Lamproites of the Anabar region, Northern rimming of the Siberian platform.

Vladykin N.V.[1], Lelyukh M.I.[2], Tolstov A.V.[2]

1. Institute of Geochemistry, SB RAS, Irkutsk 664033, Russia
2. Joint-stock company Diamond of Russia- Sakha, Mirny, Russia

While kimberlites occur in the Central part of the Siberian platform the lamproite occurrences are found in the its peripheral part. In the southern termination of the Siberian platform (the Aldan shield) lamproites are widespread and are studied in detail (Vladykin, 1997). One of the lamproite occurrences in the northern termination of the Siberian platform (Prianabarie) was reported to be represented by the feldspar type of lamproites (Vishnevsky, Sobolev,1986).

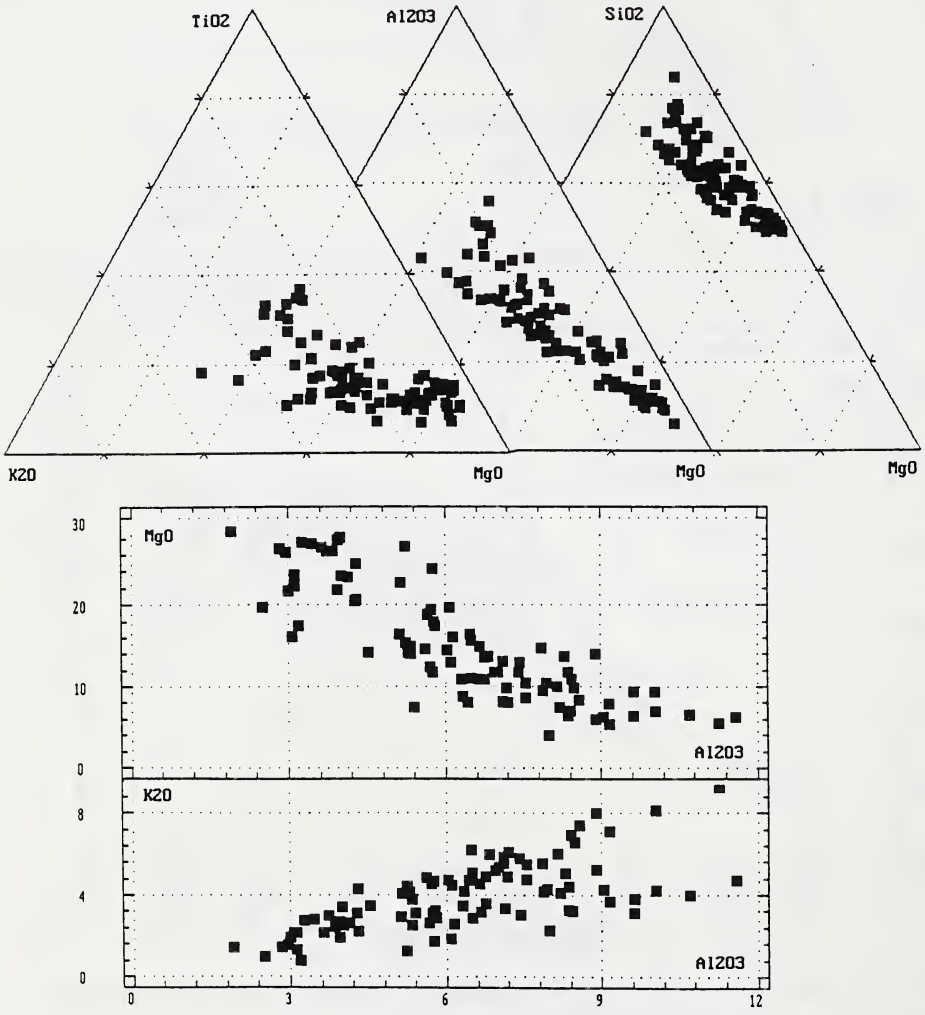

Fig. 1 Twin and triple correlations of petrogenic elements in lamproites of the Anabar province

The Anabar diamond-bearing province is confined to the eastern and south-eastern part of the Anabar shield and extends as an arc-like zone 50 km wide and 300 km long. The province is known for the presence of kimberlite and kimberlite-like rocks (picrites, alnoites and maimechites). About 300 dia-mond placers have been discovered in the Anabar province. However, their original occurrences are not known for most of kimberlite rocks do not contain diamonds. The revision of core from the boreholes drilled in the magnetic ano-malies of the Anabar province and within the large Tomtor massif of alkaline rocks , in the eastern part of the province revealed the lamproite series rocks.

