

***LATE QUATERNARY PALAEOCEANOGRAPHY:
RECONSTRUCTING PATTERNS OF CLIMATE
CHANGE IN THE NORTH ATLANTIC AND
SOUTHERN OCEAN***

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ABSTRACT

The palaeoclimate of the Late Quaternary is studied using three deep marine sediment cores; two from the North Atlantic region and one from the Southern Ocean. A new transfer function has been produced using an updated, revised and expanded dataset. Results indicate that the new dataset performs well and is capable of reconstructing temperatures across the full range of oceanic environments.

The North Atlantic cores cover the last glacial-interglacial cycle at high resolution using both surface and deep ocean proxies to enable a detailed reconstruction of past variability in the ocean system. The marine record of the last glacial cycle in the North Atlantic is characterised by rapid fluctuations in hydrography and climate related to large scale instabilities in the northern ice sheets. Results indicate that these fluctuations correspond to periods of significant reorganisation of North Atlantic circulation and the production of deep water, and thus global thermohaline circulation as a whole. Sea surface temperature reconstructions and the abundance of glacially derived sediments in samples from the last interglacial indicate that this period was not entirely stable and that some degree of the climate fluctuations occurring during the glacial period also operated during interglacials. The transition into full glacial conditions also appears to have been a time of particularly extreme shifts in the climate and ocean systems.

The Southern Ocean core represents the southern limb of the global thermohaline conveyor and is closely linked to the northern hemisphere. The Agulhas region is of particular interest since this represents the region whereby warm Indian Ocean water is "leaked" into the Southern Atlantic. Sea surface temperature reconstructions from this core suggest significant fluctuations in the positions of the fronts controlling the rate of flow between the oceans over the last 340 ka. The record also allows a comparison with the Antarctic ice cores to provide a regional view of southern hemisphere climate change and also with the two North Atlantic cores.

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