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Brittle-ductile transition zone along the North Anatolian Fault from GPS and Magnetotellurics

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The North Anatolian Fault (NAF) is a 1600 km long transform fault acting as a boundary between the Eurasian plate in the north and Anatolian block in the south. As a complex shear zone, NAF widens from east to west due to the convergence in eastern Turkey and extension in Aegean. This active strike-slip fault generates devastating earthquakes (M>7) as reported by the historical earthquake catalogues. Characterizing the depth extension of the brittle zone becomes crucial for seismic hazard assessment since it controls the released energy and the magnitude of large earthquakes along the fault. Therefore, in the current work we investigate brittle-ductile transition zones combining geodetic data (e.g. GPS) with geo-electrical data (magnetotelluric models) along the NAF. Our calculations on the across-fault GPS profiles show that the locking depths change from $\sim$20 km to $\sim$10 km from east to west, respectively. The electrical resistivity variation from high-resistive (>1000 ohm-m) to the relatively conductive (<300 ohm-m) zone on the across-fault magnetotelluric profiles indicates brittle-ductile transition zones. The depth range of the brittle-ductile transition zones verifies the locking depths obtained from GPS profiles and correlates well with thinning of the crust toward the west.