Geophysical Research Abstracts
Vol. 12, EGU2010-1093, 2010
EGU General Assembly 2010
© Author(s) 2009

High fidelity proxies of Pliocene seasonality for the northern Weddell Sea, Antarctica

Tanya Knowles (1), Mark Williams (2,3), Nicola Clark (2), Melanie Leng (3), Beth Okamura (4), Paul Taylor (4), Andrew Johnson (5), Anna Nelson (6), John Smellie (2,6), and Alan Haywood (7)

(1) Imperial College, University of London, (2) Department of Geology, University of Leicester, (3) British Geological Survey, Nottingham, (4) Natural History Museum, London, (5) School of Science, University of Derby, (6) British Antarctic Survey, Cambridge, (7) School of Earth & Environment, University of Leeds

The Pliocene (5.3 to 2.6 Ma) spans a time when the Earth experienced a transition from relatively warm conditions to a cooling climate that heralded the high magnitude glacial-interglacial oscillations of the Pleistocene. The warm interglacial climates of the Pliocene are plausible comparative scenarios for interpreting the path of future climate warming during the 21st century. Given the significance of warming on high latitude sea temperatures and sea ice extent, it is important to develop proxies that can 'ground-truth' models of polar-regions during the Pliocene. Here we present data from fossil pectinid bivalves and cheilostome bryozoans from a warm interval of the Early Pliocene in the Weddell Sea, northern Antarctic Peninsula, that demonstrate: 1) inter-annual variation in water column productivity and temperature; 2) reduced or no sea ice throughout the year; and 3) intervals of much greater mean annual range of temperature (6-7°C) in surface waters than pertain at the present day. We demonstrate that bivalve and bryozoan growth-related morphologies, interpreted in conjunction with stable oxygen and carbon isotope data, can provide a powerful tool for tracking high latitude climate in the Antarctic Pliocene.