



Northern Hemispheric trigger for The Mid-Pleistocene Transition

Maayan Yehudai (1,2), Joohee Kim (1), Maria Jaume-Seguí (1), Steven L. Goldstein (1,2), Leopoldo D. Pana (3), Laura Heynes (1,2), Bärbel Hönlisch (1,2), Jesse Farmer (1,2), Heather Ford (1), Maureen E. Raymo (1,2), and Torsten Bickert (4)

(1) Lamont-Doherty Earth Observatory of Columbia University, USA, (2) Department of Earth and Environmental Sciences, Columbia University, USA, (3) Department of Earth and Ocean Dynamics, University of Barcelona, Spain, (4) MARUM-Center for Marine Environmental Sciences, University of Bremen, Germany

The earth's climate changed fundamentally during the Mid-Pleistocene Transition (MPT), when glacial-interglacial periodicity shifted from ~41- to ~100 kyr, and glacial periods became more intense, with no substantial change in the orbital Milankovitch forcing. Here we present new evidence showing that the onset of the MPT initiated in the northern hemisphere (as opposed to the southern hemisphere). Using Nd isotopes as water mass tracers, from deep sea cores along a meridional section of the Atlantic Ocean, we have reconstructed the changes to the Atlantic Meridional Overturning Circulation (AMOC) through the MPT, and the changes to the North Atlantic end-member. Our results show that glacial perturbations to the southward transport of North Atlantic source waters (NASW) started at Marine Isotopic Stage (MIS) 38 (~1250 ka), and culminated during MIS 26 (~960 ka) with anomalously high inputs of detrital discharge from surrounding Archean shield regions into the North Atlantic. This was followed by a major basin-wide disruption of the AMOC between 950-850 ka, (Pena & Goldstein 2014) leading to recurring 100 kyr glacial-interglacial periodicity. This new view of the AMOC throughout the MPT interval points to a northern hemispheric sourced initiation, possibly through regolith loss (Clark et al. 2006) which would have facilitated the growing and thickening of northern hemispheric ice-sheets, leading to changes in the ice-sheet and forcing feedbacks.

References:

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