

# Continental growth in oceanic island arcs: Fiji 40 years later

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The crust in some Tertiary island arcs is similar in velocity structure to the continents with a middle crust ~ 6 km/sec and a middle:lower crust ratio ~1:2. Estimates of the average chemical composition of the upper crust of these arcs are similar in most major elements to average continental crust (Taylor's "andesite model"). The middle crust of these arcs includes tonalitic plutons similar in most major elements to average continental middle crust which can be explained by episodic intra-crustal differentiation. The chief differences between Tertiary and average crust are in incompatible elements that are much lower in modern crust.

We present a synthesis of data for the best exposed example of middle crust formed in the Tertiary, in Viti Levu, Fiji. Nine mostly tonalitic plutons are >30 km<sup>2</sup>. They range from 55-75% SiO<sub>2</sub> and from LREE-depleted to slightly enriched compositions, with K<sub>2</sub>O <1% in most cases. Most formed during episodes of rifting prior to formation of back arc basins and unrelated to collisions.

Our estimates of the composition of average Fijian upper and middle crust are similar to those for the Izu-Bonin-Mariana arc, and differ most from their continental analogues in the under-abundance of all incompatible elements but especially alkalies, Th, U, and Nb. Crust similar to the average of continents can no longer be made in subduction zones except by recycling extensive amounts of old continents. This conclusion also applies to the tonalitic middle crust produced by intra-crustal differentiation.