

Palaeoclimate data from New Zealand speleothems

Paul W. Williams, Department of Geography, University of Auckland, New Zealand
Zhao Jian-xin, Department of Earth Sciences, University of Queensland, Brisbane, Australia
David Fink, Australian Institute of Nuclear Sciences and Engineering, Menai, NSW, Australia
Kenneth D. Collerson, Department of Earth Sciences, University of Queensland, Brisbane, Australia

New Zealand has particular significance for palaeoclimate studies because of its location in the midlatitudes of a largely oceanic hemisphere. Stable isotope records have been obtained from more than 15 speleothems occupying various interval of time back to 242 ka BP. All are dated by TIMS. The most recent have been sampled at decadal interval and show a direct correlation of $\delta^{18}\text{O}$ with instrumental temperature records. Recent enhanced 'greenhouse' warming commenced about 1885 AD. Five overlapping series during the Holocene indicate a post-glacial climatic optimum between 10 and 8 ka BP, a cool interval from 5 to 3 ka BP, and a warm peak around 1 ka BP.

Late-Pleistocene stable isotope records to 32 ka BP confirm two glacial advances at 15-17 and 18-20 ka BP and show the last termination to have centred on 15 ka BP, although the first signs of warming were earlier. There is no clear evidence for a cool reversal of the intensity, duration or form of the Younger Dryas event in the North Atlantic.

Evidence of glacial stages from deposits in Aurora Cave in Fiordland have been supplemented by cosmogenic ^{10}Be exposure ages on lateral moraines overlying the cave. Glacial advances more recent than 25 ka BP buried only the lower half of the cave below 290 m, whereas the earlier glacial advances overwhelmed it completely with the glacier surface at 975 m. The exposure ages indicate deposition of the highest moraines at about 70 ka BP, which is consistent with the U/Th age from speleothems of prior to 67 ka BP. Thus the greatest advance of the Last Glaciation was at Stage 4. Glacial advances at 40-41 and 46-48 ka BP rose to about 830 m.

The earliest stable isotope record covers the interval 161-242 ka BP through isotope Stage 7 interglacial, which appeared to culminate in New Zealand at 205 ka BP.