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Intercomparison of IPCC AR4 models with ERA-40 and NCEP/NCAR reanalysis within the AFRICA-CORDEX domain

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One of the most useful techniques to obtain regional climate projections along the XXI century is to run a mesoscale model driven by coarse input data (initial and boundaries conditions) obtained from Atmosphere-Ocean coupled Global Circulation Models (AOGCM). This is the dynamical downscaling approach. To correctly configure the dynamical downscaling approach it is necessary to choose the correct input dataset that project the climatic situation in a more accurate way and to establish a boundary to the errors in the results associated to these input data. In this study, we consider that the agreement of models with present observations is a way to assign confidence to the quality of a model. With this aim we intercompare the surface temperature of 21 IPCC AR4 runs models with the results from the reanalysis databases ERA40 and NCEP/NCAR in the CORDEX-AFRICA domain in the period 1961-2000. Thus, we have studied the seasonal cycles of the four decades of this period in addition to the probability density functions (PDFs) of the IPCC models. The statistical study allows us to classify the IPCC AR4 models according to their discrepancies with reanalysis data for the CORDEX domain.

In general, the MRI CGCM 2.3.2 IPCC AR4 model presents the best fits compared with the reanalysis databases regarding to the correlation factor, root mean square (rms) and PDF skill score. For the intercomparison with ERA-40, the percentage of points with rms lower than 2ºC is over 80%, for the four decades; with 89% of the points showing correlations coefficients larger than 0.80 and a 76 % of the data presents skill-scores values, based on the common areas of the PDFs, above a threshold of 0.7.

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