



Simulated Extreme Precipitation Indices over Northeast Brasil in Current Climate and Future Scenarios RCP4.5 and RCP8.5

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In this study, we analyzed extreme precipitation indices, for present and future modeled climates over Northeast of Brazil (NEB), from CORDEX simulations over the domain of Tropical Americas. The period for the model validation was from 1989-2007, using data from the European Center (ECWMF) Reanalysis, ERA-INTERIM, as input to drive the regional model (RAMS 6.0). Reanalysis data were assimilated via both lateral boundaries and the entire domain (a much weaker "central nudging"). Six indices of extreme precipitation were calculated over NEB: the average number of days above 10, 20 and 30 mm in one year (R10, R20, R30), the number of consecutive dry days (CDD), the number of consecutive wet days (CWD) and the maximum rainfall in five consecutive days (RX5). Those indices were compared against two independent databases: MERRA (Modern Era Retrospective analysis for Research and Applications) and TRMM (Tropical Rainfall Measuring Mission). After validation, climate simulations were performed for the present climate (1985-2005) and short-term (2015-2035), mid-term (2045-2065) and long-term (2079 to 2099) future climates for two scenarios: RCP 4.5 and RCP 8.5, nesting RAMS into HadGEM2-ES global model (a participant of CMIP5). Along with the indices, we also calculated Probability Distribution Functions (PDFs) to study the behavior of daily precipitation in the present and by the end of the 21st century (2079 to 2099) to assess possible changes under RCPs 4.5 and 8.5. The regional model is capable of representing relatively well the extreme precipitation indices for current climate, but there is some difficulties in performing a proper validation since the observed databases disagree significantly. Future projections show significant changes in most extreme indices. Rnn generally tend to increase, especially under RCP8.5. More significant changes are projected for the long-term period, under RCP8.5, which shows a pronounced R30 enhancement over northern states. CDD tends to decrease over most of NEB in the short but this trend is reverted toward the end of the century in both scenarios with a significant increase in the duration of the dry season over Northwestern and Eastern NEB (exceeding 50 days over certain areas), whereas projected CWD changes are smaller. Rx5 shows a general increasing trend especially in the long term period, under RCP8.5.