

Isotopic Constraints on Subduction Initiation and Evolution: IODP Exp. 352 (Bonin Forearc)

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IODP Expedition 352 provides the first *in situ* crustal stratigraphy of subduction initiation and evolution beginning in the Eocene (c. 52Ma) by drilling the inner trench wall of the Bonin Forearc. Four Sites were drilled with total penetration into igneous basement of c. 1200m. The two sites nearest to the trench recovered forearc basalts (FAB), representative of nascent volcanism during subduction initiation, whilst the two sites furthest from the trench yielded boninites of likely slightly younger age. Presently, some 50 representative samples have been analysed for Sr-Pb-Nd-Hf isotopes. Uppermost boninite units have the highest ⁸⁷Sr/⁸⁶Sr and ²⁰⁶Pb/²⁰⁴Pb ratios and lowest ¹⁴³Nd/¹⁴⁴Nd and ¹⁷⁶Hf/¹⁷⁷Hf ratios. Forearc basalts have strikingly similar isotopic characteristics to Indian MORB, with evidence for weak involvement of slab-derived fluids. This observation, together with sheeted intrusions at the base of FAB dominated sites, supports models where sea-floor spreading takes place immediately following subduction initiation in response to slab rollback. A subduction component with high Pb/Nd and Hf/Nd relative to the mantle wedge is identified. Overall, radiogenic isotope stratigraphy traces the progressive influence of the embryonic subduction zone on magma genesis.