

**Workshop Proposal to Lamont Climate Center  
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**The role of ocean gateways for Plio-Pleistocene climate and the onset of major Northern Hemisphere Glaciations**

**Spring 2003 (probably late March) at Lamont-Doherty Earth Observatory**

The opening and closing of oceanic gateways have been proposed as responsible for some of the most significant climate changes observed in Earth history, including the transition from pronounced warmth to the onset of major ice sheet growth in the Northern Hemisphere during the late Pliocene between 3.1 and 2.7 Ma ago.

The closure of the Central American Seaway and its potential to alter ocean circulation has received special attention during the last 25 years as a key candidate to ultimately trigger this climate transition. However, recent data suggest that gradual shoaling of the Central American seaway altered the distribution of freshwater and energy in the global ocean at about 4.5 Ma ago, much before the onset of major ice ages. In addition, other hypotheses arose during the last few years, which involve the progressive changes in the Indonesian Throughflow, latitudinal shifts of the ITCZ, and changes in the structure of the tropical Pacific thermocline. All of these point toward the Pacific and the tropics as critical players in this global rearrangement. These altered circulation patterns may have changed both thermohaline and atmospheric heat and moisture transports to high northern latitudes, which in turn produced new ocean-atmosphere-climate feedback mechanisms that also affected the Arctic Ocean. The opening of the Bering Straits during the late Miocene/early Pliocene compounds the effect on the Arctic.