



On the warming asymmetry between Europe and North America in climate change projections

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A new Earth system model of intermediate complexity, LOVECLIM, has been developed in order to study long-term future climate changes. It includes an interactive Greenland and Antarctic ice sheet model (AGISM) as well as an oceanic carbon cycle model (LOCH). A set of numerical experiments have been performed in order to study the possible perturbations of climate induced by human activities over the next millennia. Those simulations reveal that the warming over Europe is substantially weaker than over North America in LOVECLIM. The causes of this feature have been investigated on a regional and large-scale point of view. In particular, the impact of the pattern of sea surface temperature increase induced by the weakening of the meridional heat transport in the Atlantic has been assessed. The study shows that this explains part of the warming asymmetry in winter but has no impact in summer. The modification of snow cover contributes to amplify the warming over North America mainly during spring, while the change of the position of the sea ice edge is dominant in winter and autumn. In summer, LOVECLIM simulates a drying in the Great Plains region explaining the enhanced warming found during that period.