ECLOGITE PAREGENESIS OF DIAMONDS FROM UDACHNAYA AND MIR PIPES, YAKUTIA.

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An unique collection of xenoliths of diamondiferous eclogites from Udachnaya pipe, collected by the authors over a long period of time and consisting of more then 120 samples of different sizes (principally 2-5 cm in longest dimension) is compared with data (Sobolev et al., 1983) on more than 40 diamondiferous eclogite xenoliths collected for years from the Mir pipe. Most eclogites have been collected at processing plants where samples of kimberlite with diamonds exposed at the surface are checked.

In most samples euhedral garnets are embedded in the pyroxene matrix but in a number of cases garnet-pyroxene occur in banded structures. Modal proportion of garnet varies from almost pure garnetite down to samples with about 35-40 % of modal garnet. Kyanite eclogites containing up to 10 % of kyanite are typical mostly for Udachnaya pipe. Only one sample of this type was collected in Mir pipe. A few corundum eclogites have been found in both pipes.

Diamonds in the studied samples vary widely both in size and number in each specimen. The largest diamonds exposed at the surface have a size up to 8-9 mm across, smallest diamonds extracted from some dissolved specimens have a size up to 40-50 microns. Diamonds usually have a variable morphology but octahedral crystals predominate. Within single samples in most cases the diamond morphology is similar. In several samples of eclogite, diamonds contain inclusions of garnet, omphacite and sulfides.

Comparison of major and minor elements abundances in garnets from diamondiferous eclogites and inclusions in diamonds from the same pipe shows that both types of garnets contain similar CaO and Na_2O within each pipe, but with higher CaO for both inclusions and eclogites from Udachnaya pipe. TiO_2 content is almost double for included garnets compared to eclogitic ones. All Mir pipe garnets are richer in iron in comparison to Udachnaya eclogite and inclusion garnets.

Omphacites from eclogites are more sodic than omphacites from diamonds both for Udachnaya and Mir pipes, but in general Mir pipe omphacites contain more Na_2O. Very systematic differences are noted in K_2O contents between omphacites from diamonds and diamondiferous eclogites. In spite of detectable K_2O content for all studied omphacites, pyroxenes included in diamonds for both pipes contain up to 2-2,5 times more K_2O on average than pyroxenes from diamondiferous eclogites. As was previously shown for Mir pipe (V.S. Sobolev et al., 1972) this might be related to the loss of a major part of K_2O by pyroxenes during reequilibration at subsolidus temperatures.

The temperature estimates, using Ellis and Green (1979) approach, show that the inclusions have been equilibrated at temperatures up to 1220-1230°C on average for both pipes compared with average equilibration temperatures of 1100-1150°C for diamondiferous eclogites.