

Euro-Atlantic modes of variability simulated by IPCC-AR4 models in wintertime

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The main motivation of this study is to analyse the ability of the multi-model simulations from the Fourth Assessment Report of the Intergovernmental Panel of Climate Change (IPCC-AR4) to reproduce the main leading modes of variability over the Euro-Atlantic region: the North Atlantic Oscillation (NAO), the East-Atlantic (EA), the Scandinavian (SCAND) and the East-Atlantic/West Russian (EA/WR) modes for the winter period 1980-2000. The modes are determined by performing a Principal Component Analysis (PCA) followed by a varimax orthogonal rotation on the daily winter Mean Sea Level Pressure field. The choice of variability modes as a diagnostic tool for climate model assessment can be justified by the fact that variability modes determine local climate conditions and their likely change may have important implications for future climate changes.

All models are able to reproduce the main spatial features of the ERA40 variability modes, the SCAND being the mode which is best spatially simulated. Regarding temporal characteristics, the NAO and SCAND modes are the best simulated. UKMO-HadGEM1 and CGCM3.1(T63) are the models best simulating spatial characteristics whereas CCSM3 and CGCM3.1(T63) are the best ones with regard to the temporal features. GISS-AOM is the less successful performing model in terms of both spatial and temporal features.