Summary

Mantle pyroxenites are important components of mantle rocks, because they provide important insights into bulk composition and heterogeneity of the Earth's upper mantle and therefore, direct evidence of mantle evolution throughout the Earth history. Studied pyroxenites from localities Bečváry (the Kutná Hora Complex), Níhov, Nové Dvory, Mohelno, Horní Kounice, Karlstteten and Meidling (the Gföhl Unit of the Moldanubian Zone) occur as dykes and/or layers within spinel and garnet peridotites from the Bohemian massif.

Whole-rock concentrations of rare earth (REE) and other trace elements in studied pyroxenites yield extreme variability, which most likely reflect: 1) variable garnet/clinopyroxene ratios in bulk rocks, 2) different degree of fractionation of parental melts and 3) different concentrations trace elements in the source host material. Pyroxenites from locality Mohelno (LREE-depleted) may be derived from depleted or only slightly enriched suboceanic mantle. In contrast, pyroxenites from Karlstetten, Meidling, Horní Kounice and Nové Dvory (LREE-enriched) crystallized from the melts derived from enriched mantle source with possibly significant contribution of recycled crust.

Studied pyroxenites are characterized by extremely variable $^{187}Os/^{188}Os$ ratios. While the pyroxenites from Mohelno and Bečváry display only slightly suprachondritic γ Os values, the pyroxenites from Horní Kounice and Karlstteten yield extremely high γ Os. This variability suggest that pyroxenites crystallized from different, non-cogenetic melts and the former were derived from primitive and/or slightly enriched suboceanic mantle (or oceanic crust), while the latter were formed from the melts with high, but variable contribution of recycled crust. Chemical composition of the studied pyroxenites may indicate interaction between parental pyroxenite melts and host peridotites. This interaction is characterized by increased concentrations of Ni in pyroxenites and variability of $^{187}Os/^{188}Os$ ratios. Pyroxenites, which display low $^{187}Os/^{188}Os$ have the highest concentrations of Os (this trend is typical for pyroxenites from locality Mohelno). This may indicate that Os contents in pyroxenites can be strongly influenced by melt-rock reactions.

For the purpose of improvement of Re-Os analytical protocol, two international reference materials (BIR-1a, TDB-1) were analyzed using different digestion procedures – Carius Tube and High Pressure Asher. These methods of sample decomposition were combined with desilicification procedure using HF acid, which may improve Re yields from the basaltic materials. In the case of BIR-1a (basalt), no effect with regard to different digestion technique and/or using desilicification was observed on analyzed Re concentrations. On contrary, in case of TDB-1 (diabase), significantly higher Re yields were obtained using desilicification method. Therefore, using of desilicification method can have strong impact on correct determination of $^{187}Re/^{188}Os$ ratio.