Geophysical Research Abstracts
Vol. 21, EGU2019-17728, 2019
EGU General Assembly 2019

Moderate melt depleted anhydrous mantle xenoliths underneath Central Vietnam: evidence for stabilization of the lithospheric mantle before Meso-Proterozoic times.

Peter Proßegger (1), Theodoros Ntaflos (1), Lukáš Ackerman (2,3), Christoph Hauzenberger (4), Tuan Anh Tran (5), Vojtech Erban (2,3)

(1) University of Vienna, Dept. für Lithosphärenforschung, UZA II, Vienna, Austria (theodoros.ntaflos@univie.ac.at), (2) Institute of Geology v.v.i., TheCzech Academy of Sciences, (3) Czech Geological Survey, Geologická 6, (4) NAWI Graz Geocenter - Petrology & Geochemistry, (5) Institute of Geological Sciences Vietnam Academy of Science and Technology

The Vietnam Cenozoic basalts belong to the Western Pacific “diffuse” igneous province (Hoang et al., 2013). They consist mainly of mantle xenolith-bearing alkali basalts, basanites, rarely nephelinites as well potassic rocks and quartz tholeiites. The subduction of the Pacific plate underneath the Eurasian plate has been account for the back-arc volcanism in Vietnam.
A collection of 24 mantle xenoliths from La Bang Lake, Dak Doa district and Bien Ho, Pleiku city in the Gia Province, Central Vietnam has been studied in detail. They are predominantly spinel lherzolites (19) but spinel harburgites (3) and two garnet pyroxenites are present as well. The size of the xenoliths range from 5 to 40 cm in diameter with medium to coarse-grained protogranular textures.
The whole rock Mg# for spinel lherzolites and spinel harzburgites vary from 89.5 to 90.7 and from 91.4 to 91.6 respectively. Most of the xenoliths have an $CaO/Al2O_3$ ∼0.8-0.9, which is slightly higher than the Primitive Mantle ratio. Both CaO and $Al2O_3$ correlate positively most likely indicating that the sampled rocks were derived from a common mantle source experienced variable degrees of partial melting.
Mineral analyses show that the rock forming minerals are chemically homogeneous. The Fo contents of olivine vary between 89.2 and 91.2 and the Mg# of orthopyroxene and clinopyroxene range from 89 to 92 and 89 to 94 respectively. The range of Cr# for spinel is 0.06-0.26.
Model calculations in both whole rock and clinopyroxenes show that lithospheric mantle underneath Central Vietnam experienced melt extractions that vary between 2-15 %.
The majority of the primitive mantle-normalized whole rock and clinopyroxene REE patterns are parallel to each other indicating that clinopyroxene is the main repository of the trace elements. Clinopyroxenes are divided into two groups: group A with concave upwards REE and (La/Yb)N < 1 suggesting various degrees of melt extraction and group B with (La/Yb)N ranging between 1 and 10. The group B in a mantle normalized trace element diagram shows negative Pb and Sr anomalies compared to their neighbour elements, which together with the general absence of hydrous phases, suggest variable interaction with percolating silicate melt(s).
The primitive-mantle normalized highly siderophile element (HSE) patterns show insignificant fractionation among Ir, Ru and Pt with only slight depletion in Os suggesting very limited effect of metasomatism on the HSE contents. On the other hand, all samples have a (Pt/Re)N ranging from 1.4 to 4.5, which is an evidence for melt depletion. The samples display clear Re addition from the percolating melts preventing calculation of reliable rhenium depletion ages (TRD). However, one sample with depleted Pd and Re signature yield TRD 1.6 Ga which can be interpreted as a minimum SCLM stabilization age in this area.
Literature
Hoang et al., 2013, Collision-induced basalt eruptions at Pleiku and Buon Me Thuot, south-central Viet Nam. Journal of Geodynamics 69, 65-83.