

MODAL AND CRYPTIC MANTLE METASOMATISM IN XENOLITHS FROM CENTRAL AND SOUTHERN VIETNAM

Hauzenberger, C. A.¹, Konzett, J.² & Nguyen, H.³

¹Department of Petrology and Geochemistry, NAWI Graz Geocenter, University of Graz, Universitaetsplatz 2, A-8010 Graz, Austria

²Institute of Mineralogy und Petrography, Universität Innsbruck, Innrain 52f, A-6020 Innsbruck, Österreich Austria

³Institute of Geological Sciences, Vietnam Academy of Science & Technology, 84 Chua Lang, Hanoi, Vietnam
e-mail: christoph.hauzenberger@uni-graz.at

Mantle xenoliths, clinopyroxene, zircon and sapphire xenocrysts occur commonly within the basalt plateaus in central and southern Vietnam. The different basalt flows/eruptions belong to a tholeiitic and an alkaline suite and have Neogene to Quaternary age (HOANG & FLOWER, 1998). The mantle xenoliths are exclusively found in the alkaline basalts and are typically a few cm to tens of cm in size, consist of spinel lherzolites as well as some spinel harzburgites and pyroxenites. Samples from Pleiku, Da Lat, Nui Trai, Xuan Loc and the off shore locality Ile de Cendres were recovered and investigated in detail.

Most samples display the simple lherzolitic mineral assemblage Ol–Opx–Cpx–Sp. The Ol, Cpx and Opx crystals are equigranular, Sp occurs usually as smaller sized intersertal phase or as oriented inclusion in Cpx. Clinopyroxene is found in two generations: (1) primary Cpx I has a uniform composition with a typical X_{Mg} ($=Mg/(Mg+Fe^{2+})$) of 0.92 to 0.98, a X_{Na} ($=Na/(Na+Ca)$) of 0.10 to 0.16, a Cr_2O_3 content of 0.6–0.9 wt. % and Al_2O_3 values of 6 to 8 wt. %. (2) Cpx II recrystallized as “spongy rim” around Cpx I, has a lower X_{Na} and Al_2O_3 content as well as higher X_{Mg} and Cr_2O_3 content compared to Cpx I. Orthopyroxene typically has a X_{Mg} of c. 0.90 to 0.93. The X_{Mg} values for Ol differ slightly between different samples but are within 0.84 to 0.94. Spinel grains have a variable composition with X_{Mg} from 0.65 to 0.92 and X_{Cr} ($Cr/(Cr+Al+Fe^{3+})$) of 0.08 to 0.25. The use of the Cpx–Opx thermometer (BREY & KOEHLER, 1990) and the Al and Cr in Ol thermometer (DE HOOG et al., 2010) allowed to calculate temperatures of 800 to 1100 °C at a pressure of 1.5 to 2.0 Gpa. Clinopyroxene I trace and rare earth element pattern are slightly depleted in light rare earth elements (LREE), typical for average depleted mantle compositions, some samples are strongly enriched in LREE indicating mantle metasomatic processes by carbonatitic melts. The variation in LREE as well as LIL element concentration in Cpx from different xenoliths is evidence for the heterogeneous nature of the mantle beneath Indochina. In addition elongated apatites as well as carbonate droplet inclusions in olivine are found in some samples indicating metasomatic influence from carbonatitic melts.

Financial support from the Austrian Academy of Sciences and ASEA-Uninet is gratefully acknowledged. This is a contribution to IGCP557.

BREY, G.P., KOEHLER, T.P. (1990): *J. Petrology*, 31:1353–1378.

DE HOOG, J.C.M, GALL, L., CORNELL, D.H. (2010): *Chem. Geol.*, 270, 196–215.

HOANG, N. & FLOWER, M. (1998): *J. Petrology*, 39, 369-395.