



## INTERGLACIAL-GLACIAL CLIMATE TRANSITIONS

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A global earth system model of intermediate complexity, CLIMBER-2.3, is used to assess the processes leading to a transition from an interglacial into glacial conditions. The model couples dynamics of atmosphere, ocean, vegetation, and inland-ice and is feasible for long-term (multi-millennia) simulations. Whereas most of CLIMBER-model components have rather low resolution, the resolution of the bi-directionally coupled polythermal ice-sheet model SICOPOLIS is higher (0.75 x 1.5 degrees). Three main results will be presented here.

- Last Glacial Inception: The last glacial inception in the sense of inland-ice spreading over northern America happens within a few hundred years at around 117,000 years before present in our model and can be described as a bifurcation. Maximum ice volume is reached about 3000 years after maximum ice area and is accompanied by a sea-level drop of about 40m, global drying, and a drop of annual temperature of about -2oC.

- Boundary conditions: In our model, changes in the orbital parameters, mainly perihelion, are a prerequisite for Laurentide ice-sheet growth during the last glacial inception. CO<sub>2</sub> changes alone are not sufficient but act as an amplifier. In addition, the transient behaviour of different climate characteristics can be modified by use of different CO<sub>2</sub> reconstructions. Changes in ocean circulation as well as in the vegetation state are found to strengthen ice-sheet growth. Fixing these characteristics can significantly dampen the inland-ice as well as the climate signal.

- Earlier interglacials: Currently, we investigate whether the relations we found for the end of the last interglacial are similar for earlier interglacials as well. Very first results indicate that whether or not our model simulates a glacial inception depends on a certain relation between insolation conditions and atmospheric CO<sub>2</sub> amount. A

closer analysis will be presented here.

A detailed model-data intercomparison especially for Europe has been carried out within the framework of the BMBF project DEKLIM-EEM.