



Memory of the Greenland Ice Sheet

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A series of palaeoclimatic computations is performed in order to study the memory of the Greenland ice sheet, namely the information on the choice of the initial state, which is kept in the interior of the ice-sheet model after many thousands of integration years. Most of existing palaeoclimatic studies of the Greenland ice sheet are based on the simulations driven by the surface-temperature history inferred from ice core records. Since the longest ice-core record obtained from the GRIP ice core suffers from the uncertainties dating back to approximately 100 thousand years before present (kyr BP), the errors contained in the forcing prior to 100 kyr BP can play some part in the resulting ice-sheet dynamics and thermodynamics. It was found that even after entire two glacial-interglacial cycles of integration modeled ice-surface topography and thermodynamic state of the ice body might be significantly affected by the wrong choice of the initial state. Additionally present-day exterior and interior of the ice-sheet modeled by transient run is compared to the corresponding quantities obtained from the steady-state simulation under present-day climatic conditions, which is a widespread technique employed to initialize present-day ice-sheet models. There have been revealed substantial discrepancies in the thermodynamic states of the present-day ice sheets computed by transient and steady-state simulations that may result into essentially different response of the ice-sheet model on the climatic change observed at present.