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Validation of General Circulation Models in the North Atlantic region

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General Circulation models (GCMs) are used to obtain long scale global and regional projections of climate variables. To prove their predictive capacity and to improve their performance, it is needed to validate their results by comparing them with observacional or reanalysis data. In this work, the 20th century outputs of CCSM3, ECHAM5, GFDL21 and HADCM3 models are evaluated for the North Atlantic region for each season. For this propose, mean and variance fields of sea level pressure (SLP), air temperature (TAS) and sea surface temperature (SST) along with the main spatial patterns described using Empirical Orthogonal Functions (EOFs), obtained from the models are compared with those obtained from the NCEP reanalysis data and HadISST 1.1 data, for the period 1960-2000. These comparisons show that CCSM3 and ECHAM5 are the models that better reproduce the mean field of TAS, meanwhile the HADCM3 is the worst. However, the reverse is true for the SST case. Overall, the four models underestimate the TAS in the areas around Iceland, Azores and North Africa, and the SST is not well reproduced around African coast and high latitudes. For the mean SLP field, ECHAM5 is the best model and CCSM3, the worst. The variance fields of the models are in general higher than the reanalysis and observational data for the TAS y SST, and lower for the SLP. With regard to the spatial variability, the GFDL21 seems to be the best model reproducing the spatial patterns of variability.

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