# SO290: Changes in sea surface temperatures and dust input at the Lord Howe Rise (Tasman Sea) over the past glacial-interglacial cycles

F. Lamy[1], N. Ruggieri[1], L. Lembke-Jene[1], M. van der Does[2], K. Pahnke[3], T. Struve[3], H.W. Arz[4]

## Background

Sediment core SO290-33-2 from the Lord Howe Rise (Tasman Sea, Fig. 1) provides a unique archive to investigate long-term changes in sea surface temperatures (SST) and aeolian dust input from Australia over multiple glacial–interglacial cycles. Owing to its location outside major fluvial influence from New Zealand and Australia, the sediment record is dominated by biogenic carbonate, with minor climatically sensitive terrigenous contributions.

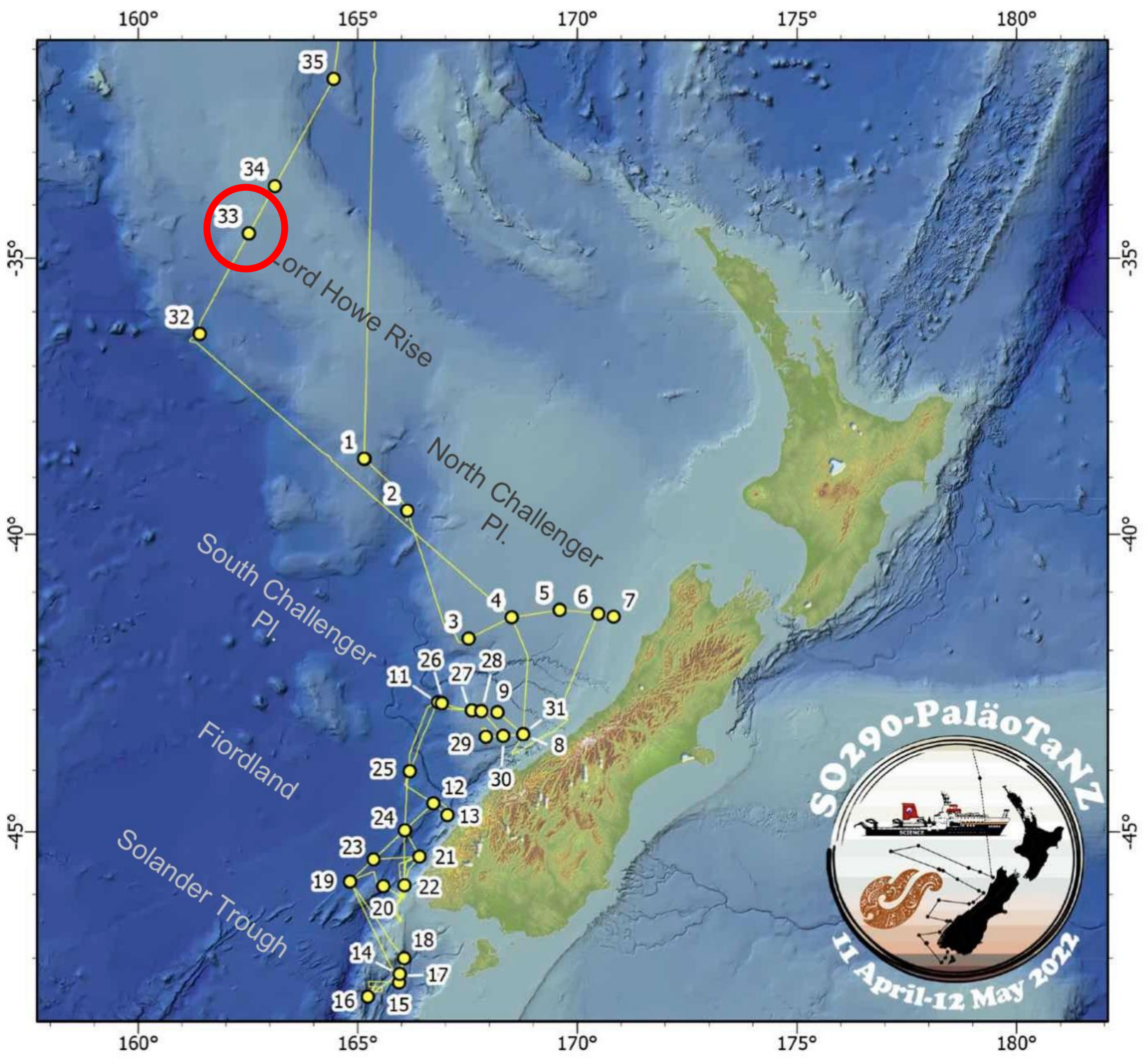


Figure 1. Study area and sampling stations. The location of core SO290-33-2 is indicated by the red circle.

## Stratigraphy

The stratigraphic framework is based on benthic foraminifera $\delta^{18}O$ measurements (Fig. 2). Despite the relatively low temporal resolution and high variability of the $\delta^{18}O$ record, most Marine Isotope Stages (MIS) are identifiable back to ~580 ka. Resulting sedimentation rates range from ~0.5 to 2.2 cm/kyr, with no significant changes across glacial–interglacial cycles over the last ~580 ka.

