Geophysical Research Abstracts
Vol. 20, EGU2018-10649, 2018
EGU General Assembly 2018

A transient fully coupled climate-ice-sheet simulation of the last glacial inception

Marcus Lofverstrom (1), Bette Otto-Bliesner (1), William Lipscomb (1), Jeremy Fyke (2), Shawn Marshall (3), and William Sacks (1)

(1) National Center for Atmospheric Research, Boulder, CO, United States , (2) Los Alamos National Laboratory, Los Alamos, NM, United States, (3) University of Calgary, Calgary, AB, Canada

The last glacial inception occurred around 115 ka, following a relative minimum in the Northern Hemisphere summer insolation. It is believed that small and spatially separated ice caps initially formed in the high elevation regions of northern Canada, Scandinavia, and along the Siberian Arctic coast. These ice caps subsequently migrated down in the valleys where they coalesced and formed the initial seeds of the large coherent ice masses that covered the northern parts of the North American and Eurasian continents over most of the last glacial cycle. Sea level records show that the initial growth period lasted for about 10 kyrs, and the resulting ice sheets may have lowered the global sea level by as much as 30 to 50 meters.

Here we examine the transient climate system evolution over the period between 118 and 110 ka, using the fully coupled Community Earth System Model, version 2 (CESM2). This model features a two-way coupled high-resolution (4x4 km) ice-sheet component (Community Ice Sheet model, version 2; CISM2) that simulates ice sheets as an interactive component of the climate system. We impose a transient forcing protocol where the greenhouse gas concentrations and the orbital parameters follow the nominal year in the simulation; the model topography is also dynamically evolving in order to reflect changes in ice elevation throughout the simulation. The analysis focuses on how the climate system evolves over this time interval, with a special focus on glacial inception in the high-latitude continents. Results will highlight how the evolving ice sheets compare to data and previous model based reconstructions.