



Geochemistry of Eclogite Xenoliths from Kimberlite Pipe Udachnaya

Aleksey Agashev, Ludmila Pokhilenko, and Nikolai Pokhilenko

Institute of Geology and Mineralogy, SB RAS, Novosibirsk, Russian Federation (agashev@igm.nsc.ru)

A suite of 17 unique big (1 to 20 kg) and fresh eclogite xenoliths from Udachnaya kimberlite pipe have been studied for their whole-rock and minerals major and trace elements composition. Whole rock major elements composition of the Udachnaya eclogite xenoliths suite have a great variability in their MgO contents (9-19Wt%). Based on major elements composition Udachnaya eclogites can be subdivided in two subsets, high magnesian (Mg# 68.8-81.9) and low magnesian (Mg# 56.8-59). High variations also shown by Al₂O₃ and Na₂O concentrations and high Mg# samples tend to contain less of those oxides then low Mg# samples with some exceptions. Two eclogitic groups are clearly different in style of inter-elements correlations. FeO and CaO contents are positively correlate with MgO in low Mg# group of eclogites but negatively in high Mg# group. The same relations present between Al₂O₃ contents of eclogite group with their Mg#. Compared to present day MORB composition eclogite samples have similar contents of most of elements with some depletion in TiO₂ and P₂O₅ and enrichment in MgO and K₂O. The variability of these elements concentrations can be related to melt extraction while elevated K₂O can indicate late metasomatic enrichment.

In terms of trace elements composition Udachnaya eclogites are enriched over PM but comparable to that of MORB composition, except significant enrichment in LILE elements (Rb, Ba, K, Sr). The records of both subduction related processes and mantle metasomatism could be find in geochemical features of these rocks. Most of the eclogites show positive Eu anomaly which is direct evidence of plagioclase accumulation in eclogites protolith. Variation of La/Yb ratio (1-11), in majority of samples are the range 2-4 indicates different degrees of samples metasomatic enrichment in LREE. Udachnaya eclogites have range of Sm/Nd ratio from 0.25 to 0.5 (MORB is 0.32) which positive covariates with Nd content. This trend could not be a result of melt extraction nor metasomatic enrichment rather it could reflect heterogeneity of oceanic crust composition and/or mixing with peridotite component during subduction.