

Evidence of slab melting for the formation of high-Mg andesite; a hafnium isotope study of Setouchi volcanics, Japan

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Hf isotope ratios were measured for high-Mg andesites (HMA) and basalts from the Setouchi volcanic belt, Southwest Japan, in order to examine whether fluid or melt from subducted slabs act as metasomatic agents for HMA magma genesis. Hf isotopes may provide strong constraints on the origin of such slab-derived components because Hf is one of the incompatible elements that may not be readily transported by aqueous fluids. Setouchi HMAs and basalts show lower $^{176}\text{Hf}/^{177}\text{Hf}$ (eHf less than +10.8) than MORBs and Izu-Bonin-Mariana arc basalts (eHf more than +13), suggesting significant contribution of subducted sediments to Setouchi magma genesis. It should be further stressed that Hf isotopes are well correlated with Sr-Nd isotopes, La/Sm and La/Nb ratios among the Setouchi magmas. Calculation of mixing between mantle wedge material and slab-derived components suggests that such geochemical characteristics can be best explained by addition of slab-derived components with sediment melts rather than aqueous fluids to the HMA source.