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Trace element geochemistry and isotopy (Sm, Nd) of lamproites of the Aldan Shield

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Lamproites of the Aldan Shield were found (Vladykin 1985) at the beginning of 80-es (for the first time in the USSR), being mainly the intrusive varieties of lamproites, though there occur among them some dyke and volcanic varieties. The general geological and geochemical features of lamproites of the Aldan shield were reported at the VI International Kimberlite Conference at Novosibirsk in 1995 (Vladykin 1997).

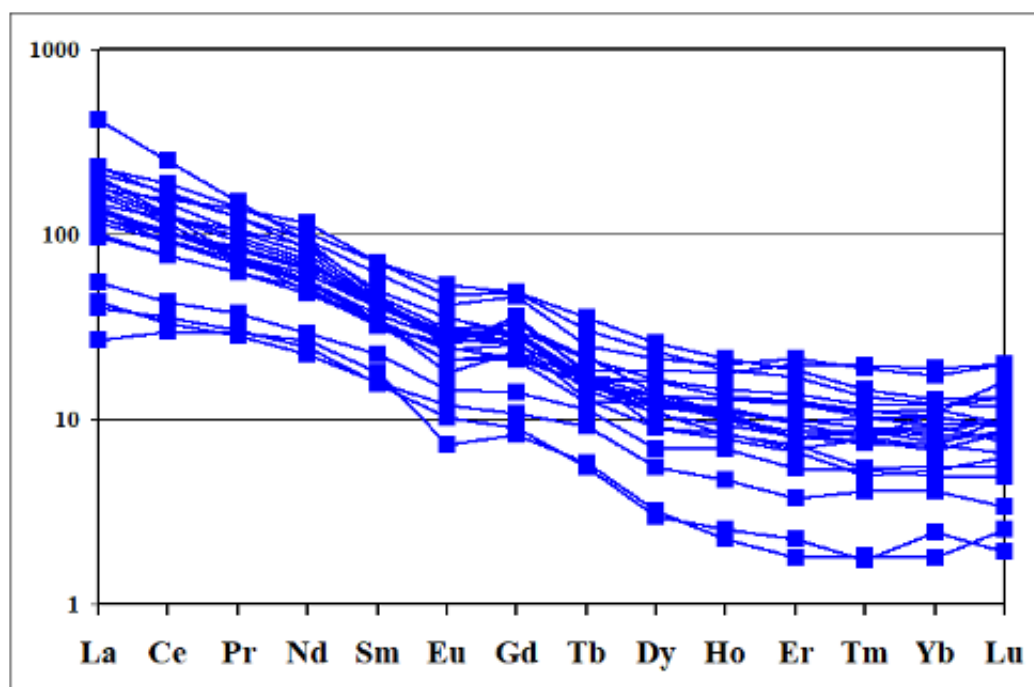
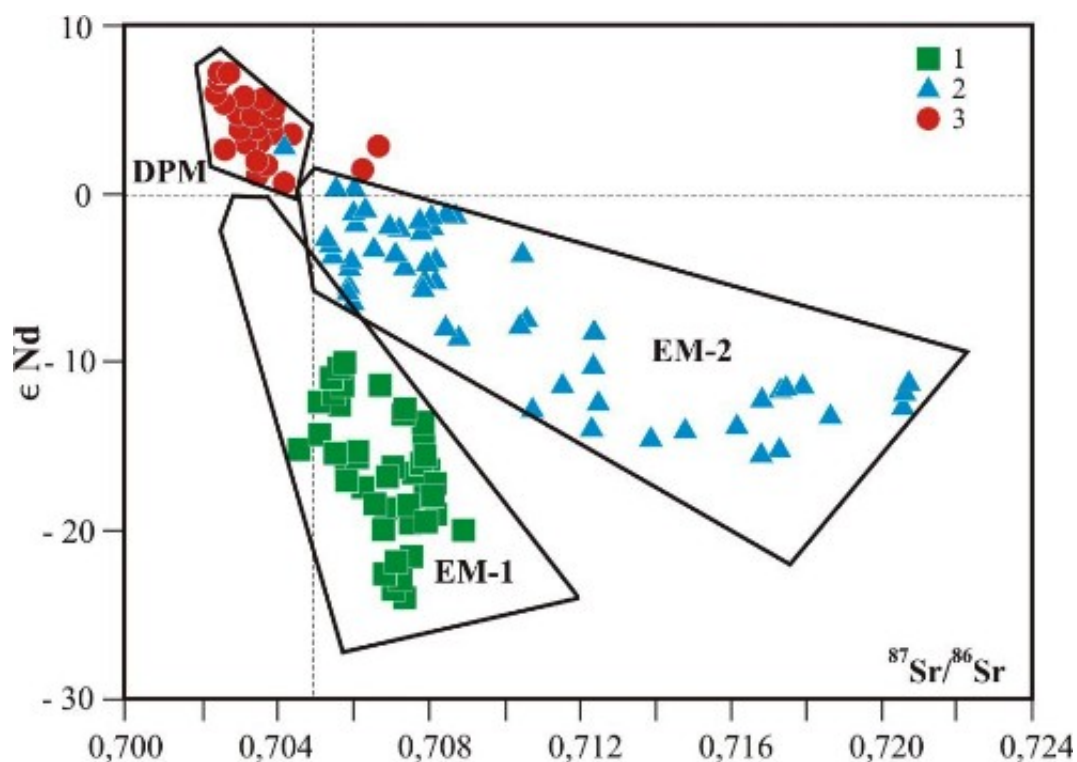
In Aldan Shield there are known 14 locations of lamproites mostly referred to the Mesozoic rifting. This zone stretches out over all Aldan Shield, from the Murun massif in the Western part of the shield up to the Konder massif in the Eastern part of the shield. These occurrences of lamproites are of Jurassic age (120-150 m.a.). Only lamproites of Khani massif in the SW part of the Aldan Shield are more ancient. At first (according to the data of V.V.Arkhangelskaya) the Khani massif was considered to be Paleozoic, then using K-Ar method (VSEGEI) it was established Proterozoic age of biotite pyroxenites of the massif 1800 m.a. We found the dyke of olivine lamproites of the massif that crosses the biotite pyroxenites. We obtained even more ancient age – 2700 m.a. by zircons from these lamproites with a device SHRIMP (VSEGEI) (Vladykin, Lepekhina - 2005).

