Evaluation of CMIP6 extreme rainfall event simulations and their projected changes over Northeast Brazil

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Abstract

Northeast Brazil (NEB) is considered a region that is strongly vulnerable to extreme rainfall event due to climate change. In this context, we evaluating the representation of dry (DDE) and heavy rainfall days (HRD) by twelve CMIP6 models in the historical period (1981-2005) and assess how they may change in the near (2016-2040) and far future (2076-2100) considering different scenarios (SSP2-4.5, SSP3-7.0 and SSP5-8.5) in NEB. For selection of extreme rainfall event, we used the absolute threshold of less than 1 mm for DDE and the 99th percentile for HRD. The results indicate that four (three) models showed an overall superior performance in reproducing the dry (heavy rainfall) days, being common in both aspects only the EC-EARTH3. Thus, the skill of the CMIP6 models for the NEB varied according to the extreme rainfall conditions analyzed. For the future climate (near and far), the results showed that dry spells are projected to increase over the NEB, especially during JJA and SON, with projections that these conditions will be more severe under the high emission scenario. For HRE, although the results indicated that these events will be more frequent, the analysis showed that under the low or intermediate emissions scenarios the HRE tends to be higher than in the most pessimistic scenario. Therefore, this study shows that it might either rain too much within a short range of time or the water scarcity will be longer-lasting in the future in the NEB.

Keywords: Future Projections, Climate Change, Precipitation, Natural Hazards, CMIP6

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