

LIMITATIONS OF 2-D INTERPRETATION OF 3-D MAGNETOTELLURIC DATA

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Interpretation of magnetotelluric (MT) data for three-dimensional (3-D) regional conductivity structures remains uncommon, and two-dimensional (2-D) models are often considered an adequate approach. In this paper we examine 2-D interpretation of 3-D data by considering the synthetic responses of a 3-D structure chosen specifically to highlight the advantages and limitations of 2-D interpretation. 2-D models were obtained from inversion of the synthetic 3-D data set with different conditions (noise and distortion) applied to the data. We demonstrate the importance of understanding galvanic distortion of the data and show how 2-D inversion is improved when the regional data are corrected prior to modelling. When the 3-D conductive structure is located below the profile, the models obtained suggest that the effects of finite strike are not significant if the structure has a strike extent greater than about one-half of a skin depth. In this case the use of only TM-mode data determined better the horizontal extent of the 3-D anomaly. When the profiles are located away from the 3-D conductive structure the use of only TM-mode data can imagine phantom conductive structures below the profile, in this case the use of both polarizations produced a better determination of the subsurface structures. It is important to note that the main structures are identified in all the cases considered here, although in some cases the large data misfit would cause scepticism about features of the models.