P-T conditions of diamond- and graphite-bearing eclogite xenoliths from Udachnaya kimberlite (Yakutia, Russia)

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The crystallization conditions for various carbon polymorphs can be inferred from diamond- and graphite-bearing mantle rock. Findings of coexisting diamond and graphite within single xenoliths are very rare [1].

The formation of graphite- and diamond-bearing eclogite xenoliths is commonly considered in terms of crystallization of carbon polymorphs close to the diamond-graphite phase change[2]. To confirm or deny this statement, eclogitic (3 samples) xenoliths from Udachnaya-East kimberlite with a garnet+kyanite+clinopyroxene+coesite+ diamond+ graphite+ sulfides assemblage were selected for recovery their P-T conditions. Both microdiamond and graphite predominantly occur in the matrix of eclogites. However, sometimes they also can be found as inclusions in rock-forming minerals. The P-T estimates for the samples are as high as 1020-1100 (±40) ℃ and 4.7-6.2 (±1) GPa [3], and correspond to diamond stability field.

Thus, the data indicate that findings of graphite in mantle xenoliths may testify for their metastable crystallization in the diamond stability field.

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