Hf-Nd-Sr isotopes of Northwest Hawaiian Ridge lavas

LAUREN HARRISON[1*], DOMINIQUE WEIS[1], MICHAEL O. GARCIA [2]

[1]Pacific Centre for Isotopic and Geochemical Research, University of British Columbia, Vancouver, BC, V6T 1Z4, Canada (*correspondence: lharriso@eos.ubc.ca)

[2]Department of Geology and Geophysics, Univ. Hawai'i, Honolulu, HI 96822, USA

The Hawaiian-Emperor (HE) chain records ~82 Myr of volcanism with two distinct geochemical and geographical trends, Kea and Loa, identified along archipelago [1]. The Northwest Hawaiian Ridge (NWHR) includes 51 volcanoes spanning ~42 Myr between the bend in the HE chain and the Hawaiian Islands. Lavas from only two NWHR volanoes near the bend have high-precision isotopic data prior to our study [1,2]. Only Kea compositions have been observed on Emperor seamounts (>50 Ma) [1,3], whereas the Hawaiian Islands (<~5 Ma) have both Kea and Loa type lavas [3,4]. We have analyzed 23 samples of shield stage tholeiitic rocks from 13 NWHR volcanoes for Hf, Nd, and Sr isotopic compositions to test if the Loa composition is present south of Diakakuji seamount [1]. New high precision $^{87}Sr/^{86}Sr$ ratios are systematically lower than existing data due to greater accuracy afforded by acid leaching and age correcting measured isotopic ratios. The new analyses show a maximum $^{87}Sr/^{86}Sr$ of 0.70380 directly after the bend at Diakakuji that gradually decreases along the NWHR in contrast to the previous data that showed scatter. Nd and Hf isotopes are at a minimum at Diakakuji (ε_{Nd} = 5.7; ε_{Hf} = 9.3) and West Nihoa (ε_{Nd} = 5.9; ε_{Hf} = 11.0) and a maximum (ε_{Nd} = 8.4; ε_{Hf} = 14.8) at Gardner, where the magma flux of the NWHR is the highest. These observations suggest the Loa composition occurs ephemerally along the NWHR on a longer time interval than local periodicies in flux (1-2 and 10-15 Myr timescales [5]). At a broader scale of the enitre HE chain, correlation between radiogenic isotopes and magmatic flux suggests source composition may influence large-scale increases in magma flux and volcanic propogation rate along the NWHR, and help explain why the Hawaiian mantle plume seems to be strengthening rather than waning like other mantle plumes and LIPs.

[1] Regelous et al. (2003) *J. Pet.*, **44**, 1, 113-140. [2] Garcia et al. (2015) *GSA Sp. Pap. 511*. [3] Tanaka et al. (2008) *EPSL* **265**, 450-465. [4] Weis et al. (2011) *Nat. Geosci.*, **4**, 831-838. [5] Wessel (2016) *Geoph. J. Int.* **204,** 932-47.