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Magnetotelluric imaging of Duzce Fault, Turkey

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The highly active North and East Anatolian Faults have contributed to the occurrence of the most destructive Earthquakes in Turkey for years. One of these devastating earthquakes, Duzce Earthquake, took place on Duzce Fault, at the western part of the North Anatolian Fault (NAF) at northwestern Turkey, in 1999. Seismological studies related to Duzce Earthquake (Mw: 7.2) revealed the phenomena that the western and eastern parts of the epicenter ruptured with distinct velocities from each other. Itąś obvious that with their capability to identify resistivity variation between the neighbouring structures and the efficiency in resolving of the resistivity structure of the Earth, electromagnetic (EM) methods have been preferred for solving geophysical problems. In this study, one of the EM methods, magnetotelluric method was applied with the aim of finding a relationship between the phenomena related to Duzce Earthquake and electrical properties of the region. Wide-band magnetotelluric (MT) data were acquired along two parallel profiles at the west and the east of Duzce Earthquakeąś epicenter, P1 and P2, respectively. Both profiles crossed Duzce Basin and Duzce Fault in the north and North Anatolian Fault (NAF) in the south. P1 contained twelve sites and was 35 km long while P2 contained 11 sites and was about 40 km long. The effects of galvanic distortions produced by near surface inhomogeneities were retrieved from MT data by Groom and Bailey (1989) decomposition and as a result of this analysis geo-electric strike was found to be N72ćłE and N70ćłE for P1 and P2, respectively, which is consistent with the geology. MT data were analyzed for both TE (electrically polarized), and TM (magnetically polarized) modes by two-dimensional inversion modeling using the code developed by Ogawa and Uchida (1996). According to the inversion results of the P1 and P2, some outcomes which may explain the velocity phenomena existing on the western and eastern parts of the Duzce Earthquakeąś epicenter obtained.