

HIGH-POTASSIC MANTLE MAGMATISM AND THE PROBLEMS OF DIAMOND-BEARING IN THE IRKUTSK PRISAYANYE AREA

Sekerin, A.P., Menshagin, Yu.V., Lashenov, V.A.

Institute of the Earth Crust, Irkutsk, 664033, Russia

The new Prisayanskaya province of high-potassic alkaline rocks and lamproites has been recognized based on the studies of bulk composition and localization conditions of the mantle magmatism products from the south-western margin of the Siberian platform. The province combines a series of mantle magmatites of various ages in the range of the Uriksko-Tumanshetskaya intercratonic mobile zone. The later deposited in the Early Proterozoic between the Archean Birusinskaya block and the craton of the Irkutsk amphitheatre has gone through a set of stages: geosinclinal (the Late Proterozoic), orogenic (the Early Riphean-half of the Middle Riphean), protoplatform (the end of the Middle Riphean-Vendian), and platform beginning from the Cambrian.

High-potassic mantle rocks show up at all stages but geosinclinal the orogenic stage is associated with the formation of vein bodied of phlogopite-olivine lamproites from the Ingashinskoe field (1268 ± 12 Ma, the Rb-Sr isochrone). Their mineral association is presented by olivine (10-13% Fa), orthopyroxene (6.5% Al_2O_3 , 1.1% Cr_2O_3), chromous diopside-augite (to 2% Cr_2O_3 and Na_2O), chrome-diopside (about 4% Cr_2O_3 and 3% Na_2O), almandine-pyrope of eclogitic and chrome-calcic pyrope of lherzolitic parageneses, phlogopite (6.5% TiO_2), potassic magnesioarfvedsonite, titanium-containing pargasite, chrome-spinelides, titanomagnetite, magnetite, ilmenite (about 4% MnO), zircons, moissanite, priderite, armalcolite, diamond, native iron, graphite. Lamproites are similar to those from the Argail pipe according to petrochemical properties and concentration of admixture elements. Among the mantle inclusions hyperbasites and eclogitic gabbroids are found in them.

At the protoplatform stage in the Upper Riphean explosive alkaline magmatism manifested with the composition corresponding to high-potassic trachytes. Fragments of their paleovolcanic structures are composed of ash tuffs, tuffites, tuff aleuralites, welded tuffs of trachytic porphyrites and eruptive breccias. The rocks are slightly undersaturated with silicic acid and contain to 3% of normative leucite, 10% olivine, 5% orthopyroxene. According to petro- and geochemical properties they can be related to sanidine lamproites from the Talakhtakhskaya diatreme of the Anabarsky shield. Of the accessory minerals zircons, tourmaline, apatite, moissanite, rutile, anatase, almandine, magnetite, ilmenite, chrome-spinelides, native-iron, graphite were determined.

In the Vendian, dyke bodies and diatremes of micaceous picritic porphyrites, alnoits, olivine melilitites, which have predominated potassium composition were formed at the central type massif foundation of the alkaline-ultrabasic rocks. They were found to contain perovskite, apatite, magnetite, sphene, ilmenite, zircon, baddeleyite, monazite, moissanite, chrome-diopside, pyrope-almandine and sulphides as accessory minerals. The mantle inclusions presented by dunites, harzburgites, micaceous peridotites and pyroxenites, schriesheimites, hornblendites were found in one of the volcanic pipe.

The platform stage in the Devonian is characterized by the formation of hypabissal layered bodies and diatremes of the lamproites-like rocks of the basic composition which

is little different from potassic basaltoides and similar to lamproites for a member of parameters. A wide variety of garnets were defined as accessory minerals in lamproites-like rocks including almandine-pyropes of eclogitic and chrome-calcic pyropes of lherzolithic parageneses, chrome-diopsides, amphiboles, sanidine, aegirine, tourmaline, disthen, apatite, sphene, corundium, zircons, magnetite, rutile, ilmenite, chrome-sphinelides, monazite, moissanite, gubnerite, sphalerite, fluorite, and native iron, zinc, and copper.

Phlogopite-olivine lamproites and lamproites-like rocks are the most interesting among high-potassic mantle rocks from the mobile zone in respect of the diamond content. The diamonds were discovered in the former rocks. The heavy fraction minerals analysis of diamond-bearing places known in the region indicated the presence of minerals of the lamproites-like rocks. Compositions of mantle xenogenic minerals of diamond-bearing lamproites from the Ingashinskoe field and those of the lamproites-like rocks are very close indicating they were drained by parent magmas from common levels. The available data imply the relation between the alluvial diamond content in the southwestern margin of the Siberian platform and the lamproites-like sources.

This work was supported by the Russian Foundation for Fundamental Researches under grant 93-05-9236.