Preliminary age determination of recently discovered kimberlites of the Siberian kimberlite province.

A.M.Agashev[1,3]., Fomin A.S[2] .,Watanabe T[3]., and Pokhilenko N.P.[1]
1) Institute of Mineralogy and Petrography SB RAS, 630090 Universitetsky pr3, Novosibirsk, Russia.
2) Botuobinskaya enterprise of the ALROSA com. 3)Department of Earth and Planetary sciences, Hokkaido University, Sapporo , Japan.

The recently discovered Sredne-Marxa kimberlite field of the Siberian kimberlite province is located approximately 300 km on the North-East from the well-known Mir pipe (Malo-Botuobia field). Pipes Botuobinskaya and Nurbinskaya are located in this field and are the subject of this study. Both pipes are covered by the 80-30 meters of Jurassic sedimentary rock and therefore only drill core material is available. Kimberlite beginning from depth of more than 130 meters, is represented by a little altered kimberlite breccia with abundant xenogenic material. Investigation of heavy minerals indicate that, the perovskite SHRIMP dating is problematical because of most of the ore minerals in this pipes are chromites, ilmenite and perovskite are very rare.

The samples contain a fresh, brown to variably altered phlogopite macrocrysts and fresh phlogopite grains were selected and used for age determination by the Rb-Sr isochron method. The leaching procedure of phlologopite fractions was performed following the method described by Brown et al.(1989). For the WR Sr -Nd isotope and chemical analysis kimberlite samples were crushed up to 2-3 mm and nearly primary kimberlite fractions without visible xenogenic material were selected.

Results:

The three acid leached phlogopite fractions of the Botuobinskaya kimberlite show variable $^{87}Rb/^{86}Sr$ ratios ranging from 17.3 to 65 and $^{87}Sr/^{86}Sr$ ratios 0.798204-1.03861 reflecting the uncompleted removal of a carbonate component during the leaching. Therefore the isochrone should be considered as a two-component mixing line that was pointed out by Brown et al., (1989) and Hegner et al., (1995), but that lines commonly yield reliable age determination. The three phlogopite+whole rock isochron give an age of 364+-9Ma (MSWD=9) for the Botuobinskaia pipe with an initial Sr isotope ratio of 0.70611+-25. This age are correlated to main diamondiferous kimberlite emplacement event (353-367 Ma) as was shown by SHRIMP perovskite age determination of several kimberlite bodies from Daldino-Alakite kimberlite fields, (Kinny et al., 1997). From the Nurbinskya pipe sample only one phlogopite fraction was separated and two point isochron including WR sample yield on age of 332 Ma with an initial ratio of 0.70596. This age result is younger than mentioned above emplacement event and will be verified soon by analysis of more deeply drill core material that became available now.

The geochemical peculiarity of this pipes is a low TiO_2 content (0.6-0.3 wt%) and low TiO_2/K_2O (0.8-0.4) and Nb/Zr (O.37-0.32) ratios in comparison with other

kimberlites. This signature can be either an evidence of crustal contamination or just reflect the rare occurrence of perovskite and ilmenite which are the main host of Ti and Nb in kimberlites. On the other hand the Ni/MgO ratios (38-44) are usual for kimberlites Gr1.

The $^{143}Nd/^{144}Nd$ isotope ratios of the WR samples are nearly the same being of 0.512511 and 0.512491 for Botuobinskaya and Nurbinskaya pipes respectively. Their $^{147}Sm/^{144}Nd$ ratios (0.125-O.122) are higner then of other Devonian age Siberian kimberlites (Agashev et al., submitted) as well as kimberlites world wide and consequently their εNd CHUR values at the time of emplacement show a very little depleted source composition (0.85-0.28).

References:

Brown R.W., Allsopp H.L., Bristow J.W. and Smith G.B. 1989. Improved precision of Rb-Sr dating of kimberlitic micas: An assessment of a leaching technique., Chemical Geol. v79, pp125-136.

Hegner E., Roddick J.C., Fortier S.M. and Hulbert L.(1995). Nd, Sr,Pb,Ar, and O isotopic systematics of Sturgeon Lake kimberlite, Saskathawan, Canada. Contrib mineral Petrol 120,212-222

Kinny P.D., Griffin B.J., Heaman L.M., Brakhfogel F.F. and Spetsius Z.V. (1997). SHRIMP U-Pb ages of perovskite from Yakutian kimberlites. Russian Geol. Geoph., Proc. of 6IKC., v1., 91-99.

Agashev A.M., Orihashi Y., Watanabe T., Pokhilenko N.P. and Serenko V.P. Sr-Nd isotope and trace elements geochemistry of Siberian kimberlites. Submitted to Russian Geology and Geophysics, 1997.