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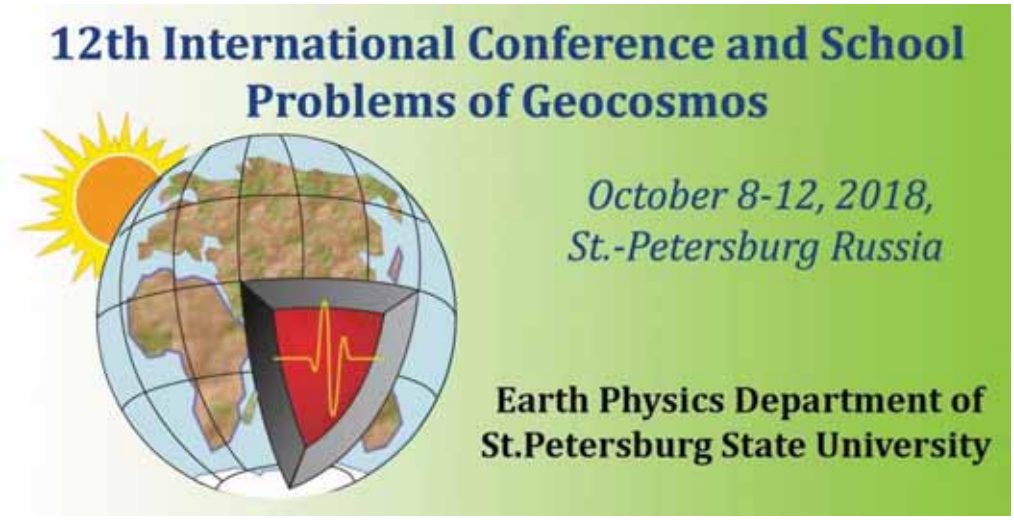

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THE INFLUENCE OF THE DAILY TEMPERATURE ON RESISTIVITY OF SULFIDE MINE TAILINGS

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Wastes from the enrichment of sulfide ores are stored in dumps or tailings. High concentrations of metals (Fe. Zn, Cu, Pb, Ag and Au) accumulated during storage, so such objects can considering as “technogenic deposit” [1]. Ores are susceptible to hypergene changes under the influence of outside temperature. Technology of secondary processing of mine tailings will depend on the degree of hypergene transformation.

Daily variations of outside atmospheric parameters lead to a change in the natural electrical fields and resistivity (ρ) [2]. The temporal dynamics of geoelectrical fields are often observed on ore deposits [3]. The temporal changes of geolelectrical properties that occur during the hypergene transformations of technologene systems was the object of our study. The main purpose of this work is to determine the nature and causes of the variation in the resistivity of the waste material during the day.

The study area is the tailings dump formed during the mining of the Beloklyuch deposit (Kemerovo region). Gold was extracted from the upper parts of the ore bodies by cyanidation in the 1930-s years of the last century. The structure, morphology, mineral composition of the ore bodies, the sequence of mineral formation have been studied and described by many researchers [4].

The Electrical resistivity tomography (ERT) is most often used among geophysical methods to study the mine tailings [5, 6]. Measurements were conducted by micro-electrotomography method on the surface of the tailing. The sequence of connecting the electrodes corresponded to a dipole-dipole array. The length of the profile is 9.1 m, the depth of the survey is up to 1.5 m. The measurements of rhe resistivity were carried out every hour during the period of 24 hours. We determined the temperature of the tailings by a probe at a depth of 0.1 m in the middle of the profile.

The geoelectric section of the tailing has zones of reduced and elevated resistivity according to the ERT data. The anomalies of high resistivity correspond to the materials, which was changed as a result of hypergenesis. Regular dynamics of ρ during the day on the graphs of electrical profiling refers to the areas of increased resistivity. The daily temperature variation of the tailings and its ρ showed a strong inverse correlation (K=-0.97). As the temperature of the tailings decreases, the resistivity increases, and vice versa. We attribute this effect to the change in the conductivity of the pore solution. This dependence

is expressed by an exponential law, which is confirmed by other works [7, 8]. We conclude that the air temperature is the main physical factor of the resistivity dynamics in tailing subsurface section.

Thus, the resistivity of the tailings depends on the outside temperature. Maximum changes are noted in the zones of intensively altered rocks because of hypergenesis. This feature can be used as a criterion for determining the degree of mine tailings transformation.

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