

Multi-spacing MT observation regarding anomalous phase responses

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The magnetotelluric (MT) impedance tensor exhibiting anomalous phases greater than 90 degrees are sometimes observed. Since simple 1D or 2D models do not generate such responses, the appearance of them puts a difficulty on the analysis of MT data. The origin of anomalous phases due to characteristic geo-electric structures has been extensively investigated: some attribute to 3D conductive objects and others to 2D anisotropic structures. On the other hand, noises, imperfection of device or tiny objects near an observation site might induce anomalous phase behavior. Inspecting these possibilities and discriminating them for each data will contribute to improve the interpretation of MT responses.

Anomalous phases were observed at several sites in the observation in western Shikoku (Yoshimura et al, 2016). To exploit more detailed properties, we performed a denser, multi-spacing MT observation around one of the sites showing anomalous responses in that observation. Along with standard MT method measuring three components of magnetic field and two components of horizontal electric fields (3H2E), we measured redundant four components of electric fields (3H4E) at two sites. This is intended to examine the possibility of device or tiny objects.

The estimated response functions show the reproducibility of anomalous responses irrespective of the arrangement of electrodes, which confirms that the cause is different from device or tiny objects. Responses at different sites impose some restrictions on the spatial distribution where anomalous phases appear at this region, and we discuss the origin of anomalous responses.

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