

Atmospheric circulation changes and neoglacial conditions in the Southern Hemisphere mid-latitudes: Insights from PMIP2 simulations at 6 kyr

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Glacial geologic studies in the Southern Hemisphere (SH) mid-latitudes (40-54°S) indicate renewed glacial activity in southern South America (Patagonia) and New Zealand's (NZ) South Island starting at ~7 kyr, the so-called neoglaciation. Available data indicate that neoglacial advances in these regions occurred during a rising trend in atmospheric CO₂ and CH₄ concentrations, lower-than-present but increasing summer insolation and seasonality contrasts. In this paper we examine the climatological context in which neoglaciations occurred through analysis of the complete Paleoclimate Modelling Inter-comparison Project (PMIP2) database of simulations at 6 kyr for the SH. We observe that the amplitude of the annual insolation cycle in the SH did not change significantly at 6 kyr compared to the pre-industrial values, the largest difference occurring in autumn (MAM, negative anomalies) and spring (SON, positive anomalies). The simulated changes in temperatures over the SH respond to the inso