AGU Fall Meeting 2009

You may print by clicking on this button. To return to the previous page, close this browser window or click the 'X' button in the top right corner of the page.

ID# PP11D-1357
Location: Poster Hall (Moscone South)
Time of Presentation: Dec 14 8:00 AM - 12:20 PM

Orbitally Modulated Changes in the African Monsoon System during the last 5 Million Years.

O. Elison Timm¹; A. Timmermann¹; L. Menviel¹; A. Abe-Ouchi²,³; F. Saito³; T. Segawa³

¹. International Pacific Research Center, University of Hawaii at Manoa, Honolulu, HI, United States.
². Center for Climate System Research, The University of Tokyo, Kashiwa, Japan.
³. Frontier Research Center for Global Change, Japan Agency for Marine-Earth Science and Technology, Yokohama, Japan.

Since the early discoveries of Milankovitch cycles in marine proxy records that represent the North African Monsoon variability over the last 5 million years, it has been argued that the 41,000 and 100,000-yr cycles have been induced by remote ice-sheet effects in the Northern Hemisphere (deMenocal et al, Paleoceanography, 1993), whereas the precessional 19-23,000-yr cycle is a direct response to orbital forcing. We re-examine the question of what forces the main periodicities in the African Monsoon proxies with transient paleoclimate simulations using the 'Earth System Model of Intermediate Complexity' LOVECLIM with the aim to quantify the joint effects from ice-sheets and orbital forcing on the formation of African
Humid Periods. The transient simulation cover the last full glacial-interglacial cycle from 130,000 - 0 BP. LOVECLIM was forced with time-dependent orbital parameters, northern hemispheric ice-sheets, and atmospheric CO2 concentrations. Several sensitivity experiments have been analyzed and the results indicate that the North African Monsoon system is largely controlled by the combined factors from orbital and ice-sheet forcing. The precipitation over North Africa and subsequently the migration of the vegetation zones is directly controlled by the incoming summer insolation and remotely by the extend of the ice-sheets over Europe and North America. It is found that large ice-sheets during MIS3 have suppressed the precessional cycles in the African Monsoon system. We found independent evidence for the suppressed precessional cycles in a network of recent monsoon proxies.

The results of the transient simulations corroborate the idea of a significant influence from the remote ice-sheets throughout the Pleistocene. We further discuss whether the closing of the Panama Isthmus and the reorganization of the ocean and atmospheric circulations had a critical influence on the African monsoon and its sensitivity to orbital changes and ice-sheets.

**Contact Information**
Oliver Elison Timm, Honolulu, Hawaii, USA, 96822-0000, [click here](#) to send an email