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Multiproxy Paleoenvironmental Records Spanning the INTIMATE Timescale from Auckland Maar Lakes, New Zealand

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High-resolution Late Quaternary paleoclimate archives are preserved in the lake sediment records contained in several maar craters from the Auckland region in northern New Zealand. Tephrochronology, AMS ^{14}C and Ar/Ar -based chronostratigraphies were developed with several lakes containing laminated sediment records spanning much of the last glacial cycle. A multi-proxy approach was taken to construct a reliable record of local and regional paleoenvironments including: pollen and diatom paleoecology, environmental magnetism, grain size, XRF geochemistry, TOC, TN, TS, organic matter δ^{13}C, δ^{15}N and δD, as well as δ^{18}O in biogenic silica.

Pollen and diatom analysis of records spanning the last ca 60 ka show marked vegetation changes that reflect orbital forcing, although diatoms suggest significant hydrological changes that are not reflected in the pollen. Reduction of forest with expansion of grass and shrublands at the start of the LGM (29 ka BP), is accompanied by cool, dry and windy conditions, although the situation is complex with multiple brief warmer phases punctuating the LGM. Post-glacial warming commenced ca 17.9 ka BP and is reflected in several proxies, although the pollen record does not display the marked changes displayed in many of the other proxies during the LGIT and Holocene. Some of the inferred environmental changes are similar to the nature and timing of short-duration events during the last glacial cycle from the North Atlantic region, although others appear to reflect a southern polar forcing. The multi-proxy approach used has produced one of the most complete, well-dated and high-resolution paleoenvironmental records spanning the INTIMATE timescale from the mid-latitude Southern Hemisphere with implications for the nature, timing and forcings of climate change in the Southwest Pacific region.