Modeling Ocean Bottom MT Data at the Marmara Sea, Turkey

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Ocean Bottom Electromagnetic (OBEM) data at 16 stations within the Sea of Marmara (Fig. 1a) were collected in three campaigns (2008 – 2009), using OBEM instruments developed by JAMSTEC with the aim of uncovering 2D electrical structure beneath the Sea of Marmara. In this study we investigate the effect of ocean bottom on the data prior to data analyses. For this aim, a forward test was performed using Ogawa and Uchida's 2D inversion code which is now modified by us to consider bathymetry effect. Fig. 1-b represents the initial model (100 Ωm half-space) which includes bathymetry (0.3 Ωm) layers for the first profile (see Fig. 1a for the stations given in red rectangular) for the forward test.

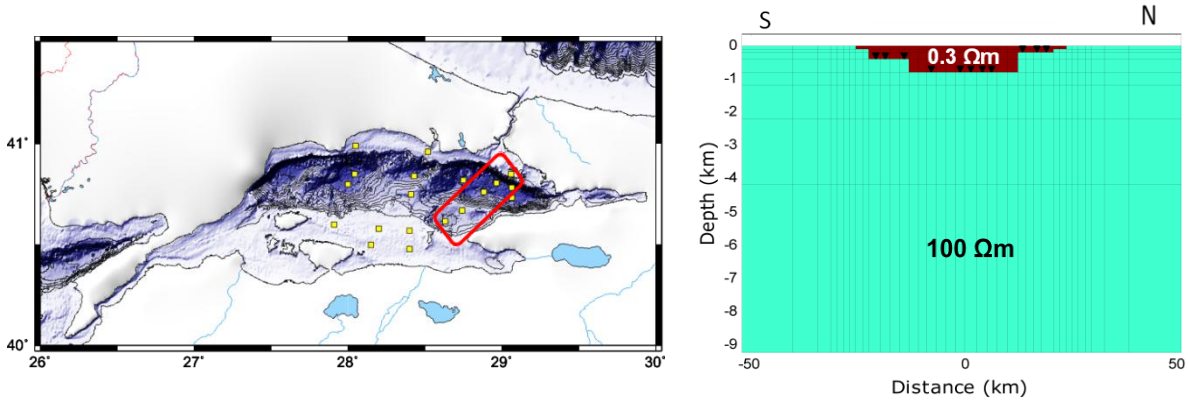

Figure 1- a) Bathymetry map of the Marmara Sea with OBEM site locations (yellow squares). b) Initial model for the forward test.

It is evident from the magnetotelluric (MT) response curves (Fig. 2) that both TE and TM modes are influenced by the ocean bathymetry. Fig. 2 displays apparent resistivity and phase responses for a model given in Fig. 1 at the stations located on different bathymetry layers (400m, 800m and 100m from left to right). In Fig. 2, for both modes the top two graphs show the apparent resistivity and phase responses obtained from the first and third southern stations of the profile while middle two graphs represent the stations located at the deepest locations. The last two graphs at the bottom show the response of the northern sites at the shallowest depth. Unlike TM mode which exhibits a smooth

phase response for all stations, in TE mode, phase is much more affected by the ocean bottom. Apparent resistivity values are higher than the normal values in TE mode compared with TM mode which indicated a few decades of decreasing from the normal values. These results clearly show the importance of the ocean bathymetry effect and therefore the effect should not be ignored in 2D modeling studies.

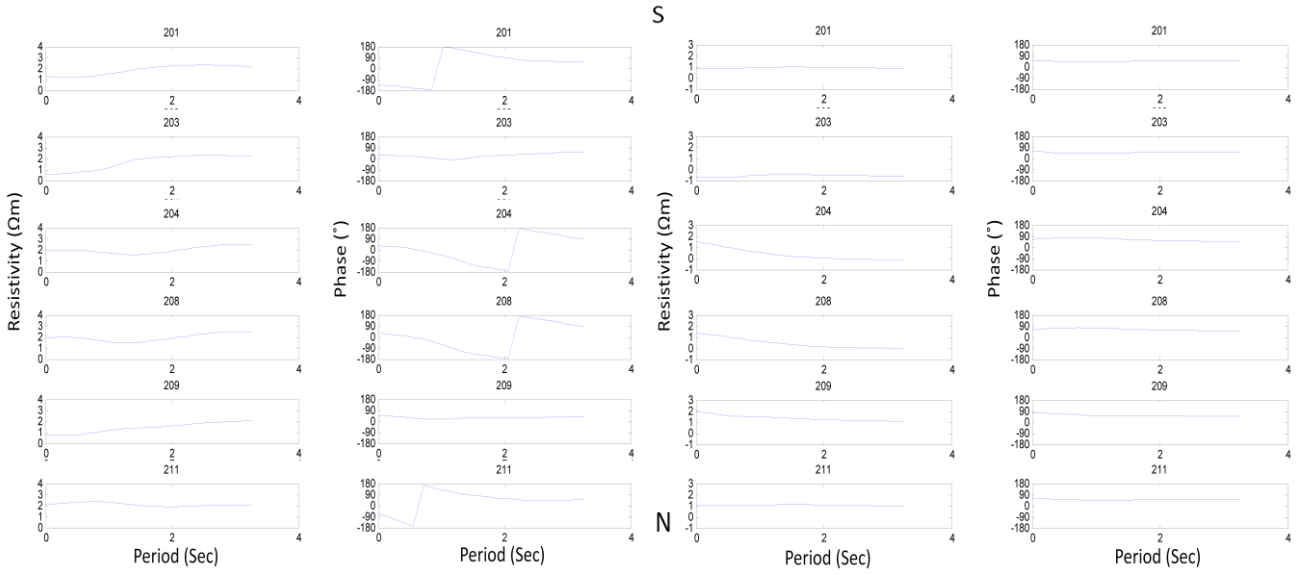

Figure 2: Apparent resistivity and phase responses of sample stations for TE (left hand side) and TM (right hand side) modes obtained from initial model given in Figure 1-B.

References

Ogawa, Y. and Uchida, T., 1996, A two-dimensional magnetotelluric inversion assuming Gaussian static shift, *Geophys. J. Int.*, 126, 69-76.