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Title: Analyzing seasonal and inter-annual variability of rainfall extremes into Ecuador and Peru
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Abstract:
Seasonal and inter-annual variability of rainfall extremes are examined on a latitudinal transect (0-6ºS) of long-term ground records (1964-2010) on the boundary of the El Niño (EN) impact area in the Pacific-Andean basin into Ecuador and northern Peru (PAEP). In particular, we asses whether the well-established hypothesis that rainfall extremes are due to anomalies of the ocean-atmospheric setting off shore the PAEP region, as obseved for the last EN events in the 20th and the begining of the 21th century, is valid at the western Andean foothills. A singular value decomposion of Extended Reconstructed SST (ERSST) and NCEP/NCAR wind fields is applied to extract anomalous synoptic situations (8ºN-15ºS, 65-105ºW). A non-stationary generalized extreme value (GEV) model is fit to monthly maxima of daily precipitation series of selected catchments. The models represent seasonal and inter-annual variability of rainfall extremes. First, the seasonal variation was characterized then; the inter-annual variability investigated by the inclusion of anomalous ocean-atmospheric drivers. The dominant synoptic situation influencing each catchment was identified. The results show a clear inter-annual control of ocean-atmospheric EN-like situations on rainfall extremes in the central Ecuadorian catchments (2.5ºS), where both SST and westerly anomalies (850 hPa) are identified. In the northern catchments (0-3ºS), both SST anomalies of an EN as well as a non-EN type are encountered, however lower and upper wind circulation counterpart are not consistent. Furthermore at higher altitudes in the same area, easterly anomalies of the upper circulation (300 hPa), typical of non-EN years, suggest the influence of the normal rainy season weather type. Seasonality modulates the occurrence of extremes on the Andean rims south of 3.5ºS, highlighting the predominance of local phenomena and to some extent the importance of the South-Pacific high in regulating the annual intensity of heavy rainfall in the Southern Ecuador and Northern Peruvian region.
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