

POSSIBILITY OF E/M (LOW-FREQUENCY) SOUNDING OF THE CRYOLITOZONE OF MARS; F.M.Kamenetskiy, V.M.Linkin, Yu.R.Ozorovich, Institute Space Studies

Analysis of e/m sounding in the Earth conditions was showed the principal possibility of the studies cryolitozone of Mars with helping of martian rover, smaler stations and martian aerostat.

Martian subsurface layers are the heterogeneous structure which combines many substance with different E , and ρ ; basic structure components are mineral sceleton, salt ice and CO_2 . Based on photogeological analysis, the study of frozen rocks properties and the possible phase state of subsurface soil layers we shall the following section of the cryolithozone as a model:

1-st layer - (0 to 30m) - dry frozen rocks , $\rho \sim 10^4 (\Omega \cdot m)$

2-st layer - (30 to 100m) - transitional layer $\rho = 10, 100, 10^3 (\Omega \cdot m)$

3-st layer - (100 to 500.) wet frozen rocks $\rho \sim 10^3 (\Omega \cdot m)$

4-st layer - (500m) salt solutions at negative temperature $\rho \sim 10, 100 (\Omega \cdot m)$

For this model the effective resistance was numerically calculated for e/m sounding of the lower half-space with 4-layers:

$$\begin{aligned} E &= 1.6 \cdot 10^4 (I \cdot S_r S_n) \cdot (\rho^3 t^5)^{-0.5}, \\ t &= 50 (I \cdot S_r S_n /)^{-0.4} \cdot \rho^{-0.6}, \\ z &= 7 (\rho \cdot I \cdot S_r S_n /)^{0.2} \end{aligned}$$

where $E(v)$ - level signal in v , t - time (ms) investegation, $z(m)$ - depth of e/m sounding. It allows determining the depth of sounding for average resistance of subsurface structure in order $\rho \sim 100 (\Omega \cdot m)$, where $z \sim 500m$.

Besides the induction sounding the investigation program maybe include detectors for magnetic-variation sounding on the marthian rover and smaller stations. This makes of possible to obtain the geoelectric section down to depths of the order of 1 to 5 Km and to compare measurements in the upper part of the under surface section (down to about 0,5 km).

1. Sagdeev R.Z., Linkin V.M., Ozorovich Yu.R. Martian aerostat project; possibility of e/m. (low-frequicy) sounding of the martian cryolitozone. Institute Space Studies, N 1420, 1988

2. Kamenetskiy F.M., Linkin V.M., Ozorovich Y.R., Novikov P.V. Possibility of e/m (low-frequency) sounding of the cryolitozone of Mars. Institute Space Studies, N 1477, 1988