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South Atlantic records of diatom stable isotopes, surface temperature and sea ice from ODP sites 1094 and 1093

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High-resolution records of δ^{13}C and δ^{15}N of diatom-bound organic matter from sediment cores in the Atlantic Sector of the Southern Ocean (ODP site 1094 and 1093) are combined with summer sea surface temperature and winter sea ice deduced from diatom transfer functions. These records are located south and nearby the present day Polar Front and archive the main climatic events during the past 640 ka. The records of site 1094 exhibit six full glacial-interglacial cycles (Marine Stages 3-16) and six Terminations (II-VII). δ^{13}C diatom-bound are interpreted with respect to the global climate by comparing to SPECMAP oxygen isotope stack record and to the Vostok CO_2 content and dust records. An excellent agreement exists between δ^{13}C and the SPECMAP oxygen isotope record and the Vostok CO_2 content suggesting that global physical processes rather than local biological factors mainly influence diatom δ^{13}C. Contrary, a weak correlation exists between the Vostok dust record and the carbon and nitrogen isotope records of site 1094. Therefore, if dust accumulation represents iron input, our data do not support the suggestion that iron fertilization of the Southern Ocean during glacial periods was the main factor that lowered atmospheric CO_2. Our records suggest that sea ice cover, water column stratification and iron addition from deep water mixing are more likely to explain these observations.

ODP site 1093 is positioned north to 1094 nearby the present day Polar Front and shows seven glacial-interglacial cycles spanning from Marine Stages 1 to MIS 16. In general, 1093 diatom δ^{13}C record shows smaller glacial – interglacial variability. The similarity between the two cores is greater between 350-650 ka than in the time

period of 20-350 ka. We attribute it to the relative position of site 1093 and the opal high-productivity belt during glacial periods.