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106-6: OXYGEN ISOTOPE MAPPING REVEALS A CRUSTAL-SCALE STRUCTURE WITHIN THE MEDIAN BATHOLITH, FIORDLAND, NEW ZEALAND

Monday, 23 October 2017
09:25 AM - 09:40 AM
The Conference Center - Skagit 2

The Median Batholith in New Zealand is a complex, Cordilleran-type batholith that formed along the southeast Gondwana margin from the late Paleozoic to late Mesozoic. Previous studies have proposed that the Median Batholith intruded a fundamental temporal and lithologic discontinuity between allochthonous, primarily oceanic-affinity rocks to the east (Eastern Province) and primarily Gondwana-affinity rocks to the west (Western Province). However, the crustal architecture of this boundary is obscured by voluminous intrusions of Mesozoic Darran and Separation Point Suite plutons.

Here, we use zircon oxygen isotope SIMS data from lower and middle crustal plutons to provide new insights into the crustal-scale structure within the Median Batholith and its significance as a boundary between the Eastern and Western Provinces. We present over 500 $\delta^{18}O$ (zircon) isotope analyses from 66 samples distributed across ~9,000 km^2 of Fiordland. Isotope data reveals three isotopic domains separated by 0.7 to 1.0‰ discontinuities. The western isotopic domain includes lower crustal Western Fiordland Orthogneiss rocks and has mantle-like $\delta^{18}O$ values ranging from +5.3 to +6.1‰. The eastern isotopic domain includes mid-crustal Darran and Separation Point Suite plutons, and is characterized by lower $\delta^{18}O$ values ranging from +3.7 to +4.5‰. The central isotopic domain includes plutons from mid-crustal Darran and Separation Point Suite and lower-crustal Arthur River Complex and Western Fiordland Orthogneiss. This domain is characterized by transitional isotopic values that display a strong E-W gradient with $\delta^{18}O$ values rising from +4.5 in the east to +5.3‰ in the west. The E-W gradient is also present in solely Jurassic plutons, implying transitional values formed prior to or during Jurassic magmatism. We propose that transitional values from plutons in the central isotopic domain reflect downthrusting of low-$\delta^{18}O$ crust beneath the Gondwana margin and record a paleo-suture zone at depth. Steep isotopic steps are interpreted to reflect modification of the original isotopic gradient by Cretaceous transpression, delineated by the Grebe mylonite zone (east-central boundary) and the George Sound shear zone (west-central boundary).

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