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Crustal Thickness Variation Across the Sea of Marmara Region, NW Turkey: A Reflection of Modern and Ancient Tectonic Processes

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The Marmara region in Turkey is an important geological setting, both from a tectonic and a seismic hazard/risk perspective. Here we present a recently published map of crustal thickness variation across this complex region (Jenkins et al., 2020), to aid in furthering our understanding of the past and present tectonic processes that formed present□day structure. The crustal thickness map was created using Ps converted phases and receiver function (RF) analysis of earthquakes recorded at all publicly available seismic stations and stations in the national monitoring network (run by AFAD Disaster and Emergency Management Authority Turkey). RFs were converted from time to depth using a local 3□D full□waveform tomographic model and combined in multiphase common conversion point stacks, such that direct P to S converted arrivals and associated multiples are used together to produce continuous maps of the Moho discontinuity. Results reveal the Moho beneath Marmara ranges in depth from 26–41 km, and shows a regional trend of westward thinning, reflecting the effects of the extensional regime in western Anatolia and the neighboring Aegean Sea. The thinnest crust is observed beneath the western end of the Sea of Marmara, and can be attributed to transtensional basin opening. A distinct region of increased crustal thickness bounded by the West Black Sea Fault in the west, and the northern strand of the North Anatolian Fault in the south, defines the ancient crustal terrane of the Istanbul Zone. Isostatic arguments indicate that the thickened crust and lower elevation in the Istanbul Zone require it to be underlain by thicker lithosphere, a conclusion that is consistent with its hypothesized origin near the Odessa shelf.