

Isotope geochemistry of Hualalai shield stage tholeiites from the submarine North Kona region

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We report the results of Hf, Nd, Sr, and Pb isotopic compositions of 34 lavas collected from deep submarine North Kona region, the west flank of Hualalai Volcano. The samples were collected from the lower section of the North Kona bench (dives K218 and K219), the submarine section at Hualalai volcano's northwest rift zone (dive S690), and the elongate ridge below the central section of the bench (dive S692) during 2001 and 2003 JAMSTEC Hawaii cruises. Hualalai volcano is presently in the post-shield alkalic stage and most of its subaerial surface is covered by alkalic basalts. All analyzed samples of the pillow lavas are tholeiites that erupted during Hualalai shield stage. It is important to identify source materials involved in the volumetrically dominant stage of Hualalai Volcano, in order to provide constraints on the chemical structure of the Hawaiian plume.

Isotopic compositions of the lavas have $^{176}\text{Hf}/^{177}\text{Hf}$ from 0.283055 to 0.283124, $^{143}\text{Nd}/^{144}\text{Nd}$ from 0.512847 to 0.512934, $^{87}\text{Sr}/^{86}\text{Sr}$ ratios ranging from 0.703642 to 0.703801, $^{206}\text{Pb}/^{204}\text{Pb}$ from 18.0825 to 18.3294, $^{207}\text{Pb}/^{204}\text{Pb}$ from 15.4470 to 15.5039, and $^{208}\text{Pb}/^{204}\text{Pb}$ from 37.8354 to 38.1719. Hf, Nd, Sr isotopic compositions of the submarine North Kona lavas are similar to the data previously reported for Mauna Loa tholeiites. Pb isotopic compositions for samples from dive K218 form different mixing line than samples from dive K219, reflecting the contribution of another source component. Samples from dive S690 plot on both mixing trends. Our new data provide important information about geochemical characteristics of the source of Hualalai shield volcanism and about the spatial distribution of isotope heterogeneities in the source of Hawaiian lavas.