

Late Pleistocene intraplate extension of the Central Anatolian Plateau, Turkey: Inferences from cosmogenic exposure dating of alluvial fan, landslide and moraine surfaces along the Ecemiş Fault Zone

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Late Pleistocene activity of the Ecemiş Fault Zone is integrally tied to ongoing intraplate crustal deformation in the Central Anatolian Plateau. Here we document the vertical displacement, slip rate, extension rate, and geochronology of normal faults within a narrow strip along the main strand of the fault zone. The Kartal, Cevizlik and Lorut faults are normal faults that have evident surface expression within the strip. Terrestrial cosmogenic nuclide geochronology reveals that the Kartal Fault deformed a 104.2 ± 16.5 ka alluvial fan surface and the Cevizlik Fault deformed 21.9 ± 1.8 ka glacial moraine and talus fan surfaces. The Cevizlik Fault delimits mountain front of the Aladaglar and forms >1 km relief. Our topographic surveys indicate 13.1 ± 1.4 m surface breaking vertical displacements along Cevizlik Faults, respectively. Accordingly, we suggest a 0.60 ± 0.08 mm a⁻¹ slip rate and 0.35 ± 0.05 mm a⁻¹ extension rate for the last 21.9 ± 1.8 ka on the Cevizlik Fault. Taken together with other structural observations in the region, we believe that the Cevizlik, Kartal ve Lorut faults are an integral part of intraplate crustal deformation in Central Anatolia. They imply that intraplate structures such as the Ecemiş Fault Zone may change their mode through time; presently, the Ecemiş Fault Zone has been deformed predominantly by normal faults. The presence of steep preserved fault scarps along the Kartal, Cevizlik and Lorut faults point to surface breaking normal faulting away from the main strand and particularly signify that these structures need to be taken into account for regional seismic hazard assessments. This project is supported by The Scientific and Technological Research Council of Turkey (TUBITAK, Grant number: 112Y087).