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Geomagnetic method of primary diamond deposits prediction

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Large-scale aeromagnetic survey at low altitudes enables measurements of the geomagnetic field with an accuracy of $\pm$ 1.0 nT and horizontal binding to 3 m, which opens up new opportunities for exploration and prediction of possible primary sources of diamond deposits, particularly in the Western Urals region. The proposed technology of revealing primary diamond deposits of unconventional type using high-precision geomagnetic measurements is based on the analysis of spectral characteristics of the magnetic anomaly field represented by petromagnetic sections, and their combination with geological, geochemical, geophysical data and well materials.

Theoretical background for exploration and prediction of primary deposits of the Uralian diamonds are based on experimental and theoretical dependence of the parameters of spectral structure of the magnetic field on the occurrence depth of magnetic formations surface. Estimated petromagnetic section permits to select contrasting surfaces including low-magnetic heterogeneities related to primary diamond shows.

Geomagnetic method was tested in diamondiferous regions of the Western Urals in the development areas of industrial deposits and occurrences. The studies resulted in discovery of petromagnetic and petrodensity diagnostic features of fluid-explosive formations associated with the known deposits. The presence of subvertical heterogeneities caused by the development of fluid-conducting zones and areas of explosive breccias, including diamondiferous ones, was observed in a medium 9-10 km thick.