



Alkaline and carbonatite metasomatism of lithospheric mantle beneath SW Poland- Pilchowice case

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The Cenozoic basanites from Pilchowice (SW Poland) form volcanic plug located exactly at Intra- Sudetic Fault. These basanites belong to the Polish part of the Central European Volcanic Province and contain numerous, usually small (<10 cm) peridotitic mantle xenoliths.

Their protogranular texture (olivine up to 8 mm, common kink bands) is obliterated by intense fissuring and fragmentation of the grains. The peridotites have harzburgitic composition (Ol 87- 86%, Opx 13- 9%, Cpx 3-0%, Spl 8-0%). Fragmentated and sometimes serpentinized olivines (Fo 90.2- 91.5) contains 0.35- 0.45 wt. % NiO. The orthopyroxene Al content varies from 0.02 to 0.12 atoms pfu and mg# from 0.915- 0.920 . One xenolith contains clinopyroxene with abundant spongy rims. Primary clinopyroxene is very rare and Al-enriched (mg# 0.92, 0.17 atoms of Al pfu). The spinel is Cr enriched (cr# 0.46-0.68) and is usually associated with clinopyroxene.

Orthopyroxene is depleted in REE compared to primitive mantle. Orthopyroxene from majority of xenoliths are strongly LREE depleted ((La/Lu)_N = 0.03-0.21).

All studied peridotites contain clinopyroxene which is enriched (2 to 70 times) in REE compared to primitive mantle. Clinopyroxene patterns show relative low HREE concentration ((La/Lu)_N = 4.75- 19.99), moreover patterns from three samples are convex- upward shaped with inflection point on Nd ((La/Nd)_N = 0.36-0.96).

Clinopyroxene- poor lithology, high cr# in spinel and LREE- depleted nature of orthopyroxene suggest that upper mantle sampled by Pilchowice basanite is a restite after partial melting. The LREE enriched composition of clinopyroxene suggest that peridotites were metasomatised. Clinopyroxene convex- upward shaped REE plots with inflection point on Nd is typical for metasomatism related with alkaline melt. On the other hand very low ratios of Ti/ Eu (24.8- 738.9) and high (La/ Yb)_N (3.5- 17) ratio (Coltorti, 1999) suggest that the metasomatic agent was either a mixture of alkaline silicate melt with carbonatite or peridotite reaction with two independent agents is recorded.

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Coltorti, M., Bonadiman, C., Hinton, R. W., Siena, F. & Upton, B. G. J. (1999). Carbonatite metasomatism of the oceanic upper mantle: Evidence from clinopyroxenes and glasses in ultramafic xenoliths of Grande Comore, Indian Ocean. *Journal of Petrology* 40, 133-165.