Estimation of electrical anisotropy in the oceanic upper mantle from seafloor magnetotelluric array data

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Electrical anisotropy in the oceanic upper mantle could provide important clues on mantle structure and dynamics if it is confirmed from observational data. Seafloor magnetotelluric (MT) data are useful to estimate electrical anisotropy in the oceanic upper mantle, but should be carefully treated partly because maximum anisotropic signal may not be so large (half an order of magnitude in electrical conductivity) and there is always trade-off between intrinsic anisotropic effects and effects of a large-scale lateral heterogeneity including bathymetric variations and coast effects. One promising method to estimate electrical anisotropy from seafloor MT array data is first to obtain a 1-D isotropic model through iterative correction for bathymetric distortion, and then to estimate anisotropy as deviations from the 1-D isotropic model. We first investigate the performance of this method through a series of synthetic modeling using plausible 1-D anisotropic models for the Normal Oceanic Mantle project area in the northwestern Pacific. The synthetic modeling includes forward modeling using the 1-D anisotropic models with and without bathymetry and inversion with iterative bathymetric correction to data produced from the 1-D anisotropic models underlying a 3-D real bathymetry. After the synthetic test, we apply the method to an observational array data obtained during the Normal Oceanic Mantle project in the northwestern Pacific. We will show and discuss results of the application in the presentation.

