



Hydroclimatic trends in simulations over the CORDEX North America region

Raymond Arritt (1), Pavel Groisman (2), Arielle Daniel (1), and Tayler Schillerberg (1)

(1) Iowa State University, Ames, Iowa, United States (rwarritt@bruce.agron.iastate.edu), (2) Hydrology Science and Services Corporation, Asheville, North Carolina, United States

An increase in the occurrence of heavy precipitation has been one of the most pronounced climate change signals for the central United States. We study this trend by using the RegCM4 regional climate model to dynamically downscale CMIP5 global projections for 1950-2099 over the CORDEX North America domain. We examine the robustness of the results by driving the regional model with two different global models, by performing simulations at both 50 km and 25 km grid spacing, and by using different convective parameterizations in RegCM4. The global models sample the range of climate sensitivity in CMIP5: HadGEM2-ES has the highest equilibrium climate sensitivity of the CMIP5 models, while GFDL-ESM2M has one of the lowest sensitivities.

RegCM4 results show increases in heavy precipitation (> 50 mm/day) over the central United States for the period 1951-2005 similar to observed trends. This trend is predicted to accelerate so that by the end of the 21st century incidence of heavy precipitation increases by a factor of 2 to 3. The trend is robust in that it is produced regardless of the driving global model or the configuration of the regional model. Results also show a modest increase in the number of dry days and a marked increase in the number of long runs of dry days (16 or more consecutive dry days). The combination of heavier events and longer runs of dry days has implications for sectors such as agriculture and water quality.

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