MODERATE MELT DEPLETED ANHYDREOUS MANTLE XENOLITHS UNDERNEATH CENTRAL VIETNAM: EVIDENCE FOR STABILIZATION OF THE LITHOSPHERIC MANTLE BEFORE MESO-PROTEROZOIC TIMES

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The Vietnam Cenozoic basalts belong to the Western Pacific "diffuse" igneous province (HOANG et al., 2013). They contain mantle xenolith-bearing alkali basalts, basanites and rarely nephelinites. The volcanism has been attributed to continental extension caused by the collision of the India-plate with the Eurasia-plate and by subduction of the Pacific Ocean below Asia.

A collection of 24 mantle xenoliths from Ia Bang Lake, Dak Doa district and Bien Ho, Pleiku city in 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 ranges 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 CaO/Al_2O_3–ratios of 0.8-0.9, which is slightly higher than the Primitive Mantle ratio. Both CaO and Al_2O_3 correlate with MgO most likely indicating that the sampled rocks were derived from a common mantle source having experienced variable degrees of partial melting. 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 clino-pyroxenes show that lithospheric mantle underneath Central Vietnam experienced melt extractions that vary between 2-15 % for most samples.

Most of the primitive mantle-normalized whole rock and clinopyroxene REE patterns are parallel 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 53. Group B in a mantle normalized trace element diagram shows negative Pb and Sr anomalies, 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. 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. Some samples display clear Re addition from percolating melts preventing calculation of reliable rhenium depletion ages (T_{RD}). However, one sample with a depleted Pd and Re signature yields T_{RD} of 1.9 Gy which can be interpreted as a minimum SCLM stabilization age in this area.

HOANG, N., FLOWER, M.F.J., CHI, C.T., XUAN, P.T., QUY, H.V. (2013): J. of Geodynamics, 69, 65-83.