

THREE-DIMENSIONAL CONJUGATE GRADIENTS INVERSION OF MAGNETOTELLURIC IMPEDANCE TENSOR

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We have developed a three-dimensional conjugate gradients inversion algorithm of magnetotelluric (MT) impedance tensor. This inversion algorithm can be used to invert 3D MT area data and 2D MT profile data. The importance of including the on-diagonal impedance tensor terms, Z_{xx} and Z_{yy} , in 3D inversion is considered in the synthetic example. The results from the 3D inversion of synthetic 3D area data indicate that the results using all impedance tensor elements, Z_{xx} , Z_{xy} , Z_{yx} and Z_{yy} , in the inversion are better than those without using on-diagonal elements. Therefore, 3D inversion should include all tensor elements if possible. The results from the 3D inversion of synthetic 2D profile data show that reasonable images for structures beneath and near a single MT profile can be obtained if all tensor elements are used in the inversion of the profile data. Currently, most of MT data are still collected on 2D profiles. This inversion algorithm of impedance tensor can promote the practical application of 3D MT inversion. We also use this inversion algorithm to invert the real data in the kayabe area in Japan. From the trial inversion with the synthetic and real data, the validity and practicability of this inversion algorithm is verified.

Magnetotelluric inversion, conjugate gradients, impedance tensor

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