



Pan-oceanic synchronization of millennial-scale variability

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Global climate during the last glacial was punctuated by abrupt warm excursions and occasional pulses of freshwater into the North Atlantic that disrupted deep water production. These massive freshwater pulses known as Heinrich events arose in part, from instabilities within the Laurentide ice sheet. Paleo-evidence from the North Atlantic suggest that these events altered the production of deep water and caused downstream climate changes throughout the hemisphere. In the tropical western Pacific sea surface temperatures and salinity varied in association with the ocean and climate changes at high latitudes. Here we present results from a coupled model experiment that elucidates a possible dynamical linkage between the North Atlantic Ocean, the Indian Ocean and the western tropical Pacific that involves a global oceanic standing wave pattern brought about by millennial-scale glacial density changes in the North Atlantic. Millennial-scale changes of the meridional overturning circulation in the North Atlantic trigger thermocline anomalies in the tropical Indian ocean and the Pacific of several tenths of meters with impacts on ocean currents and ENSO.