

Petrological and geochemical analysis of basalts in forearc & subducting slab offshore Costa Rica, IODP Exp. 334, CRISP

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The Costa Rica Seismogenesis Project (CRISP) is designed to understand the processes that control nucleation and seismic rupture of large earthquakes at erosional subduction zones. Integrated Ocean Drilling Program (IODP) Expedition 334 penetrated the slope sediments of the overriding Caribbean plate at Sites U1378 and 1380, the entire sequence of the slope sediments and the upper part of the acoustically defined basement at Site U1379, and sediments and oceanic crust of the incoming Cocos plate at Site U1381. In order to constrain the tectonic setting of the drill site and fluid rock interaction within the basaltic crust, which is a potential fluid source for the seismogenic zone, basalts were petrologically and geochemically analyzed. Basalt clasts from poorly sorted matrix-supported breccia were recovered at the top of the acoustically defined basement at Site U1379. Some of the clasts contain prehnite and pumpellyite, indicating prehnite-pumpellyite facies metamorphic conditions, similar to the Osa melange onshore Costa Rica. At Site U1381, sequences of pillow basalts are intercalated with calcareous mudstone as part of the oceanic crust. The pillow basalts are characterized by plagioclase and pyroxene phenocrysts with microcrystalline to fine-grained groundmass with variable extent of alteration. The basalts were cut by numerous veins mostly consisting of calcite. Groundmass alteration is especially evident along veins, fractures and vesicles, associated with clay minerals and pyrites. Based on our data, the origin of the basalt clasts in the forearc basement, and fluid-basalt interaction in the subducting oceanic crust will be discussed.

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