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Impact of ice sheet reconstructions on the deglacial climate in iLOVECLIM

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The last deglaciation is a time of large climate transition from a cold Last Glacial Maximum at 21,000 years BP with extensive ice sheets, to the warmer Holocene 9,000 years BP onwards with reduced ice sheets. Despite more and more proxy data documenting this transition, the evolution of climate is not fully understood and difficult to simulate. The PMIP4 protocol (Ivanovic et al., 2016) has indicated which boundary conditions to use in model simulations during this transition. The common boundary conditions should enable consistent multi model and model-data comparisons. While the greenhouse gas concentration evolution and orbital forcing are well known and easy to prescribe, the evolution of ice sheets is less well constrained and several choices can be made by modelling groups. First, two ice sheet reconstructions are available: ICE-6G (Peltier et al., 2015) and GLAC-1D (Tarasov et al., 2014). On top of topographic changes, it is left to modelling groups to decide whether to account for the associated bathymetry and land-sea mask changes, which is technically more demanding. These choices could potentially lead to differences in the climate evolution, making model comparisons more complicated.

We use the iLOVECLIM model of intermediate complexity (Goosse et al., 2010) to evaluate the impact of different ice sheet reconstructions and the effect of bathymetry changes on the global climate evolution during the Last deglaciation. We test the two ice sheet reconstructions (ICE-6G and GLAC-1D), and have implemented changes of bathymetry and land-sea mask. In addition, we also evaluate the impact of accounting for the Antarctic ice sheet evolution compared to the Northern ice sheets only.

We show that despite showing the same long-term changes, the two reconstructions lead to different evolutions. The bathymetry plays a role, although only few changes take place before ~14ka. Finally, the impact of the Antarctic ice sheet is important during the deglaciation and should not be neglected.

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