Igneous architecture of Cenozoic Juvenile oceanic arc crust from start to finish

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Cenozoic oceanic island arcs of the Western Pacific are products of ~50 m.y. of juvenile crustal production far from earlier continents. They record overall statis, with trace element and isotopic compositions that vary within a relatively narrow range, reflecting DMM-type mantle and little recycling of continental REE, HFSE, Th, or even O. Exceptions are restricted to arc rifting, rupture, and demise. Other potential secular trends are veiled in inconsistent nomenclature and acronyms (e.g., tholeiitic, calcalkaline, FAB, BABB, EAT). Most crustal recycling occurs in rear arcs and during rupture, due to melting of subducted volcaniclastic ± hemipelagic sediment. Creating arc crust from the mantle takes as little as 10-20 m.y. even for crustal anatexis. Fiji is a well-studied example and will be reviewed. For almost 50 m.y. from arc inception to demise, most Fijian crust was LREE-Th-HFSE-depleted, variably Fe-enriched, basalt to andesite ("island arc tholeiite") except in rear arc environments and during arc rupture and rotation. Sr-Nd-Hf-Pb isotopes changed little, show scant evidence of recycled pelagic sediment, and are mostly FOZO-like in composition. There were three episodes of tonalite ± gabbro plutonism at ~37, 20, and 10 Ma. The first and last tonalities were mostly anatectic in origin from young amphibolite sources, whereas the middle episode seems to reflect shallow differentiation of relatively dry basalt during or shortly after backarc basin opening. Tonalite and detrital zircons lack old cores, have mantle Hf+O isotopes, and almost MORB-like trace element ratios. Regional uplift accompanied or quickly followed the first and last plutonic episodes.