U-PB ZIRCON AGE FOR CARBONATITE AND ALKALI-PICRITE PIPES, ORTO-YIARGA FIELD (YAKUTIA), RUSSIA.

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U-Pb ion microprobe ages were determined on zircon samples from four carbonatite and two alkali-picrite pipes located in the Orto-Yiarga field on the eastern slope of the Anabar uplift. The pipes in the Orto-Yiarga area are composed of brecciated rocks of varying compositions. Alteration is severe so that it is difficult to apply a petrogenetic classification. According to V. K. Marshintsev (pers. comm.) 90% of the pipes are carbonatite and the remaining 10% are alkali-picrite and the Orto-Yiarga field is, therefore, considered to be carbonatitic. Irrespective of nomenclature, the rocks are uniform in composition and represent single magmatic pulses.

The zircons have isotopic compositions that are very close to concordant. All the zircons dated have, within error, equal 238U/206Pb ages and yield a weighted mean age of 160 +/- 4 Ma (2s). However, the age distribution can be interpreted to be skewed with the alkali-picrite pipes being emplaced slightly earlier than the carbonatite pipes. The weighted mean zircon ages for the alkali-picrite and carbonatite pipes are 163 Ma and 158 Ma, respectively, statistically different at 67% confidence limits. For the majority of zircons from both the alkali-picrite and the carbonatite pipes the Th/U ratios are in the range of about 0.3 to 0.6. Three zircons are morphologically identical and the same age as all the other zircons but are distinguished by high Th (>400 ppm) and U (>290 ppm) contents and Th/U ratios in excess of 1. Two of these are from each of the alkali-picrite pipes and one is from a carbonatite pipe.

The zircon U-Pb ages are interpreted to indicate that the carbonatite and alkali-picrite pipes are essentially coeval at about 160 Ma, with the alkali-picrite pipes being emplaced perhaps slightly earlier than the carbonatite pipes. At this time both the high and low U zircon grains became closed systems with respect to radiogenic Pb-loss. However, although both zircon populations record the same time of incorporation into the kimberlite magma they must have originated in different primary source environments. The presence of high U zircons in mantle derived rocks has been reported previously (Coenraads et al., 1990; Kinny and Dawson, 1992; Kinny and Meyer, 1994). The presence of both low and high U and Th bearing zircon in the Orto-Yiarga region implies that these diatremes sampled distinctly different mantle reservoirs at about 160 Ma ago. The latter must have been derived from a mantle source that had undergone partial melting or metsomatic enrichment to produce a geochemically more evolved magma that contained incompatible elements such as U and Th.

Kimberlites are, apparently, spatially associated with these carbonatites and alkali-picrites in the Orto-Yiarga field. High U kimberlitic zircon has also been identified in other regions where carbonatites and diamond poor kimberlites are present (Barton, unpublished data). It would be interesting to investigate whether or not there is a relationship between the presence of high U mantle zircon and the diamond bearing potential of kimberlites in such regions.

Coenraads, R.R., Sutherland, F. Lin and Kinny, P.D. (1990) The origin of sapphires: U-Pb dating of zircon inclusions sheds new light. Mineralogical Magazine, 54, 113-122.

Kinny, P.D and Dawson, J.B. (1992) A mantle metasomatic injection event linked to late Cretaceous kimberlite magmatism. Nature, 360, 726-728.

Kinny, P.D. and Meyer, H.O.A. (1994) Zircon from the mantle: a new way to date old diamonds. Geology, in press.