



Impact of horizontal resolution on scenarios of future European temperature and precipitation as derived from RCM and GCM simulations

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In this study we investigate possible changes in temperature and precipitation on a regional scale over Europe from 1961 to 2100. We use data from three ensembles of climate simulations, one global and two regional ones, over the Europe-CORDEX domain. The global ensemble includes five coupled atmosphere ocean general circulation models (AOGCMs) from the CMIP5 project with horizontal resolution varying from about 1° to 3°, namely CNRM-CM5, HadGEM2-ES, IPSL-CM5A-MR, EC-EARTH and MPI-ESM-LR. In the regional ensembles all 5 AOGCMs are downscaled at the Rossby Centre (SMHI) by a regional climate model – RCA4 at 0.44° (c. 50 km) and at 0.11° (c. 12.5 km) resolution under the forcing scenarios RCP 8.5. The experimental setup allows us to investigate the benefit of the higher horizontal resolution, in RCA4 by comparing the results in the two RCA4 ensembles 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 and their relation to changes in the large-scale atmospheric circulation 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.