



Geoelectrical anomalies and diamonds in the Ukrainian Shield

S. Kulik and T. Burakhovich

Institute of Geophysics, Ukrainian National Academy of Sciences, Ukraine (kulik@ndc.org.ua)

Our work is devoted to build deep geoelectrical models of the Earth's crust and upper mantle (up to the depth of 200 km) of Ukraine and adjacent territories, to finding of regions and layers of anomalously high electric conductivity and also to explanation of the nature of their origin. The data of magnitovariational profiling and magnitotelluric sounding at approximately 2500 locations was analyzed. We developed a methodology for building geoelectric models of the Earth crust and upper mantle, which is based on using the apparatus of 3D modeling in a low-frequency range of natural electromagnetic fields.

Regions of anomalously low magnitudes of electric resistivity were found and geoelectric models of the Earth crust and upper mantle of Ukraine were built. Ukrainian Shield (USh) is rich by anomalous objects of high electrical conductivity in the Earth crust and upper mantle. Geoelectrical parameters are also observed to be considerably non-uniform in the USh mantle. In the southwestern part of USh was found a conductor with the upper layer at 50-70 km with $\approx 25 - 30 \text{ Om-m}$. In the west the conductor reaches the depth of 90-100 km and is galvanically linked with the anomaly in the upper mantle of the Carpathian region. This deep mantle anomaly could be considered analogous to the Slave province of Canada.

All kimberlite pipes that have been found in the Ukraine correlate with the anomaly of conductivity of the Earth crust: with Priazovian, Kirovogradian and Volynian. In Podolian megablock area the kimberlites has not been found, but the presence of their indicating minerals are rather common. The pyropes were formed in the wide range of the pressure conditions. In the region of the mantle's anomalies the mantle is poorly depleted and is metasomatically changed and consists from eclogites and similar rocks, whose melting temperature is lower than the melting temperature of the surrounding mantle rocks. From the seismic data it is possible to assume the existence of the powerful lithosphere. Above the "diamond-graphite" stability level, the carbon could exist in the form of the high conductivity graphite, when below that level the carbon crystallizes into the diamond with the high electrical resistivity. Ancient lithosphere of the upper mantle was characterized by the low values of oxygen volatility. For this oxidation-restoration state of the depth matter corresponds the existence of carbon saturated fluids with the high concentration of hydrocarbons.