

Tonalites from Fiji: A probe of Archean continental crust growth?

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The generation of felsic melts within modern oceanic crust is less voluminous than in the Archean, and it is debated whether such melts can serve as modern analogues for formation of Archean TTGs (e.g. [1]). Interestingly, voluminous tonalitic plutons like those from Viti Levu, Fiji, have calc-alkaline compositions and Archean TTG characteristics.

Here, we present combined trace element, high precision HFSE and Hf-Nd-Sr isotope data on Fijian plutons. The tonalite plutons are divided into LREE-enriched, LREE-depleted, and evenly REE-enriched suites. In line with their mafic host rocks, all tonalites exhibit “pacific” type Hf-Nd isotope compositions [2]. Zr/Hf are from 23-39, and Nb/Ta (9-16) decrease with increasing LREE. The LREE-enriched suite exhibits the most similar Zr/Hf and Nb/Ta (32-39 and 9-13) to Archean TTGs [3].

Petrogenetic modelling suggests that the LREE-depleted tonalites represent products of fractional crystallization of island-arc tholeiitic (IAT) melts. In contrast, the LREE-enriched rocks are produced by dehydration melting of IAT in presence of amphibole. In general, formation of high volumes of tonalites via batch melting of thickened oceanic crust is still possible, even though some typical “Archean” traits are lacking, such as equilibrium with a residual garnet phase or with residual rutile (TTGs with high Nb/Ta).

[1] Willbold et al. (2009) *EPSL* **279**, 44-52. [2] Todd et al. (2012) *EPSL* **335-336**, 180-194. [3] Hoffmann et al. (2011) *GCA* **75**,4157-1478