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Last Glacial Maximum temperatures over the North Atlantic, Europe and western Siberia: a comparison between PMIP models, MARGO sea-surface temperatures and pollen-based reconstructions

M. Kageyama (1), **A. Laîné** (1) and Co-authors

(1) LSCE/IPSL, CE Saclay, L'Orme des Merisiers, Bâtiment 701, 91191 Gif-sur-Yvette Cedex, France

Evaluating the ability of models to simulate climates different from the modern one is important for climate prediction. Here we present a first comparison between results from simulations of the Last Glacial Maximum climate and continental and surface ocean reconstructions for the North Atlantic, Europe and western Siberia. The simulations include prescribed Sea Surface Temperature (SST) and slab-ocean Atmospheric General Circulation model runs performed within the PMIP1 project, and atmosphere-ocean fully coupled runs performed after PMIP1 and within the PMIP2 project. The surface ocean reconstructions are from the MARGO project. Continental reconstructions are based on pollen data. Over the North Atlantic, most models simulate the strengthening of the SST meridional gradient suggested by the reconstructions, but most do not reproduce the LGM–modern SST anomaly at the right location, nor with the right amplitude. Over western Siberia, the model results are much improved when a new ice-sheet reconstruction (ICE-5G) is used to force the models. The main discrepancy remains for western Europe winter temperatures, for which LGM–modern anomalies are significantly underestimated by all models. All models indicate that this region during the LGM experienced significantly higher interannual variability in coldest-month temperatures compared to the control runs. This increased variability could have conspired to bias the apparently extremely cold pollen-based temperature reconstructions.