

LINKING CLIMATE RECORDS FROM ANTARCTIC ICE AND THE SOUTHERN OCEAN

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Ocean Drilling Program (ODP) Leg 177 and the European Project for Ice Coring in Antarctica (EPICA) have recovered records that document Pleistocene climate development at high and ultra-high resolution. We combine marine signals we obtained from ODP Sites 1093 and 1094 (Atlantic Sector of Southern Ocean) for a time period spanning the past 7 climate cycles (ca. 650,000 y) with atmosphere signals from the EPICA Dome C (EDC) ice core recovered from the East Antarctic Ice Sheet (EPICA 2004). Diatom transfer function derived sea surface temperature records compare remarkable well with the EDC atmospheric temperature record, including the shift from lower to higher interglacial temperature regimes around 450,000 years. As such, temperature was selected as a tool for correlation of marine and ice core records. Maximum winter and summer sea ice extents, reconstructed from diatom sea ice indicators, coincide with coldest ice core temperatures and increased dust deposition. The Antarctic sea ice field, which expanded during glacials to double the present extent, represents a major player in global climate development because of its impact on the albedo, ocean and atmosphere circulation, and atmospheric CO₂ concentration. The combination of the high-resolution records from ODP Sites 1093 and 1094 and the EDC ice core provides detailed insight into the sequence of ocean and atmosphere environmental events at the past 7 glacial/interglacial transitions. This documents the complex interplay of external and internal forcing and amplification mechanisms driving climate development and its variability.

EPICA, 2004. Eight glacial cycles from an Antarctic ice core. *Nature* 429, 623-628