

## REFERENCE PROFILE AND ELECTRICAL CONDUCTIVITY OF THE UPPER MANTLE BENEATH CRATONS

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Most part of geophysical studies of deep structure of Precambrian cratons was traditionally carried out on shields. The deep EM studies were no exception due to the data obtained in 1980 on the Baltic (Fennoscandian) Shield. Prof. Leonid. Vanyan has constructed “the normal curve” of MT sounding and the reference profile relevant to it. In terms of physics the reference profile is the lower limit of all possible conductivity vs depth distributions in the upper mantle. Its interpretation taking into account the recent data on the conductivity nature, testifies to the fact that the upper mantle beneath Precambrian cratons does not contain a well-defined electrical asthenosphere and is characterized not only by low temperatures, but also by low water content. The application of the reference profile as a starting model and/or lower limit of conductivity in inversion schemes could adjust the reliability of conductivity structure of the upper mantle derived from EM data.

Archean - Proterozoic boundary is a significant landmark in the history of the Earth. It was at this stage that the oxygen atmosphere of the Earth emerged. Global manifestations of plate tectonics on Archean - Proterozoic boundary for the first time brought about subduction process of considerably oxygenized oceanic crust, containing increased concentration of volatile components ( $H_2O$ ,  $CO_2$ ), which in its turn caused involvement of these components in mantle cycles, that resulted not only in increase of content of volatile components in the mantle, that had lost volatile components in the process of high temperature accretion at the early stages of formation, but also resulted in oxygenizing of the mantle atmosphere, which was likely to be composed of methane and hydrogen in the pre-Proterozoic time. The most important process is continuous movement and submergence of the oxygenized lithosphere in the mantle since the end of Archean. One of the consequences of redox process on the Archean - Proterozoic boundary is the fact that diamonds on the Earth are practically found within the limits of Archean domains of Precambrian cratons. In its turn this fact shows that according to the well-known scheme of Haggerty diamond origin, that only the Archean upper mantle can possess free carbon. That means that conductive zones in cold Precambrian lithosphere can exist only within Archean domains at the depths up to 150 km (phase transition graphite –diamond). Hence the conductivity of the upper mantle of Proterozoic blocks should be less than in the Archean ones.

New experimental long-period EM profile and array data set collected within the northeastern part of East European Platform in the last years and a application of a reference profile concept provides new opportunities to study theoretically proposed lateral inhomogeneities of electrical conductivity of the upper mantle of Precambrian cratons. This study was also supported by the Russian Foundation for Basic Research under project № 09-05-00466.

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