New data on Sr-Nd – systematization of the lamproites of the Aldan Shield have been obtained. The ratios $87\text{Sr}/86\text{Sr}$ in lamproites of Aldan vary from 0.703 to 0.708, whereas ϵ_{Nd} – from -6 to -25. The source of Aldan Shield lamproites is enriched mantle EM-1 (рис.1), that is consistent with their geological position (Vladykin -1997). They are situated between the Aldan Shield and the Siberian platform, where did not occur subduction. The North American lamproites (Leucite Hills, Smoky Bewt, Prery Creak ecc) have a similar position between the Canadian shield and the North-American platform and the same mantle source.

Compared to the Australian lamproites, the lamproites of the Aldan Shield have lower concentrations of rare-earth elements. The TR spectra for the Aldan lamproites (fig. 2) are rather uniform. A slight slope of the spectrum curves and slight Eu-anomaly are typical. For the earlier olivine lamproites lower TR concentrations are typical as compared with more differentiated leucite and sanidine lamproites.

The lamproites of the Aldan Shield originated from the enriched mantle source EM-1, the age of that, according to Pb isotopic data, obtained for the rocks of the Murun massif (Vladykin 1997) is estimated as 3200 m.a. The dykes of the olivine lamproites of the Khani massif are the oldest

lamproites in the world (2700 m.a.). The TR spectrum of the same type is indicative of similar genesis of the lamproites from various massifs of the Aldan Shield. In spite of the deep mantle source of the Aldan lamproites, they don't bear diamonds actually, since the diamonds were likely burnt during their crystallization (at t- 1200-1000o C).



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References:

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