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The sensitivity to Last Glacial Maximum boundary conditions in ECHAM5 simulations

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The response of the Earth's climate system to different external forcing factors has become an important topic motivated by the discussion on anthropogenic climate change. Paleo climate modelling provides a good test bed to put this into context with natural climate variations. Numerous paleoclimatic records have become available to test the models. A prominent example for considerable changes in Earth's climate is the Last Glacial Maximum (21000 years B.P., 21K). Boundary conditions such as greenhouse gas concentrations, orbital parameters, and ice sheet topography were different from today's situation. Therefore, in the present study model simulations are presented that focus on the Last Glacial Maximum. They have been performed using the Max Planck Institute for Meteorology global atmospheric circulation model ECHAM5 with prescribed 21K boundary conditions. In order to investigate the relative importance of the different forcing factors, experiments have been conducted where only one forcing factor at a time has been changed. The results are compared to an ECHAM5 preindustrial control simulation. The response to LGM boundary conditions is discussed with respect to its seasonal behaviour. Furthermore, we will try to elucidate the LGM response of stationary waves and stormtracks. In addition, the experiments have been conducted at three different horizontal resolutions. This allows to investigate the sensitivity of the atmospheric response with respect to the model representation of atmospheric dynamics. It will be shown that horizontal model resolution has to be taken into account when simulating past climates.