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Constraining the <500 Ka faulting history of the Central Taurides above the Cyprus Subduction Zone: Insights from U-Th carbonate geochronology

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The Central Taurides is located at the southern margin of the Central Anatolian Plateau with a high relief up to a 2 km topography. This plateau margin rises in the upper plate north of the Cyprus Arc where the African Plate subducts beneath the Anatolian Plate. Although the relationship between regional surface uplift and mantle-driven processes, such as slab tearing/break-off and asthenospheric upwelling are well constrained in this area, the Quaternary faulting history and the seismic hazard potential remain hardly known. The Central Taurides between Alanya and Seydişehir (from the coast to the plateau), presents a series of NW-SE striking faults that control the topography across the highly erosional and karstified orogenic plateau margin. In this study, we utilize U-Th carbonate geochronology, microstructural analysis and fault-slip data to decipher the timing and mechanism of upper crustal brittle deformation. We date fault-related calcites and examine fault kinematics to constrain the <500 Ka faulting history of the overriding Anatolian Plate (southern part) that has uplifted 1.5 km since 450 Ka. Our kinematic measurements of the youngest generation of the brittle structures indicate widespread normal faulting due to NE-SW horizontal tension in the upper crust. Microscopy and scanning electron microscope analyses on calcite samples show twinning, brecciated zones, calcite gouges, slickenlines, slickenfibres, fault grooves, microfractures and displaced dilation veins; underlining microstructural footprints of faulting-related deformation. U-series dating of fault-related calcites yielded twenty-eight U-Th ages ranging between 714±285 ka and 18.76±0.53 ka. The results of this study constrain the temporal relationships between surface uplift, upper crustal brittle deformation and mantle-rooted processes above active subduction zones. This study is supported by the Scientific and Technological Research Council of Turkey (TUBITAK) “2232 International Fellowship for Outstanding Researchers Program” (Grant No: 118C275), and TUBITAK “2214-A International Research Fellowship Programme for PhD Students” (Grant No: 1059B142200520).