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Impact of ice sheet changes on the climate evolution at the onset of the Last Interglacial

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Understanding the climate and ice sheet evolution during past warm periods in the history of the Earth may provide important insights for projections of future climate and sea-level changes. The growing numbers of paleo-reconstructions for the Last Interglacial in combination with improved model representations of this most recent warm period make it an interesting target for studying the coupled climate system. In the present work we have simulated the Last Interglacial period from 135 to 115 kyr BP with the Earth System model of Intermediate Complexity LOVECLIM version 1.3, which includes realistic representations of the evolution of the Northern Hemisphere and Antarctic ice sheets and their freshwater fluxes. We study the impact of ice sheet changes on the climate evolution by comparing our reference simulation with idealised experiments in which freshwater fluxes from the ice sheets are partially suppressed. Our analysis is focused on the polar and sub-polar regions in both hemispheres where large perturbations of the climate system arise when ice sheets disintegrate at the onset of the Last Interglacial. In particular, we find model evidence for a large freshwater induced sea-ice expansion around Antarctica during termination II together with an oceanic cold reversal as recorded in Southern Ocean sediment cores.