



Comparison of different paleoclimate simulations of the last millennium

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A comparison of different paleoclimate simulations of the last millennium is carried out by attending to several aspects of their response to external forcing at global, hemispherical and large scales. The simulations have been performed with three high complexity general circulation models (ECHO-G, HadCM3 and CCSM) and incorporate yearly changes in external forcing conditions along the last millennium. Both, natural (solar variability, volcanic aerosols) and anthropogenic (CO₂, CH₄ and N₂O changes) forcing are considered for all simulations. The forcing factors considered are however not identical in all model runs: the ECHO-G model does not consider the cooling effect of anthropogenic aerosols or land use changes that the HadCM3 model includes, for instance. The forced response in these model simulations can be compared to the steady climate as represented by the control simulations when available.

This work focusses on the temperature and circulation response in the various model simulations, attending also to the influence of the different model internal variability and the different model climate sensitivities to external forcing changes. The temperature is studied in a global and hemispheric context, comparing the control and the forced runs during the last millennium. The circulation response is focused on various well known dynamical patterns, as the annular modes: the Arctic Oscillation (AO) and the Antarctic Oscillation (AAO). Within more regional scales, the North Atlantic Oscillation (NAO) and El Niño-Southern Oscillation (ENSO) are considered. The variability of the model response is pictured in comparison with available paleoclimate reconstructions targeting the same past climate variability.