

# **U/Pb dating of detrital zircons: Implications for the provenance record of Gondwana margin terranes**

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## **ABSTRACT**

SHRIMP U/Pb age data for over 300 detrital zircons from Late Mesozoic samples of the Torlesse and Waipapa arc-trench terranes in New Zealand range from ~ 100 Ma (Early Cretaceous) to 3140 Ma (Archean). Greater than 65% of the analysed zircon grains are Permian or Mesozoic. The remaining detritus is largely of Paleozoic age with progressive smaller amounts of Proterozoic and Archean debris. Cathodoluminescence imaging indicates that the younger grains are exclusively of igneous origin whereas the older grains show evidence for a more complex history including metamorphic overprints and inherited cores. The youngest zircon grains in most of the samples approximate the age of deposition of the rock units, suggesting input into the depositional basins from contemporaneous igneous activity. The overall age profile of the detrital zircons is consistent with sediment accumulation adjacent to the Gondwana margin rather than in exotic blocks accreted to the margin. The bulk of the detritus is derived from a late Paleozoic to Mesozoic Gondwana margin, Andean-style magmatic arc. Elements of this arc extend from Marie Byrd Land in Antarctica, through New Zealand (Median Tectonic Zone) to New England in eastern Australia. Paleozoic and older grains form a minor but significant component of all samples and have an age signature indicative of derivation from the Paleozoic and Neoproterozoic fold belts of East Australia and Antarctica (Gondwana). A characteristic feature of the older grains is ages in the range 500-650 Ma and 1000-1200 Ma which is also a feature of the zircon age spectrum for early Paleozoic greywackes from the Lachlan/Tuhua fold belt suggesting either derivation from these sedimentary rocks or from the same original source rocks.