



The Southern Ocean at the Last Glacial Maximum – A circum-Antarctic view based on siliceous microfossil records

R. Gersonde (1), A. Abelmann(1), X. Crosta(2), H. Jacot des Combes (1), A. Shemesh (3) and L. Armand (4)

(1) Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany, (2) DGO, UMR-CNRS 5805 EPOC, Université de Bordeaux I, Talence, France, (3) Weizmann Institute of Science, Rehovot, Israel, (4) School of Earth Sciences, University of Tasmania , Hobart, Australia (rgersonde@awi-bremerhaven.de)

Based on the quantitative study of diatoms and radiolarians, summer sea-surface temperature (SST) and sea ice distribution were estimated to reconstruct the last glacial environment of the Southern Ocean at the EPILOG (19.5-16.0 ka or 23,000-19,000 cal yr. B.P.) time-slice, a study accomplished within the international MARGO initiative for the reconstruction of the glacial ocean surface. Summer SSTs reveal greater surface-water cooling than reconstructed by CLIMAP, reaching a maximum (4° - 5°C) in the present Subantarctic Zone of the Atlantic and Indian sector. The reconstruction of maximum winter sea ice extent is in accordance with CLIMAP, showing an expansion of the winter sea ice field by around 100 % compared to the present. Although only limited information is available, the data clearly show that CLIMAP strongly overestimated the glacial summer sea ice extent. As a result of the northward expansion of Antarctic cold waters by 5-10° in latitude and a relatively small displacement of the Subtropical Front, thermal gradients were steepened during the last glacial in the northern zone of the Southern Ocean. Such reconstruction may, however, be inapposite for the Pacific sector. The few data available indicate reduced cooling in the southern Pacific and give suggestion for a non-uniform cooling of the glacial Southern Ocean. Causes for non-uniform behavior of the Southern Ocean physical environment during the last glacial maximum are discussed in the light of estimates of surface water salinity (melt water pulses) derived from oxygen isotope measurements.