

## EVIDENCE FOR MANTLE METASOMATISM IN SELECTED SAMPLES FROM THE STYRIAN BASIN

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The Pannonian Basin is an extensional back-arc basin surrounded by the Eastern Alps and the Carpathian fold belt. Two main volcanic events can be distinguished within the Pannonian Basin: (i) younger Pliocene to Pleistocene activity, consisting of extension related alkali basalt volcanics, and the (ii) older Eocene subduction related calc alkaline volcanism.

The samples appear as small nodules ranging from 2 to 5 cm in diameter and stuck within the basaltic tuffs. They were collected near the villages of Beistein and Waxenegg and at the prominent locality of Kapfenstein.

They comprise (i) spinel ( $\pm$  amphibole) lherzolites (samples K12, KK1, K11, Wa2) and (ii) amphibole spinel websterites (samples BS5, WA1). Spinel-amphibole lherzolites are protogranular textured with large olivine, Cr-diopside and orthopyroxene crystals. Pargasites are found in two samples as interstitial grains. Fluid trails in some crystals indicate the presence of fluids as an agent for metasomatic reactions. Ti-pargasites indicate metasomatism in the amphibole spinel websterites. Mantle metasomatism is indicated by an overall enrichment in REE compare to the CI chondrite and a slight enrichment in LREE and MREE compared to the HREE. Amphiboles show a positive anomaly for Sr which is not seen in the coexisting clinopyroxenes.

Clinopyroxenes show a similar chondrite normalized REE pattern as amphiboles with slightly higher values compared to the amphiboles.

P-T calculations show that these samples are derived from the lithospheric mantle at depths of around 50 km corresponding to  $\sim$ 930-1070 °C and  $\sim$ 10-14 kbar. All samples plot near the Styrian Basin geotherm, but show slightly higher temperatures (or lower pressures) than expected. Temperatures for the Styrian xenoliths were calculated using the aluminium partitioning between olivine and spinel geothermometer ( $T_{WCC2008}$ ) of WAN et al. (2008). Pressures were estimated using the calcium exchange geobarometer between olivine and clinopyroxene ( $P_{KB1990}$ ) of KÖHLER & BREY (1990).

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