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Future changes in African temperature and precipitation in an ensemble of Africa-CORDEX regional climate model simulations

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In this study we investigate possible changes in temperature and precipitation on a regional scale over Africa from 1961 to 2100. We use data from two ensembles of climate simulations, one global and one regional, over the Africa-CORDEX domain. The global ensemble includes eight coupled atmosphere ocean general circulation models (AOGCMs) from the CMIP5 project with horizontal resolution varying from about 1º to 3º, namely CanESM2, CNRM-CM5, HadGEM2-ES, NorESM1-M, EC-EARTH, MIROC5, GFDL-ESM2M and MPI-ESM-LR. In the regional ensemble all 8 AOGCMs are downscaled at the Rossby Centre (SMHI) by a regional climate model – RCA4 at 0.44º resolution. Two forcing scenarios are considered, RCP 4.5 and 8.5. The experimental setup allows us to illustrate how uncertainties in future climate change are related to forcing scenario and to forcing AOGCM at different time periods. Further, we investigate the benefit of the higher horizontal resolution in RCA4 by comparing the results to the coarser driving AOGCM data. The significance of the results is investigated by comparing to i) the model simulated natural variability, and, ii) the biases in the control period. Results dealing with changes in the seasonal cycle of temperature and precipitation are presented. We also address higher-order variability by showing results for changes in temperature extremes and for changes in intensity and frequency of extreme precipitation.