Abstract ID : **284**

The Mid-Pleistocene Transition and precession cancellation in the Early Pleistocene

Content

The Quaternary is characterized by intense climate variability due to the cyclic growth and decay of ice sheets atop the northern hemisphere continents. These glacial cycles are readily attributed to changes in summer insolation intensity due to variations in the Earth's orbital parameters. The Mid-Pleistocene Transition (MPT), however, recorded in the oxygen isotope composition (δ18O) of benthic foraminifera in marine sediments, represents a switch from smaller 40 kyr glacial cycles in the Early Pleistocene, to larger 100 kyr cycles in the Late Pleistocene, with no major changes in the orbital forcing's. Furthermore, the lack of global ice volume variability at the precession period (~21 kyr) during the Early Pleistocene, as compared with the Late Pleistocene, is difficult to reconcile with the orbital theory of glaciation. Precession is a dominant control on the summer insolation intensity and theories that attempt to explain its absence or reduced intensity in the Early Pleistocene, involve either an inverse relationship between insolation intensity and the length of the summer season, or out-of-phase behavior between Antarctica and the northern hemisphere ice sheets which leads to the cancellation of δ18O signals in the deep-ocean. These different theories of precession cancellation will be assessed using a simple climate model that simulates glacial cycles over long time periods as a response to the full seasonal cycle in insolation. A coupled ice sheet model and energy balance mode of the climate system will be constructed which aims to simulate the evolution of both a southern hemisphere and northern hemisphere ice sheet, to determine whether out-of-phase behavior between Antarctica and northern hemisphere ice sheets can generate precession cancellation in the global ice volume record. In addition, theories for the MPT, including CO2 lowering and regolith removal, will be implemented to determine their potential influence on changes in precession periodicity between the Early and Late Pleistocene

Primary author: GUNNING, Daniel (University of Bergen)

Presenter: GUNNING, Daniel (University of Bergen)

Track Classification: Glacial / interglacial dynamics, interglacials, and sea level