

## Geochemistry of Late Cenozoic basaltic rocks from Vietnam

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We have determined the major and trace elements, and Sr-Nd-Hf-Pb isotopic compositions of Late Cenozoic (4.1 to 13.8 Ma) basaltic rocks from southern Vietnam to understand the nature of the mantle source. The volcanic rocks are composed of tholeiite basalt, and alkaline basanite, trachybasalt, basaltic trachyandesite and trachyandesite. The alkaline rocks show LREE-enriched pattern with  $(La/Yb)_N = 10.3-29.8$ . The tholeiite basalts are distinguished by much less values (8.8-9.5) of  $(La/Yb)_N$ . On a primitive mantle-normalized trace element distribution diagram, they show OIB-like LILE enrichment without HFSE depletion. However, some samples exhibit positive anomalies in K and Pb, and negative anomaly in Sm, suggesting phengite or K-amphibole possibly in the source. The samples have Sr ( $^{87}Sr/^{86}Sr = 0.703794-0.704672$ ), Nd ( $\epsilon Nd = 1.2-5.4$ ), Hf ( $\epsilon Hf = 4.0-10.9$ ), Pb ( $^{206}Pb/^{204}Pb = 18.23-18.75$ ;  $^{207}Pb/^{204}Pb = 15.53-15.59$ ;  $^{208}Pb/^{204}Pb = 38.32-38.88$ ) isotopic compositions, plotting within the OIB field with a DMM-EM2 array. There are no discernible isotopic differences between tholeiite and alkaline series, reflecting same source origin. The Nd and Hf isotopic compositions are coupled and plot along the mantle array, ruling out pelagic sediment or possibly lithospheric mantle in the source. Plots of the NiO against Fo of olivines from the basaltic rocks are within the field of Hainan or Hawaiian basalt olivines, reflecting pyroxenite in the source. Also note that the estimated primary melt compositions plot within the experimental field defined by partial melting of silica-poor eclogite and peridotite. We suggest that the Vietnamese basaltic rocks might be produced by the Hainan plume containing recycled eclogitic oceanic crust.