (1950/51 – 2000/01) were used in this work. Seasonal rainfall anomalies were sorted and allocated in tercils corresponding to below, near and above normal categories. Standardized seasonal averages of Niño 3.4 indices were used to assess the phase impact of the 11 strongest El Niño and La Niña events observed in the period. The significance of the number of times that simultaneous and 1 to 3 months lagged rainfall anomalies during ENSO extreme events were in each considered tercil was calculated using 3x2 contingency tables. The significance of the results was assessed using a hypothesis test based on the hypergeometric distribution. Simultaneous and 1 to 3 months lagged below normal rainfall in the northern and central part of the region were significant associated with El Niño in the austral summer (mature phase). In their typical development (SON) phase they were significant associated with below normal rainfall in central Amazonia, simultaneously and 3 months lagged. La Niñas in their development phases (SON) were significantly associated with above normal rainfall in the beginning of the rainy season in eastern and northern Amazonia. In JJA they were simultaneously and 1 to 3 months lagged associated with above normal rainfall in the northern part of the region. There is a notable asymmetry between El Niños and La Niñas impacts on rainfall related to the season of significant impact and affected region. The high ENOS previsibility and its great impact in Amazonia provide a significant source of seasonal rainfall variability forecasting in the region.