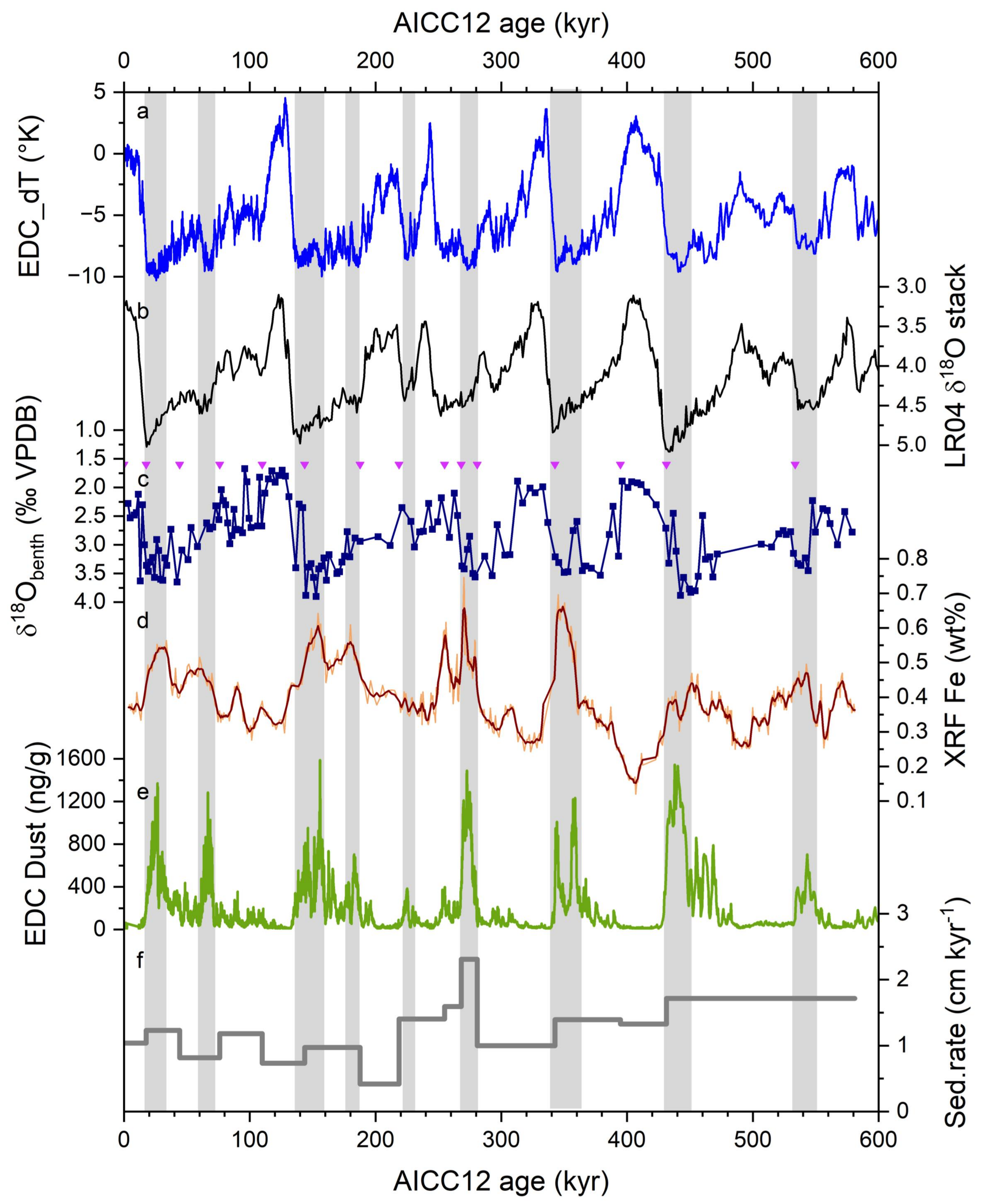


Figure 2. Lithogenic input data from core SO290-33-2. (a) EPICA Dome C (EDC) temperature record (Jouzel et al., 2007). (b) Fe concentrations (XRF core scans). (c) Variations in derived lithogenic content. (d) Lithogenic MAR. (e) EDC dust concentrations (Lambert et al., 2008).

## SST reconstruction

Alkenone-based SST reconstructions (Fig. 3) reveal pronounced glacial–interglacial variability with amplitudes of ~5–6 °C, particularly after the Mid-Brunhes Transition. Interglacial SSTs average ~24 °C, with peak values of up to 25 °C during the last interglacial (MIS 5e), while glacial minima reach ~17 °C during MIS 10. The pattern of SST variability broadly resembles temperature changes recorded in the EPICA Dome C ice core, although reduced pre–Mid-Brunhes amplitudes reflect relatively warm glacials rather than cooler interglacials (as documented in the ice core).

