

# Diatoms suggest limited sea-surface-temperature change in the seas around Antarctica during the middle part of the Pliocene

John A. Barron, U.S. Geological Survey, Menlo Park

Diatoms were studied from the middle part of the Pliocene (3.2-2.8 Ma) of 17 deep-sea cores (ODP, DSDP and piston cores) from the seas around Antarctica [Barron, 1996a, b]. This climatically warm interval, which is being studied by the PRISM Project of the U.S. Geological Survey, coincides with a proposed interval of major deglaciation of East Antarctica. The relative percentages of *Fragilariopsis weaveri*, a species that preferred warmer waters, were compared with that of *Fragilariopsis barronii* and *Rouxia* species, taxa that preferred cooler waters, in order to estimate the position of the Antarctic Polar Front during the middle Pliocene (see figure). When compared with modern oceanographic conditions, these data imply that summer (December-March) [average] sea surface temperatures during the middle Pliocene were typically about 2°C warmer than they are at present at latitudes between 55-65°S. Diatom assemblages and preservation also suggest that, although sea ice was geographically less extensive during the

middle Pliocene Antarctic summer than it is at present, it was still prominent in parts of the western Weddell Sea region near ODP Site 695. Together, these results support more closely the "stableist" theory [Kennett and Hodell, 1993] of rather limited reduction of the East Antarctic Ice Sheet during the middle Pliocene than the "dynamicist" theory of Webb and Harwood [1991] that calls for a major deglaciation at that time.

#### References:

- Barron, J.A., Diatom constraints on the position of the Antarctic Polar Front in the middle part of the Pliocene, *Marine Micropaleontology*, 27, 195-213, 1996a.
- Barron, J.A., Diatom constraints on sea surface temperatures and sea ice distribution during the middle part of the Pliocene, *US Geological Survey Open-File Report*, 96-713, 1-45, 1996b.
- Kennett, J.P. and D.A. Hodell, Evidence for relative climatic stability of Antarctica during the early Pliocene: a marine perspective, *Geografiska Annaler*, 75, 205-220, 1993.
- Webb, P.-N. and D.M. Harwood, Late Cenozoic glacial history of the Ross Embayment, Antarctica, *Quaternary Science Reviews*, 10, 215-223, 1991.

