

**Isotopic constraints on magma
source evolution during subduction
initiation: IODP 352 (Izu-Bonin
Forearc)**

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IODP Exp. 352 drilled four main holes in the Izu-Bonin-Mariana Forearc, recovering fore-arc basalts (FAB) formed at the initiation of subduction and later boninites (low- and high-silica varieties LSB and HSB) formed from an inferred depleted mantle source fluxed by subduction-derived melts and fluids. Trace elements and Nd-Hf-Pb radiogenic isotope compositions of these drilled sequences thus provide a unique window into processes operating in a nascent arc system during subduction initiation. The recovered FAB have extremely depleted Nd-Hf isotopes with Indian Ocean Plate mantle signatures. Nd-Hf-Pb isotopic compositions for the LSB plot between FAB and subducting Pacific basaltic crust. HSB show a narrow range of Hf isotopic compositions similar to the lowest values for LSB, and also trend towards lower Nd isotope values. Pb isotopes for HSB plot between those of Pacific basaltic crust and subducting sediments. Modelling of the isotope and trace element data provide evidence for a contribution of melt from subducted, amphibolite-facies Pacific basaltic crust for the LSB source and a fluid contribution from subducted pelagic sediments for the source of the HSB. The mode of mantle source enrichment by different subduction inputs argues for the origin of the nascent arc system near the subduction initiation ridge spreading center and progressive cooling of the downgoing plate as subduction developed.