

Evidence for the low-pressure and -temperature origin of the Minami-Shimabara basalts in northwest Kyushu, southwest Japan

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Hot spot-type basalts erupted from 4.6 to 0.6 Ma are distributed in the Minami-Shimabara area, at the southern foot of the Unzen volcano in northwest Kyushu, southwest Japan. Compositional similarities between the Minami-Shimabara basalts and the host lava of mantle xenoliths from northwest Kyushu indicate that most of the Minami-Shimabara basalts would have originally been primitive or less-fractionated magmas. Their normative olivine-quartz-[Jd + CaTs] compositions demonstrate that the Minami-Shimabara magmas would have been segregated from the heterogeneous source mantle at pressures ranging from 1.5 to 0.5 GPa. Their normative olivine-quartz-[Jd + CaTs] compositions also indicate that the source mantle would have had a relatively low potential temperature, such as 1300 °C. Upwelling of the mantle with such low temperature would have been caused by shallow mantle processes, such as plate tectonics. Potential tectonic activity causing mantle upwelling would be the subsidence of the Amakusa-nada Graben simultaneous with the Minami-Shimabara volcanism.