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Changes and variability of extreme precipitation index in Colombia

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Climate models have not achieved a consensus about the future trend of long-term average of precipitation. As well as, the future trend of extreme values (including both extreme, droughts and heavy events) has higher uncertainties, because are unusual events. The Colombian territory is permanently in risk due to precipitation climatic extremes: during El Niño years, the rain amounts are severely reduced, consequently the rivers flow and the water resource availability; nevertheless, during La Niña years, floods and landslides events are common, because the rain is excessive.

The precipitation extremes are affected due to long-term trends and the inter-annual variability represented by El Niño/La Niña cycle, then conduct this study is relevant. The selected study area is the Colombian territory. A Satellite Rainfall Estimate (SRE) was used to ensure a whole spatial coverage. The SRE has a daily temporary resolution, then it is suitable for building the selected Extreme Precipitation Indices (EPI). Statistical tests were carried out to verify the long-term change of EPI. The hydrological years were discriminated according to the ENSO, in order to perform a statistical test to probe the hypothesis that EPI, during these particular years (El Niño/La Niña), belong to probability distributions different from that distribution of EPI in "normal" years.

Mean annual precipitation in the Andean region drops in El Niño years, and it increases in La Niña years. In the Colombian Pacific basin, the number of wet days is reduced by the long-term trend, but the variable is not affected by the ENSO phenomena. However, in the Andean region and the eastern plains, El Niño has a high effect on reducing the number of wet days. Finally, extreme events are affected by both the long-term trend and the ENSO phenomena too; however, the change spatial distribution reveals a high impact on the Andean region.