



Future changes in South American temperature and precipitation in an ensemble of 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 South America from 1961 to 2100. We use data from two ensembles of climate simulations, one global and one regional, over the South America CORDEX domain. The global ensemble includes ten coupled atmosphere ocean general circulation models (AOGCMs) from the CMIP5 project with horizontal resolution varying from about 1° to 3°, namely CanESM2, CSIRO-Mk3, CNRM-CM5, HadGEM2-ES, NorESM1-M, EC-EARTH, MIROC5, GFDL-ESM2M, MPI-ESM-LR and NorESM1-M. In the regional ensemble all 10 AOGCMs are downscaled at the Rosaby Centre (SMHI) by a regional climate model – RCA4 at 0.44° resolution. Three forcing scenarios are considered: RCP2.6 (five out of ten AOGCMs); RCP4.5 and RCP8.5. 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, taking both AOGCM and RCM ensembles and focusing on seasonal mean temperature and precipitation over South America we i) evaluate the ability of the ensembles and their individual members to simulate the observed climatology in South America, ii) analyse similarities and differences in future climate projections between the two ensembles and iii) assess how both ensembles capture the spread of the grand CMIP5 ensemble. We also address higher-order variability by showing results for changes in temperature extremes and for changes in intensity and frequency of extreme precipitation.