

MARGINAL NOTES ON MAGNETOTELLURICS

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Abstract. The paper presents the brief notes on some questionable points of modern magnetotellurics. These controversial points are: (1) nature and structure of the magnetotelluric impedance tensor, (2) magnetotelluric dispersion relations, (3) the magnetotelluric eigenstate problem, (4) separation of local and regional effects (the local-regional decomposition), (5) sensitivity of the TM and TE modes of the two-dimensional field, (6) robustness of the TM and TE modes, (7) identification and correction of the static shift, and (8) strategy of the two-dimensional interpretation: unimodal or bimodal inversion? Consideration of all these topics gives a better insight into problems and potentialities of magnetotellurics.

Keywords: bimodal inversion, dispersion relation, eigenstate problem, impedance tensor, magnetotelluric sounding, tipper

1. Introduction

Nature and structure of the magnetotelluric impedance tensor, its general properties and geophysical informativeness, and methods of its analysis and interpretations are still at the centre of theoretical and methodological controversies in the world geoelectrical community. In this paper I would like to present some viewpoints that are characteristic of the Russian magnetotelluric school. The paper has the form of an overview consisting of brief (say, marginal) notes dedicated to eight points: (1) nature and structure of the magnetotelluric impedance tensor, (2) magnetotelluric dispersion relations, (3) magnetotelluric eigenstate problem, (4) separation of local and regional effects (the local-regional decomposition), (5) sensitivity of the TM and TE modes of the two-dimensional field, (6) robustness of the TM and TE modes, (7) identification and correction of the static shift, and (8) strategy of the two-dimensional interpretation: unimodal or bimodal inversion? I hope that these marginal notes can be interesting for my colleagues from the world geoelectrical community.

