

Present and future daily precipitation extremes in the North American monsoon region

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ABSTRACT

We present daily and seasonal precipitation extremes in the North American monsoon region based on the 95 percentile (P95) thresholds for the 1979-2005 historical period, and the expected changes in 2075-2099 under the RCP8.5 scenario.

For the historical period we compared several observational datasets: (1) climate station-based CLICOM dataset (Zhu and Lettenmaier 2007) from stations of the Mexican Weather Service, and (2) model-derived data from ERA-Interim. Extreme events from the observational datasets were further compared with those derived from the HadGEM2-ES and the regional Hadley model forced with ERA-Interim HadGEM3ERA of the Climate Model Intercomparison Project phase 5 (CMIP5). Preliminary precipitation results indicate that ERA-Interim ($1.5^{\circ} \times 1.5^{\circ}$) and HadGEM2-ES ($1.8^{\circ} \times 1.2^{\circ}$) greatly underestimate the observed daily seasonal extremes, as it was expected, due its relative low resolution for such a complex-terrain region, however, the regional Hadley model (HadGEM3ERA at 50 Km resolution) greatly improves the interannual variability and intensity of the P95 threshold during all seasons, except JJA.

Future changes (2075-2099) in the distribution of seasonal daily precipitation extremes were evaluated for the HadGEM2-ES under the most extreme scenario (RCP8.5) relative to the historical period. Future scenarios show that daily precipitation extremes may significantly increase in autumn (Sep-Nov), while during the other seasons extremes are expected to marginally decrease.