GEOCHEMISTRY AND GENESIS OF LAMPROITES OF THE ALDAN SHIELD

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At present 14 occurrences of rocks of lamproite group have been recorded on the Aldan shield. They compose sills, necks, eruptive breccias as well as dykes, stocks and layers in the massifs of stratiform K-alkaline complexes. In the Western Aldan lamproites are known to be present in the massifs of Murun, Khani and Molbo River dyke. In Central Aldan lamproites are studied in the massifs Yakokut, Ryabinovy, Inagli, Yllymakh, Tommot, M.Yukhta, some diatremes of the Khatastyrsky field and the Kaila pipe. In Eastern Aldan they occur in the Bilibinsky and Konder massifs. The lamproite dykes of Khani have Proterozoic age and the rest lamproites of Aldan are Mesozoic (J and Cr). The rocks of lamproite series produce eruptive breccias with crystalline cement (Kaila and Khatastyr) and the bodies of volcanic and intrusive view. Considering the mineral composition there are olivine, leucite and sanidine lamproites and their intermediate varieties.

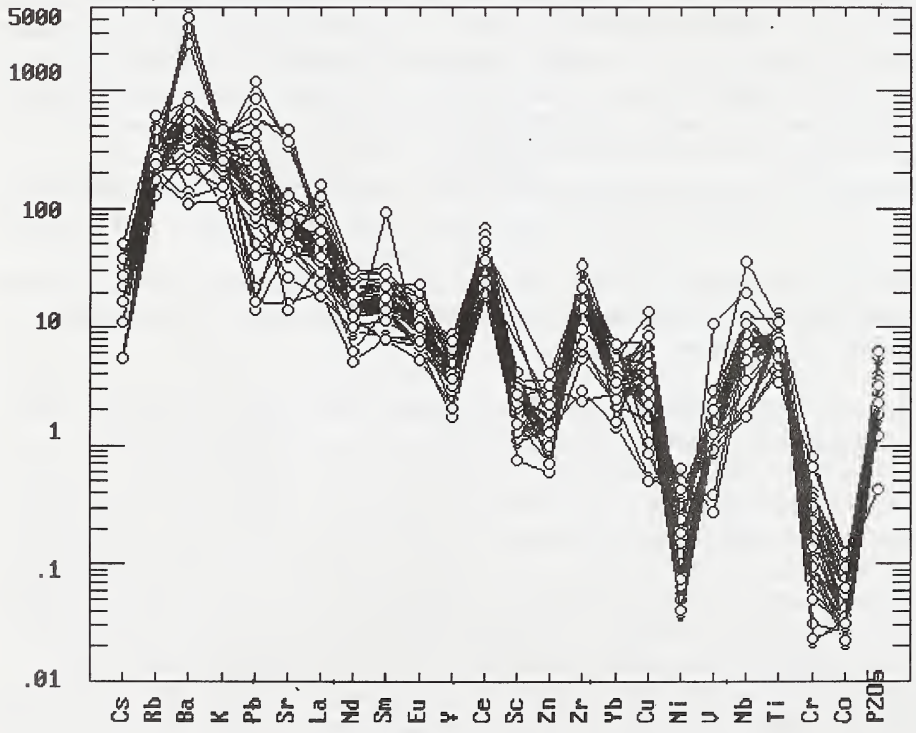

Fig.1 Rare elements in the Aldan lamproites. On the X axis the chemical elements are in the order of Ri increase, on the Y adxis- logarithm of concentrations normalized from primitive mantle.

The compositions of minerals of studied lamproites are not different from those elsewhere in the world. According to chemical composition, olivines correspond to forsterites (Fo=86-94), pyroxenes to diopcides, amphiboles to K- richterite, the micas of phlogopite-

annite series with low Al abundance which is compensated by Fe. As to the accessory minerals lamproites contain wadeite, K-baticite, chromite, Cr-magnetite, pariderite and sulfides. On the plots of coupled correlations of petrogenic and rare elements there is a single trend of lamproite compositions of Aldan. It coincides with that of these elements for lamproites of Australia, America and Spain. All known occurrences of lamproites of Aldan are genetically related to the K- alkaline massifs. This conclusion is substantiated by a spatial combination of lamproites and intrusive rocks of K- complexes. The intrusive lamproites in the Murun and Bilibinsky massifs are crystallized in single laminated bodies with the rocks of the massif. The petrochemical diagrams show that lamproites and intrusive rocks produce combined trends of compositions. The data of absolute age and isotopes of Nd, Sr and Pb are the same. The genetic confinement of lamproites to the rocks of K-alkaline intrusive complexes represent a particular feature of the Aldan lamproites. The studies of temperatures of melt inclusions homogenization in minerals of the Aldan lamproites and the chemical composition of inclusions do not contradict this conclusion.

Figure 1 shows the spectrum of concentrations of rare elements in the Aldan lamproites. It is characterized by traditionally high for lamproites abundances of K, Ba, Sr, Cr, Ni. The contents of Zr, Nb, TR in the lamproites of Aldan are low. The TR spectrum in lamproites are characterized by an absence of Eu fractionation and tilting analogous to lamproites elsewhere in the world. The Ce group dominates in the TR spectrum.