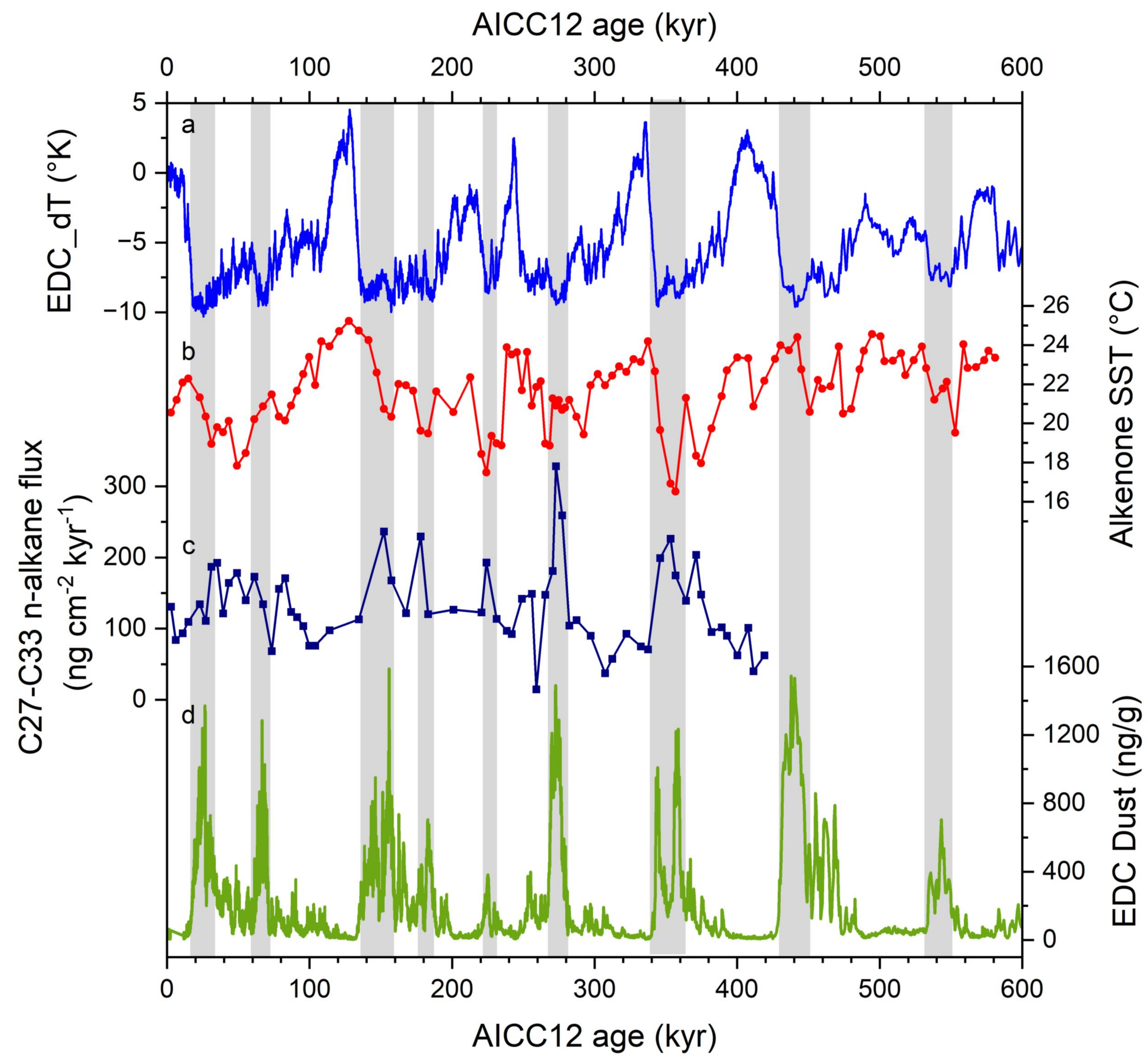


Figure 3. Alkenone-derived SST and n-alkane concentrations from core SO290-33-2. (a) EPICA Dome C (EDC) temperature record (Jouzel et al., 2007). (b) Alkenone-derived SST time series. (c) n-alkane MAR time series. (d) EDC dust concentrations (Lambert et al., 2008).

## Lithogenic Input (Australian Dust)

Dust input is assessed using n-alkane mass accumulation rates (MAR) and lithogenic content derived from XRF core-scanner data and geochemical calibrations (Fig. 4). Both proxies show enhanced dust fluxes during glacial periods and closely follow Antarctic ice-core dust records, supporting an Australian aeolian origin for terrigenous material at the site. Compared to Subantarctic South Pacific records, glacial dust fluxes at the Lord Howe Rise are lower, likely reflecting its location near the northern margin of major Australian dust source regions, whereas more distal Pacific sites integrate dust input from multiple sources within and outside of Australia.

