



Increased dust deposition in the Pacific Southern Ocean during glacial periods

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Dust deposition across the Southern Ocean plays a critical role for marine biological production through iron fertilization and is supposed to control a significant fraction of glacial-interglacial atmospheric CO₂ changes. However, in the Pacific, the largest Southern Ocean sector, reliable sediment records are sparse and climate models mostly indicate low dust deposition both for modern times and the last glacial maximum. Here, we present comprehensive data-sets of dust supply based on the analysis of sediment records recently retrieved across the Pacific Southern Ocean. The shape and glacial/interglacial pattern of lithogenic sediment input records in the western and central sector reveals strong similarities to dust records from Antarctica and the South Atlantic. Though our new data document substantial sediment redistribution, glacial dust mass accumulation rates corrected for sediment focusing exceed interglacial values by a factor of ~ 3 . The first-order changes in Subantarctic biological productivity largely follow increased dust supply during glacials.

Taken together our new sediment records document a substantial glacial dust supply from Australian and New Zealand sources to the Pacific SO sector eastward to at least 125°W. Such enhancement of dust supply is consistent with stronger aridity in Australia and a glacial dust source in New Zealand. Although the most likely dust source for the South Pacific is Australia/New Zealand, the glacial/interglacial pattern and timing of lithogenic sediment deposition is similar to dust records from Antarctica and the South Atlantic dominated by Patagonian sources. These similarities imply large-scale common climate forcings such as latitudinal shifts of the southern westerlies and regionally enhanced glaciogenic dust mobilization in New Zealand and Patagonia.