Rapid generation of felsic magmas at ~ 370 Ma in the New Zealand sector of the Gondwana margin

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Determination of crustal growth rates in continental margin arcs requires high-precision geochronology combined with realistic estimates for magma volume and the proportion of recycled crust.

Paleozoic magmatism in New Zealand is dominated by the Karamea Suite S-type granite-granodiorite-tonalite plutons which form much of the Karamea Batholith. New high precision, single zircon, U-Pb ID-TIMS dates for Karamea plutons suggest that this ~3300 km^2 suite was emplaced in a $\leq$ 2 Ma magmatic burst between 368.27 ± 0.11 Ma and 370.10 ± 0.17 Ma (internal 2σ errors). Estimating the thickness of the batholith at 10-15 km, these data indicate a flux rate of 83 to 124 km^3/km arc/Ma, an order of magnitude greater than some estimates for long-term continental margin arc averages (e.g. [1, 2]).

Significant involvement of Early Paleozoic metasedimentary crust in magma generation is indicated by Sr, Nd, and O isotopic compositions, as well as inherited zircon. Minor volumes of coeval HiSY (Sr/Y>40; TTG-like or adakitic) plutons probably reflect partial melting of a mafic crustal component. However, the rapidity of lower crustal melting also necessitates thermal involvement of significant volumes of juvenile mantle. An intra-arc or back-arc extensional setting, involving rapid influx of asthenospheric magmas into the lower crust by slab roll-back or foundering, appears likely. We will attempt to reconcile the apparent high magmatic flux and inferred mantle involvement with the high proportion of recycled crust.

Given the indicated high thermal flux into the lower crust, it is probable that the upper crust was also affected by high heat flow and hydrothermal alteration. Thus, the Karamea event may have led to at least some of the Paleozoic Au-mineralisation in western New Zealand.

[1] Ducea (2001) *GSA Today* **11,** 4-10. [2] Francis & Hawkesworth (1994) *Geological Society of London* **151,** 845-854.

Distributions of organic compounds in Dongsheng sedimentary Uranium ore deposits, China

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Organic matter (OM) associated with the Dongsheng sedimentary uranium ore deposits was characterized by Rock-Eval, gas chromatography-mass spectrometry and stable carbon isotope analysis. The OM in all of the analyzed samples is Type III with Ro less than 0.6%, indicating that the OM associated with these uranium ore deposits can be classified as a poor hydrocarbon source potential for oil and gas. n-Alkanes in the organic-rich strata are characterized by a higher relative abundance of high-molecular-weight (HMW) homologues and are dominated by C_{25}, C_{27} or C_{29} with distinct odd-to-even carbon number predominances from C_{23} to C_{29}. On the contrary, in the sandstone/siltstone samples, the n-alkanes have a higher relative abundance of medium-molecular-weight homologues and are dominated by C_{22} with no or only slight odd-to-even carbon number predominances from C_{23} to C_{29}. Methyl alkanoates in the sandstone/siltstone extracts range from C_{14} to C_{30}, maximizing at C_{16}, with a strong even carbon number predominance, but in the organic-rich layers the HMW homologues are higher, maximizing at C_{24}, C_{26} or C_{28}, also with an even predominance above C_{22}. n-Alkanes in the sandstone/siltstone sequence are significantly depleted in ^{13}C relative to n-alkanes in most of the organic-rich strata. Diasterenes, ββ-hopanes and hopenes are present in nearly all the organic-rich sediments but in the sandstone/siltstone samples they occur as the geologically mature isomers. The distribution patterns of the branched alkylbenzenes also show significant differences in different kinds of samples. The differences in organic compound distributions between the uranium-hosted sandstone and no-uranium organic-rich strata indicate that the organic matter in the organic-rich strata did not have an important or direct role in the precipitation of uranium ore in the sandstone. But an indirect role cannot be excluded, because OM alteration can create and maintain a reducing environment favorable for preconcentration of U and subsequent precipitation of uranium minerals.

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