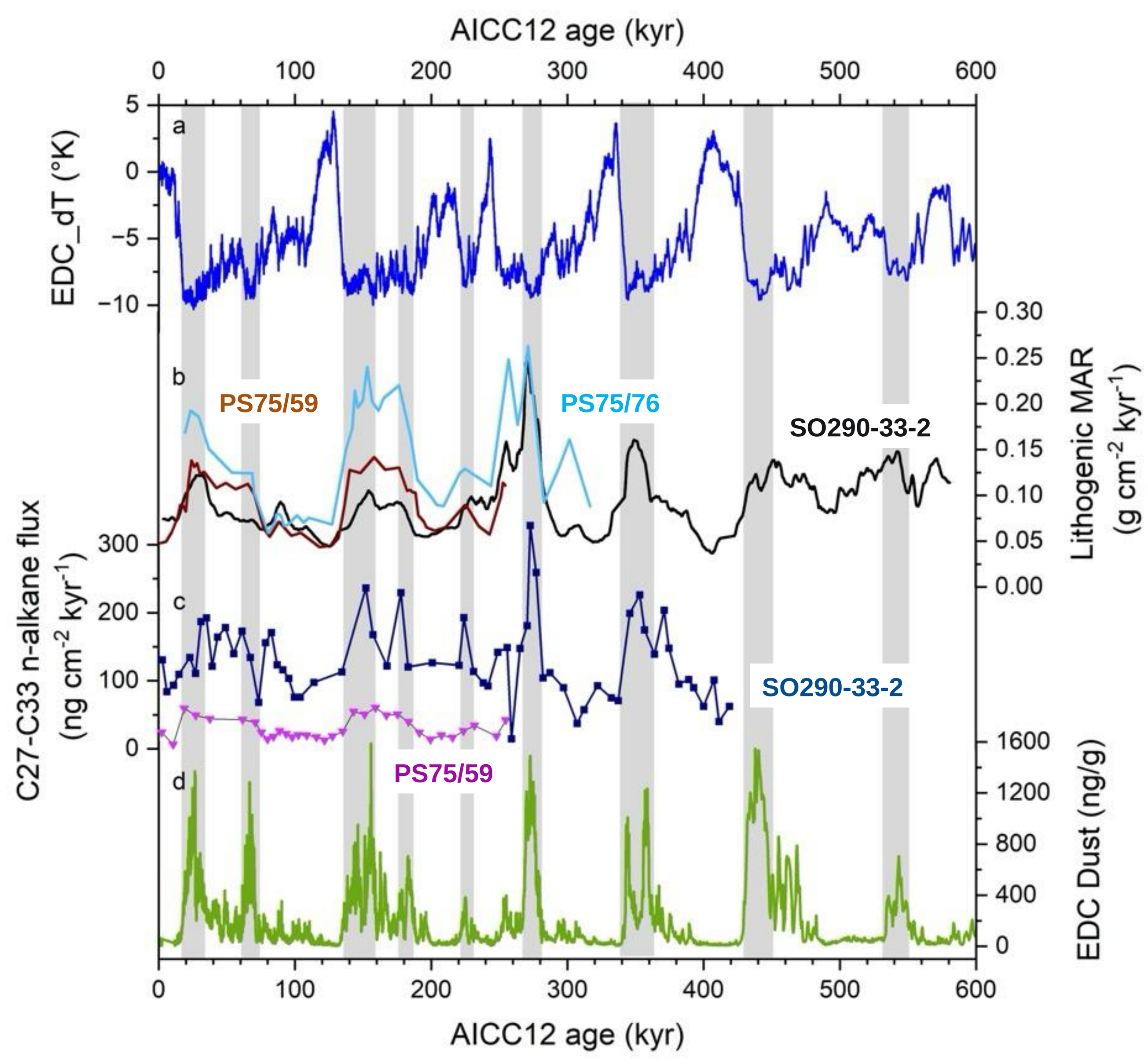


Figure 4. Comparison with published Southern Ocean dust records. (a) EPICA Dome C (EDC) temperature record (Jouzel et al., 2007). (b) Lithogenic MAR of core SO290-33-2 compared with cores PS75/59 (central subantarctic Pacific) and PS75/76 (southwestern subantarctic Pacific; Lamy et al., 2014). (c) n-alkane MAR of core SO290-33-2 compared with core PS75/59 (Lamy et al., 2014). (d) EDC dust concentrations (Lambert et al., 2008).

**References**
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Lambert, F. et al. (2008). Dust–climate couplings over the past 800 kyr from the EPICA Dome C ice core. Nature, 452, 616–619.
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**Affiliations**
*1 Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Bremerhaven, Germany*
*2 Royal Netherlands Institute for Sea Research (NIOZ), Texel, The Netherlands*
*3 Institute for Chemistry and Biology of the Marine Environment (ICBM), Carl von Ossietzky University, Oldenburg, Germany*
*4 Leibniz Institute for Baltic Sea Research Warnemünde (IOW), Warnemünde, Germany*