2D Modeling of Ocean Bottom Magnetotelluric data beneath the Marmara Sea, Turkey.

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The North Anatolian fault zone (NAFZ) being a 1600 km plate boundary between Eurasia and the Anatolian plate is one of two major intercontinental strike slip faults of Turkey. Observed westward movement of the Anatolian plate with respect to stable Euroasia is considered to be main reason for the major events along this transform zone. Since 1939, the westward migration of the big earthquakes on NAF has become an important phenomenon. After the last two earthquakes which occurred at the eastern end of Marmara Sea in 1999 (Mw7.4 Izmit, Mw7.2 Duzce), the westward migration of earthquake sequence indicates that next earthquake can possibly be located inside the Marmara Sea. From the east to the west, the NAFZ zone is divided into several branches on land. However, our knowledge of the geometry of the Marmara branch of NAFZ is insufficient. The crustal structure beneath the Marmara Sea is not well uncovered yet. In this study, our primary task is to reveal the crustal resistivity distribution and its relation with the fault network beneath the Marmara Sea. The previous on-shore magnetotelluric studies show that there is a strong relation between the resistive areas and asperity zones. Most of the resistor-conductor boundaries coincide with fault zones. In this study, the resistivity structure in the Marmara Sea was investigated by the magnetotelluric method based on the ocean bottom electromagnetic data. Totally at 16 sites, continues electric and magnetic fields (three components) were recorded with a sampling rate of 8Hz during nearly 1 month along three profiles crossing NAF within the Marmara Sea. The time series analysis is achieved by Chave and Thompson’s code. 2D and 3D forward modeling tests show that XY and YX components are affected differently by bathymetry of Marmara Sea. Therefore we performed 2D inversion modeling using Ogawa and Uchida’s code modified by us to account for the bathymetry effects on the measurements.