

Exotic olivine glimmerites of Yakutia – the related polymict breccias

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The rocks, which are totally comprised of olivine and mica, have been found among the xenoliths of the Udachnaya-East pipe (Yakutia). The essential amount (first percents) of ilmenite of different morphology has been found in two rocks. These exotic olivine glimmerites appeared to be similar to the polymict breccia in the wide variations of olivine (LUV709/11 and LUV659/11 - Mg#(%): 86-93 and 83-91, respectively), phlogopite ((wt.%), LUV659/11: SiO₂ 38.5-40.6, TiO₂ 2.5-6, Al₂O₃ 11.3-14, Cr₂O₃ 0.4-1, MgO 19.8-23.1, FeO 6.1-7.9, Na₂O 0.5-1.3, K₂O 8.6-9.9), ilmenite (LUV709/11: Mg#(%): 23.6-47.8; Cr₂O₃ (wt.%): 0.63-1.01) compositions and also in the abundance of accessory minerals (chromite, rutile, sulphides, calcite, dolomite, siderite, barite). The compositions of rock-forming minerals of the glimmerites do not fall within the compositional fields of similar minerals from the peridotites of kimberlite xenoliths but strongly overlap with that from the polymict breccias. Moreover, the compositions of phlogopite from the glimmerites have demonstrated similar in Al, Fe and Ti composition kimberlite trend typical of phlogopites from the polymict breccia of the South Africa.

Unusual olivine glimmerites LUV659/11 and LUV709/11 were probably formed from the ancient protokimberlite melts like polymict breccias. Initially they have been strongly depleted and hence olivine is the main rock-forming mineral. Therefore, two main stages of metasomatic retreatment before the capture by kimberlite can be recognized. One is related with Ti and Fe introduction (ilmenite formation), another, more strong, with abundant introduction of Al and alkalis (mainly K) with a consequent formation of abundant phlogopite. These stages probably had several phases as evidenced by the compositional variations of the formed minerals.