The lamproite rocks produce the explosion pipes of diatreme, stocks, sills, dikes and disrupt metamorphic and sedimentary rocks of Precambrian and Cambrian. They are associated with the kimberlite and alkaline rocks of the province of the Lower Mesozoic and Mesozoic age.Considering the mineral composition there are olivine and leucite varieties of lamproites. The olivine lamproites consist of rounded, rarely faceted phenocrysts of olivine and mica.

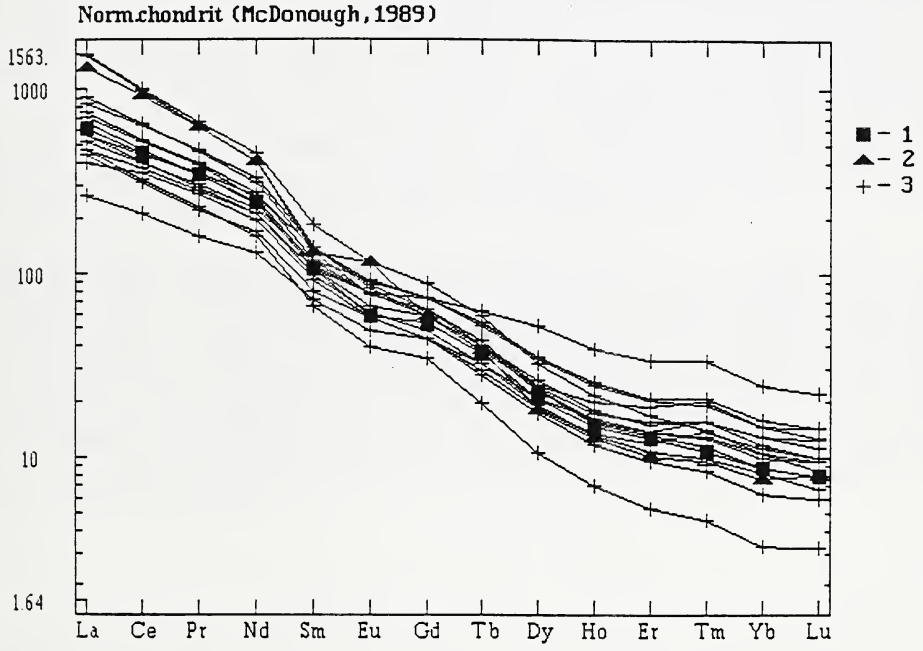

Fig. 2 The spectrum of the rare-earth elements normalized after chondrite. Lamproites of Australia; 1- dike in Argail, 2 - olivine lamproite Ellendeil - 11, 3 - lamproites of the Anabar province.

The bulk of rock is composed of varying amounts of mica, amphibole, olivine, carbonate, apatite and ore minerals (magnetite, perovskite, chromite). The olivines are partly serpentinised and carbonatised, while micas are chloritised. The leucite lamproites consist of leucite, pyroxene, amphibole, apatite and mica which surrounds the rounded grains of leucite. Altered olivine is found in small amounts. The grains of leucite are completely replaced by the secondary calcite

and only the forms of rounded crystals are remained.The chemical composition shows that the rocks are lamproites. They display high contents of MgO (8-28%), K_2O (2-8%), TiO_2 (3-7%) and low concentration of Al_2O_3 (3-10%), Na_2O (0.1-1%). The lamproites show increased abundances of CaO (3-15%) and reduced contents of SiO_2 (28-35%), which are associated with the process of late carbonatization (up to 20% $CaCO_3$). Of characteristic rare elements the lamproites contain (ppm): Ba 1000-9000, Sr 500-2500, Zr 200-800, Nb 100-300, Cr 300-1500, Ni 300-110, Co 50-250, V 200-600, Sc 10-45, La 100-360, Ce 200-600, Nd 100-200, Y 20-70. There are twin and triple correlations of petrogenic elements MgO, K_2O, SiO_2, Al_2O_3 (Fig. 1). The spectrum of rare elements has no Eu anomalies but it shows the predominance of light elements over heavy ones (Fig. 2) The spectrum of rare earths in lamproites of the Anabar province is close to the olivine lamproites of Australia.In genetic respect the Anabar province lamproites are related to the occurrences of the kimberlite and alkaline magmatism.The assessment of the diamond-bearing capacity in lamproites of the Anabar province may indicate the native sources of diamond placers.