



Comparing transient, accelerated, and equilibrium simulations of the last 30,000 years with the GENIE-1 model

D.J. Lunt (1), M.S. Williamson (2), P.J. Valdes (1) and T.M. Lenton (2)

(1) University of Bristol, (2) University of East Anglia

We examine several aspects of the ocean-atmosphere system over the last 30,000 years, by carrying out simulations with prescribed ice-sheets, atmospheric CO₂ concentration, and orbital parameters. We use the GENIE-1 model with a geostrophic ocean, dynamic sea-ice, an energy balance atmosphere, and a land-surface scheme with fixed vegetation. Two transient simulations, with boundary conditions derived from high and low resolution ice-core records are compared with equilibrium snapshots including the Last Glacial Maximum (21,000 years ago), mid-Holocene (6,000 years ago) and pre-industrial. The equilibrium simulations are within 0.1°C of both of the transient simulations in the global-annual mean, suggesting that in the last 30,000 years, the ocean-atmosphere system has been close to equilibrium with its boundary conditions. We investigate the method of accelerating the boundary conditions of a transient simulation and find that the Southern Ocean is the region most affected by the acceleration. The Northern Hemisphere, even with a factor of 10 acceleration, is relatively unaffected.