

MT survey for the deep resistivity structure, and the new method of the reliability assessment.

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1. Introduction

MT-survey is used to be applied to the investigation of the geothermal resource, mineral resource, and oil. In recent years MT-survey has also been recognized as an effective method for the investigation of deep geological environments (Asamori&Umeda,2005; Yoshimura et al.,2006). However, due to the nature of magnetotelluric source, it is difficult to maintain data quality at all time in extremely noisy environment. Furthermore, expansion of urban area will provide an opportunity to acquire MT data in such environment. Therefore, it is important to be able to evaluate the quality of acquired data numerically in order to evaluate the reliability of inversion result. We show the new method of the quality assessment of MT data, its effect to the inversion result, and the new method of the reliability assessment of MT inversion results.

2. Examination

(1) In order to evaluate the quality of acquired data numerically, we proposed new numerically expressed reliability parameters, Predicted Phase Error(PPE), Acquired Curve Roughness(ACR), Error Bar Level(EBL) (Negi et al.,2005). We examined the relationship between acquisition error and the numerically expressed parameters.

(2) In order to evaluate the effect of the quality of acquired data on the inversion result, we inverted a few models including some errors entailed by PPE, ACR, EBL.

(3) In order to evaluate the reliability of inversion result numerically, we examined the relationship between analytical error and the numerically expressed parameters, Curve Fitting between Input data and Predicted data(CFIP), Stability of Convergence(SOC) ,and Stability of Inversion result Against the manufacturer Restrictions(SIAR).

3. Results

(1) High correlation coefficient was recognized between acquisition error and PPE. Therefore, PPE was expected to be a useful parameter to evaluate the acquisition error of MT data. We propose combination of PPE, ACR, and EBL to keep the objectivity and stability for the quality evaluation.

(2) We recognized that PPE has the most severe effect on the inversion results.

(3) High correlation coefficient was recognized between analytical error and the numerically expressed parameters, SOC and SIAR. Therefore, SOC and SIAR are expected to be a useful parameter to evaluate the analytical error of MT data.

4. Conclusion

We recognized not only that PPE is correlated with data quality, but also that PPE has the most severe effect on the inversion results. Therefore PPE will be important parameter for the reliability assessment of the inversion result.

Reference

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