

Referee report of PhD theses

**by
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Geochemistry of upper mantle rocks from Kozákov and Horní Bory, Bohemian Massif

The theses are compilation of three papers on Geochemistry:

1. Geochemistry and evolution of Subcontinental lithospheric mantle in Central Europe: Evidence from peridotite xenolite of the Kozákov volcano, Czech Republic, published in *J. Petrology*
2. Effect of mantle percolation on highly siderophile elements and Os isotopes in subcontinental lithospheric mantle: a study of the upper mantle profile beneath Central Europe, which is under review in *Geochem. Cosmochem. Acta* and
3. Geochemistry of Fe-rich peridotites and associated pyroxenites from Horní Bory, Bohemian Massif: insights into subduction-related melt-rock reaction, submitted to *Chemical Geology*.

Lukaš is the first author in all three papers. As the first paper with 25 printed pages in A4 format was published in a top quality international journal with highest impact factor in Geology, this qualify the theses to be accepted for PhD defense. In this paper, the authors combined petrological and geochemical data from xenolites and interpreted them based on the upper mantle profile defined by previous petrological and geophysical results of Christensen (2001). Different sections of the upper mantle profile in depth of 30-70 km are defined by mineral textures and compositions, but mainly by minor and rare elements geochemistry and various isotopes of the rocks.

As the second paper is out my research domain, I could consider only the postulated models in relations to petrological results that seem to be relevant.

The third paper is again a good piece of work, where the authors distinguished different varieties of ultramafic rocks that are results of basaltic melt infiltration and metasomatic reactions. Classification of the rocks are well documented using mineral composition as well as by trace and rare element composition of the rocks. As I studied similar rocks from this locality, the interpretations seem to me relevant. The authors also deal with PT estimate for formation of these rocks. Here I miss the paper of Inas and Rieder (1985), published in *Contr. Min. Petrol.* They got similar results and it should be mentioned. Fig. 10 is supposed to illustrate co-existing minerals in the rock, but names of minerals are missing in the figure. I did not found the mineral names nor in the text. As this paper was just submitted to journal, there will be time to improve it. I will have a question about error in Sm-Nd dating and the author opinion on 337, 336 Ma for these rocks.

As all three papers deal with geochemistry and petrology of mantle rock, Lukaš Ackerman added a common introduction and a short chapter "1" with upper mantle rocks in the Bohemian massif. Accordingly, the last chapter "5" is called as General Conclusions. Comparing to the published or submitted papers, these two chapters as well as the introduction (totally 9 pages) contain relatively high number of error and not clear formulations. One will expect a summary of all three papers in the last chapter and

outline some geodynamic application or at least state similarities or differences of geochemical features observed in the mantle rocks from Kozakov and Horne Bory.

The last few comments do not decrease scientific quality of the papers, but they are aimed to discuss some features and relationships of the rocks in geological context during PhD defense. All three papers indicated that Lukaš Ackerman is not only a good and perspective scientist but also a good team worker. I recommend the theses to be accepted for defense and Lukaš Ackerman awarded title of PhD.

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