

# Geochemistry of Northwest Hawaiian Ridge Basalts: Insight in the Evolution of the Hawaiian Mantle Plume

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Northwest Hawaiian Ridge (NWHR) lavas were produced by the Hawaiian mantle plume. Our sample suite, extending from Academician Berg (~45 Ma) to West Nihoa (~8 Ma), spans 2000 km and ~40 Myr of the NWHR. Critical changes occurred during this time, including an increase in volcanic propagation rate, magmatic flux, and the introduction of a new mantle source component [1]. We build on previous geochemical research [1] on the NWHR to 1) characterize NWHR lavas along much of its length, filling significant knowledge gaps by providing data for 7 previously unsampled volcanoes, and 2) refine the current understanding of the geographical and temporal introduction of the enriched Loa component into the mantle source of Hawaiian volcanoes. Much of the NWHR resides within the Papahānaumokuākea Marine National Monument, a protected area mostly inaccessible to geologists, making the sample suite unique and valuable to reconstructing the evolution of the Hawaiian mantle plume. The suite is comprised of 22 rock samples from 11 NWHR volcanoes, collected via submersible in 2015 and 2016 by the National Oceanic and Atmospheric Administration. Major and trace element concentrations constrain the sample types as tholeiitic shield and alkalic postshield lavas [2], and contributes to the geochemical profile of the NWHR with lead, strontium, neodymium and hafnium isotopic analyses on a finer sample selection. This additional sample suite will allow us to further decipher the connection between the enriched Loa component and physical plume parameters, such as magmatic flux, more quantitatively using high resolution geochemical methods.

[1] Harrison, L. N.; Weis, D.; Garcia, M. O. The Link between Hawaiian Mantle Plume Composition, Magmatic Flux, and Deep Mantle Geodynamics. *Earth and Planetary Science Letters* **2017**, *463*, 298–309. <https://doi.org/10.1016/j.epsl.2017.01.027>.

[2] Clague, D.; Dalrymple, G. B. The Hawaiian- Emperor Volcanic Chain. Part I. Geologic Evolution. *US Geological Survey Professional Paper* **1987**, *1350*, 5–54.