U AND TH ABUNDANCE AND ISOTOPIC COMPOSITION OF MODERN HAWAIIAN THOLEIITES AS TRACERS OF FINE SCALE MANTLE HETEROGENEITY IN THE HAWAIIAN PLUME

Rubin, K. H., Dept. of Geology and Geophysics, Univ. of Hawaii, Honolulu, HI, 96822, USA

A large number of workers have noted isotopic and elemental abundance attributes of lavas from the active Hawaiian volcanoes that can be attributed to variations in mantle composition beneath them. These in turn have been related to a range of ancient and modern processes that enrich or deplete various trace elements from each other, including modern melting events that occur as the plume is sampled at successive volcanoes along the chain. Hawaiian tholeiites sample relatively large volumes of the mantle at more stable melting conditions (compared to alkalic lavas) and can be thought of as representing smoothed means of mantle compositional variability which are useful for looking at large spatial scale compositional variation patterns. Th and U abundance and isotopic composition data for tholeiites can be used to elucidate the subtle differences in source composition and the conditions of magmageneis of the active Hawaiian volcanoes. Historic lavas from Kilauea, Mauna Loa and Loihi volcanoes provide a snapshot in time of the evolving Hawaiian plume and how it is sampled at successive volcanoes along the chain. Actinide data from such lavas can be interpreted as showing increased melting extent and rate with associated depletion of the overall source (in terms of Th and U abundance and Th/U) from Loihi to Kilauea to Mauna Loa. Actinide data will be discussed in concert with other isotopic data to help refine models of the temporal and spatial variability in the modern composition of the Hawaiian plume.