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# The impact of the North American ice sheet on the evolution of the Eurasian ice sheet during the last glacial cycle

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Modeling studies show that the massive ice sheet expanding over the North American and Eurasian continents in the last glacial cycle has a large impact on the atmospheric stationary waves and thus yielded a glacial climate distinctly different from the present. However, to what extent the two ice sheets influenced each others growth trajectories remains largely unexplored. In this study we investigate how ice sheets in North America influence the downstream evolution of the Eurasian ice sheet, using a thermomechanical ice-sheet model forced by climate data from snapshot simulations of three distinctly different phases of the last glacial cycle: the Marine Isotope Stages 5b, 4 and 2 (LGM). Our results suggest that changes in the North American paleo-topography may have had a large influence on evolution of the Eurasian ice sheet. In the MIS4 and LGM experiments, the Eurasian ice sheet migrates westward towards the Atlantic sector – largely consistent with geological data and contemporary ice-sheet reconstructions – due to a low wavenumber stationary wave response, which yields a cooling in Europe and a warming in northeastern Siberia. The expansion of the North American ice sheet between MIS4 and LGM amplifies the Siberian warm anomaly, which limits the glaciation there and may therefore help to explain the progressive westward migration of the Eurasian ice sheet over this time period. While the Eurasian ice sheet in the MIS4 and LGM experiments appears to be in equilibrium with the simulated climate conditions, the MIS5b climate forcing is too warm to grow an ice sheet. First-order sensitivity experiments suggest that most of the MIS5b ice sheet was established during preceding colder stages.