Geophysical Research Abstracts
Vol. 15, EGU2013-1559, 2013
EGU General Assembly 2013

Simulating current and future climate over CORDEX Africa domain using the fifth-generation Canadian Regional Climate Model (CRCM5)

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Following the CORDEX experimental protocol, climate simulations and climate-change projections for Africa were made with the new fifth-generation Canadian Regional Climate Model (CRCM5). The model was driven by two Global Climate Models (GCMs), one developed by the Max-Planck-Institut für Meteorologie (MPI-ESM-LR) and the other by the Canadian Centre for Climate Modelling and Analysis (CanESM2), for the period 1950-2100 under the RCP4.5 emission scenario. The performance of the CRCM5 simulations for current climate is discussed first and compared also with a reanalysis-driven CRCM5 simulation. It is shown that errors in lateral boundary conditions and sea-surface temperature from the GCMs have deleterious consequences on the skill of the CRCM5 at reproducing specific regional climate features such as the West African Monsoon and the annual cycle of precipitation. For other aspects of the African climate however the regional model is able to add value compared to the simulations of the driving GCMs. Climate-change projections for periods until the end of this century are also analysed. All models project a warming throughout the 21st century, although the details differ notably between model projections, in particular for precipitation changes. It is shown that the climate changes projected by CRCM5 often differ noticeably from those of the driving GCMs.