

Temperature change in New Zealand during the last glacial termination

Eaves, S.

Antarctic Research Centre, Victoria University of Wellington. Wellington, New Zealand.

The last glacial termination (c. 19-11 ka BP) represents the most recent natural reorganisation of the global climate system. This event offers insight to the transient response of the earth system to external and internal forcing. Global climate model simulations provide opportunities to test hypothesised drivers and physical mechanisms of global deglaciation, however the veracity of these simulations requires assessment using climate proxy data.

Mountain glaciers are simple physical systems that can be well-represented by numerical models. Glacier length fluctuations are driven predominantly by temperature variability—especially in temperate mid-latitude regions such as New Zealand. Well-dated moraine deposits delineating past ice geometries thus represent useful targets for quantitative temperature reconstructions.

In this poster, we draw together new and published glacier chronologies and quantitative temperature reconstructions for the last glacial termination in New Zealand, from sites spanning the central North Island to the central Southern Alps.

This dataset shows: (1) temperatures remained 6–7 °C lower than present until ~18 ka; (2) temperatures increased by 3–4 °C between 17 and 15 ka; (3) glacial stillstands/readvance occurred ~ 15–13 ka when temperatures were 2–3 °C lower than present; (4) renewed warming totalling ~ 1–1.5 °C between 13 and 11 ka.

The two-step structure and timing of glacier-derived temperature change in New Zealand shows close agreement with that predicted by transient global climate model simulations. Climate model sensitivity experiments suggest that the majority of the warming in New Zealand during the last glacial termination was the product of CO₂ rise, atmospheric dynamics and changes in oceanic heat transport linked to the bipolar seesaw.