Sources of Glacial South Pacific Dust

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The Earth's change from glacial to interglacial state implies significant re-organisation of the Southern Hemisphere ocean-atmosphere system, expressed in variability of the Southern Hemisphere westerly winds (SWW) [1,2]. Since the SWW dominate the transport and distribution of dust across vast areas of the mid-latitude Southern Hemisphere [3], dust provenance can serve as a powerful proxy to trace past atmospheric dynamics.

In order to identify potential source areas (PSA) of mid-latitude South Pacific dust, we geochemically fingerprinted the dust fraction of South Pacific sediments, covering the area south of 35°S and the entire width of the basin. Our coretop radiogenic isotope and rare earth element data from across the Pacific Southern Ocean suggest PSA in South America and central Southeast Australia. The geochemical similarity with the main source of dust to the modern South Pacific leads us to assume that the coretop signal is dominated by dust from the Lake Eyre basin in central Southeast Australia. Our new strontium ($^{87}Sr/^{86}Sr$ = 0.710577 ± 0.0017) and neodymium (ε_{Nd} = -4.5 ± 0.5) isotope data from the Last Glacial Maximum (LGM) time slice overlap with the coretop results. Yet, preliminary LGM lead isotope data show distinct differences to the Holocene data, suggesting that the glacial South Pacific dust was supplied predominantly from Patagonia.

These results will be interpreted in the wider context of glacial-interglacial SWW and Southern Ocean change i.e., equatorward shifts of climatic zones, environmental changes in the PSA, enhanced dust fluxes to the study area, re-organisation of atmospheric and ocean circulation and their role during the glacial drawdown of atmospheric CO_2.

[1] Anderson *et al.* (2009) *Science* **323**, 1443-1448. [2] Lamy *et al.* (2015) *PNAS* **112**, 13496-13501 [3] Lamy *et al.* (2014) *Science* **343**, 403-407.