Geophysical Research Abstracts, Vol. 9, 08078, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-08078

Late Miocene sea-ice diatoms indicate a cold polar East Antarctic ice sheet event

D. Harwood (1), S. Bohaty (2)

(1) Department of Geosciences, University of Nebraska-Lincoln, Lincoln, USA, (2) Department of Earth Sciences, Univ. of California, Santa Cruz, CA 95064, USA(dharwood1@unl.edu / Phone: +01-402-472-6745)

The earliest indication of Antarctic sea-surface freezing based on elements of the modern sea-ice diatom flora comes from a late Miocene sedimentary erratic from McMurdo Sound. Sample MB244C, a semi-lithified mudstone collected from coastal moraine deposits on the northern shore of Minna Bluff, yielded a rich flora of marine siliceous microfossils including marine diatoms, parmales, radiolarians and silicoflagellates. A late Miocene age between ~8.5 to 6.5 Ma is indicated by the co-occurrence of diatoms *Actinocyclus karstenii, Denticuplopsis delicata, D. simonseni, Thalassiosira gersondei, T. mahoodii* and *T. torokina*, and supported by the absence of numerous *Fragilariopsis* and *Thalassiosira* taxa that first appear during the early Pliocene. This sample registers the oldest occurrence of many species common to the modern fast-ice, sea-ice and sea-ice margin diatom flora including *Entomoneis* spp., *Fragilariopsis curta,* dominant *Fragilariopsis vanheurckii, Navicula directa, N. glaciei, Pinnularia quadratarea* v. *constricta, Porosira pseudodenticulata, P. glacialis, Stellarima microtrias, Synedropsis recta, Tropidoneis* sp. and resting spores of *Chaetoceros* associated with sea-ice today. The assemblage is dominated by *Denticulopsis delicata* and *Fragilariopsis vanheurckii*. Two species of *Synedropis* described recently from the lower Miocene and Oligocene sections of the Cape Roberts Project drillcores are also common. This occurrence indicates that species of this sea-ice associated diatom flora evolved by late Miocene time. Prior studies indicate that this flora is generally absent from most Pliocene stratigraphic sections around the Antarctic periphery, suggesting the minimal presence of sea-ice during this time. The sea-ice diatom flora returns to become a dominant feature of the Antarctic marine biota during the late Pliocene and Pleistocene. Recent modeling results by DeConto and others (in press) indicate that

the simulated response of Southern Ocean Antarctic sea-ice reflects conditions of the ice sheet interior and that the appearance of sea-ice is in response to the growth of grounded ice sheets. Thus, the presence of a sea-ice diatom flora may be indicative of climatic and glacial conditions in the continental interior, similar to that of the present day. Conversely, the absence of a sea-ice diatom flora in marine sedimentary sequences around the Antarctic periphery would suggest warmer than present conditions in the Antarctic interior. Recognition of this late Miocene cold glacial event in other Antarctic regions and the Southern Ocean, in existing drillcores and future ANDRILL and IODP stratigraphic sections, will help identify the timing and duration of this glacial event.