

Advent of Continent: Evidence from the Nishinoshima Volcano in the Ogasawara Arc

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Nishinoshima, one of the submarine volcanoes in the Ogasawara Arc, ~1,000 km south of Tokyo, Japan, suddenly erupted in November 2013, after 40 years of dormancy. The Nishinoshima volcano might represent the missing link between the mantle and the continental crust because (1) Nishinoshima, whose underlying crust is only 21 km thick, is one of the world's closest volcanoes to the mantle, and (2) the lavas have been andesites and were similar in composition to the continental crust. Here we report the scientific results of our endeavours to collect lavas from the currently erupting lava flows on the surface to the submarine lavas of the Nishinoshima volcano. Using olivine-bearing phenocryst-poor andesite samples, we developed a mantle-derived andesite model for the genesis of the Nishinoshima volcano. Shallow and hydrous mantle melting is necessary to produce primary andesite magmas, and thus it is only achieved beneath Nishinoshima and submarine volcanoes in the Ogasawara arc, where the crust is thin. We also show that the primary magma composition change from basalt produced at a considerable depth beneath the old thick lithosphere to andesite produced beneath the present crust corresponds to the thermal evolution of the mantle wedge in the Ogasawara arc.

Keywords: andesite, continental crust, oceanic arc

