# Making new oceanic crust in a subduction initiation setting: New results from Bonin Forearc Drilling (IODP Exp. 352)

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There is wide support for the Stern-Bloomer hypothesis that sea-floor spreading following subduction initiation is the mechanism for the formation of most Supra-Subduction Zone ophiolites. However, testing and developing this hypothesis is constrained by the fact that even the best-studied in situ example of subduction initiation, the Izu-Bonin-Mariana (IBM) forearc, is Eocene, largely submarine, sediment-covered, and lacks good stratigraphic control. Thus, in late 2014, IODP Exp. 352 targeted the Bonin forearc in an attempt to drill a complete reference section through subduction initiation oceanic crust. Two sets of sites were drilled with a total penetration of 1200m: Sites U1440 and U1441 were drilled in deep water and recovered basalts, while Sites U1439 and U1442 were drilled in shallower water further from the trench and recovered boninites. Holes U1439C and U1440B both rooted in sheeted dolerites, inferred to be dikes on the basis of textures, geochemical variations and comparison with lava-dyke transitions drilled elsewhere. The drilled basalts are similar in composition to 'fore-arc basalts' (FAB) already sampled from the IBM forearc which give ages of c. 51-52 Ma, just following subduction initiation. In terms of enrichment in subduction-mobile elements, they exhibit little-to-no subduction input, though they are depleted in incompatible elements relative to average N-MORB and have lower Ti/V ratios. Their downhole variability and degree of differentiation are indicative of eruption from a stable melt lens. The boninites reflect a more depleted mantle source modified by a significant subduction component; they are likely slightly younger and could represent the final stages of spreading. Overall, compositions support a model of spreading above an embyonic subduction zone in which mantle depletion and subduction input increase with time. The structure and composition of subduction initiation oceanic crust here, and in general, is likely a function mainly of roll-back rate which is influenced in turn by a number of variables, including the age of the subducted lithosphere and the absolute rates of motion of the larger plates.