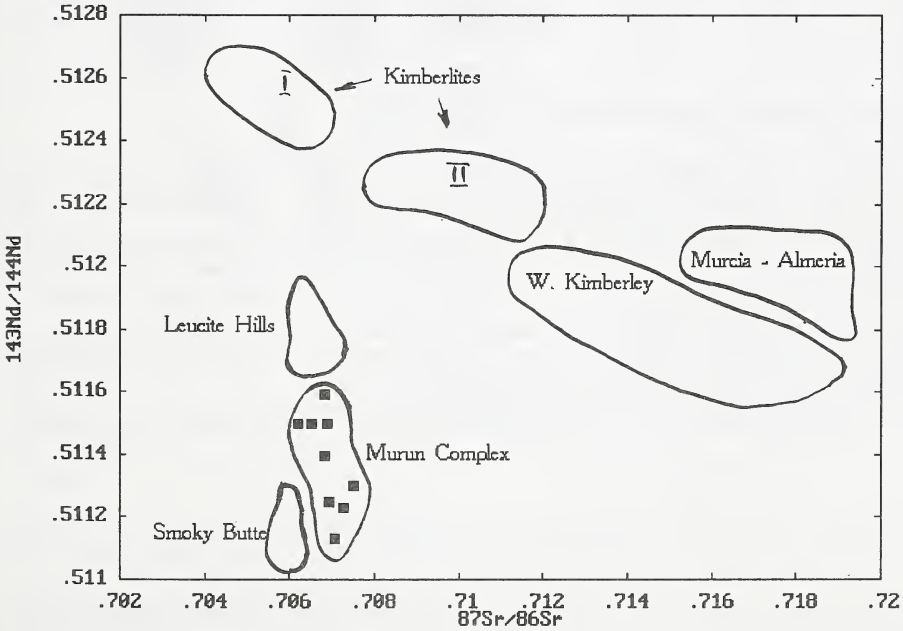

Fig.2 Isotope ratios Nd and Sr in the Murun massif rocks.

Micas of the Aldan lamproites are characterized by high contents of BaO (0.5 - 1.5%), Cr and Ni (up to 2000 ppm) and low for lithophyle elements. Geochemistry of Sr, Nd and Pb isotopes has been investigated in the Aldan lamproites, while in the olivine lamproites of Kondera, Murun and Bilibinsky massif Sr87/Sr86=0.7045, in the other

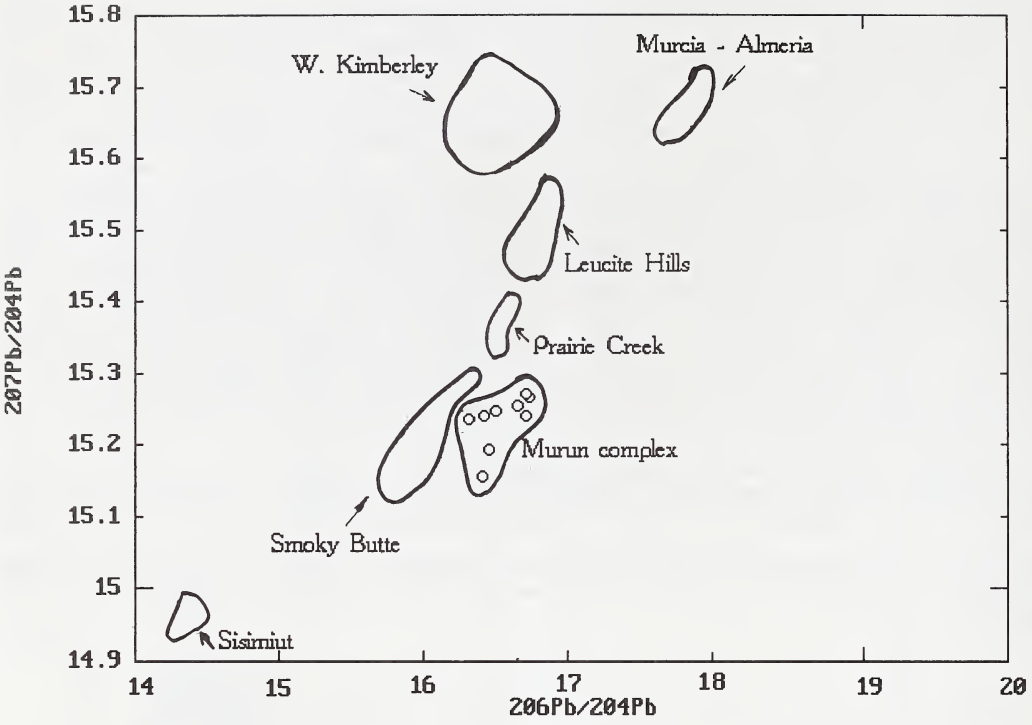

Fig.3 Isotope ratios Pb in the Murun massif rocks.

lamproites of Aldan the Sr87/Sr86 ratio is within the range 0.706- 0.709. According to the ratio of isotopes Pb207/Pb204 - Pb206/Pb204 - Nd143/Nd144 - Sr87/Sr86 (Fig. 2) the lamproites of the Murun massif make up a field between the fields of lamproites of Leucite Hills and Smoky-Butte in the USA. Considering the rare elements geochemistry, lamproites of Aldan are also close to those of North America. The isotope characteristics indicate a deep-seated mantle origin of sources of lamproite and K-alkaline magmas of Aldan. The age of the primary substratum, from which magma of the Murun massif was melted, is estimated from the Pb isotopes to be 2000 Ma.

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