Insight into the lithospheric mantle beneath NE part of Bohemian Massif: A case study of Lutynia (SW Poland) peridotite xenoliths

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During Cenozic times Central Europe has undergone intense alkaline volcanism, which formed Central European Volcanic Province (CEVP). In the Sudetes Mts. (SW Poland), constituting northern margin of the Bohemian Massif, the main phase of volcanic activity lasted from 30 to 20 Ma ago. Younger, 5–3 Ma eruptions occur in Lądek Zdrój region, which is one of the easternmost occurrences of CEVP.

Basanites occurring in Lądek Zdrój region contain Spl–lherzolite to Spl–harzburgite xenoliths, whose equilibration temperatures (Brey and Köhler [1] geothermometer) vary from 955 to 1000°C. Trace elements contents in primary Cpx suggest that the peridotites underwent early partial melting and then cryptic metasomatism. Three kinds of REE patterns occur in primary Cpx: I – LREE enriched (La_N/Lu_N=4.91-20.20); II – with constant HREE content (Lu-Dy) at ca. primitive mantle level and strongly LREE enriched (La_N/Sm_N=4.63–17.53).; III – with steep negative inflection at MREE (La_N/Lu_N=10.16 – 51.16). The metasomatic agent caused variable and sometimes mutually exclusive changes in Cpx trace elements contents (ie. significant Th and U content, Ba, Nb, Ta negative anomalies). Despite some strong carbonatitic features (eg. Ti/Eu=240-4600), lack of significant Ti and Zr negative anomalies and low Ba content exclude carbonatites. Thus, we suggest that the metasomatism was caused by a silicate melt.

Temperatures and Cpx REE contents of the Lutynia peridotites are low compared to other CEVP mantle xenoliths. They are, however, similar to those occurring in xenoliths from the Kozákov volcano (Czech Republic, ca. 150 km WNW from Lutynia) [2], who was active at the same time. The similarities may suggest that the metasomatic and volcanic processes affecting lithospheric mantle were similar beneath whole NE part of the Bohemian Massif.

[1]Brey & Köhler (1990) *J. Petrology* **31**, 1353-1378. [2] Ackerman *et al*. (2007) *J. Petrology* **48**, 2235-2260.

The alteration of calcite surface exposed to arctic soil environment – AFM study

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This study presents the results of Atomic Force Microscopy (AFM) imaging of calcite sample surfaces after they have been burried for one year in arctic soil at Spitsbergen. The objective of the study was to determine the pattern of calcite surface alterations and to compare the effects of various environments. Several samples of freshly cleaved calcite were buried in six different locations. Environmental effects include varying elevations (ranging from 1 to 590 m amsl), distances from the Greenland Sea (from 10 m to 3000 m), and distances from the Werenskiold Glacier (from 100 to 3500 m). The retrieved samples were analyzed using an AFM and compared with a control sample that was freshly cleaved and has never been exposed to an arctic environment.

The control sample is characterized by sharp step edges and smooth surfaces. Overall, all of the calcite samples recovered from Spitsbergen have more irregular surfaces with rounded edges. Development of numerous intersecting, both isometric and elongated etch pits, typically about 5 nm deep, is common. Distribution of etch pits is heterogeneous with some areas less affected. Typically top step surfaces are more alterd than bottom step surfaces. Rombohedral weathering patterns are occasionally present on some surfaces but do not dominate the weathering pattern. Calcite surfaces are covered locally by biofilm.

The most prominent dissolution features (advanced weathering) were observed in the sample located at the Greenland Sea shore characterized by the longest contact time with water and higher moisture air masses as well as in the sample located closest to the Werenskiold Glacier characterized by the abundance of chemically undersaturated, aggresive melting waters.