

Sensitivity of atmospheric forcing on Northern Hemisphere ice sheets during the last glacial-interglacial cycle using output from PMIP3

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Over the past 800,000 years, climate has gone through vast 100,000-year period changes known as glacial-interglacial cycles, accompanied by Northern Hemisphere ice sheets advancing and retreating. During the glacial state like the Last Glacial Maximum (LGM), the Northern Hemisphere ice sheets extended far more south than present day, covering northern North America, Fennoscandia and the British Isles. Since the Northern Hemisphere ice sheets have a large proportion of land-based ice, the atmospheric forcing plays an important role in ice sheet evolution. Using a simple “glacial index” method, we simulate the North Hemisphere ice sheets through the last glacial-interglacial cycle by using the three-dimensional Parallel Ice Sheet Model (PISM). In order to test the sensitivity of Northern Hemisphere ice sheets to atmospheric forcing, we use 9 different model outputs from the Paleoclimate Modeling Inter-comparison Project Phase III (PMIP3) as a boundary condition. The simulated ice sheets have large differences between the different PMIP3 models. We conclude that uncertainties in atmospheric forcing from climate model output should be considered carefully. Atmospheric forcing especially summer surface air temperature is of vital importance on long-term Northern Hemisphere ice sheet evolution.