

PROFILE TRANSIENT ELECTROMAGNETIC SOUNDINGS OVER 3D STRUCTURES: METHODOLOGY, MODELING AND EXPERIMENT

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Abstract. The technology of transient electromagnetic sounding (TEM) of the Earth by coincident ungrounded installation, with measurements along profiles crossing the explored structure is described. The possibility of recovering sections is illustrated with some models of medium sections that contain three-dimensional structures of varying complexity. The recovery process consists of three main stages: 1) transforming the measured profile responses into pseudosections of resistivity depending on the time and then “stitching” these pseudosections depending on the depth, 2) inverting the responses in a layered one-dimensional section by considering a number of layers and their location as determined from pseudosections, and 3) clarifying the sections by using block 3D inversion with the starting parameters of the blocks determined from the pseudo- and one-dimensional sections. TEM coincident loop soundings allow us to research geological media within a local area on the order of the depth of the sounding. The structure of the medium outside this area has little effect on the results of the soundings. Such locality allows us to recover the electric structure of a 3D medium using 2D sections with minimal distortion because of a lack of information regarding the medium outside the profile during the measurement of transient responses.

Keywords: TEM sounding, profile measurements, transformation, 1D, 3D, inversion.