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Antarctic timing of climate in the South-American subtropics

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With the data we present in this study we try to stimulate the discussion on the importance of the Southern Hemisphere in global climate change.

Present-day precipitation data (New et al., 2001) for South America, Africa and Australia, which show a clear seasonal latitudinal shift of the rain-bearing Southern Westerlies of about 9˚ latitude, are compared with palaeo-aridity data from Chile; We present grain-size distributions of the terrigenous sediment fraction from cores from the Chilean continental margin in the SE Pacific.

The grain-size distribution data of two sediment cores were ‘unmixed’ into subpopulations, and interpreted as ‘coarse’ aeolian dust, ‘fine’ aeolian dust and fluvial mud, respectively. The downcore ratios of the proportions aeolian dust and fluvial mud represent palaeo-continental aridity records of Chile’s winter rainfall region for the last 20,000 yr, showing relatively wet conditions during the Last Glacial and drier conditions during the Holocene.

Synchronous changes in the Sajama ice core (Bolivia) suggest that the source of moisture – the Southern Westerlies - extended northward during the LGM up to 18˚S. Further North, ice cores record a clear Atlantic signal (Quelccaya (14˚S) and Huascarán (9˚S), Peru).

We hypothesize that a hemisphere-wide atmospheric circulation system influenced climate along the entire Chilean coast up to about 18˚S during the late Quaternary; the northward displacement of the Southern Westerlies during glacial times was also observed in southwestern Africa and most likely also influenced palaeoclimate in Australia.