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Kinematics of SW Anatolia implications on crustal deformation above slab tear

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SW Anatolian tectonics are dominated mainly by emplacement of Lycian Nappes from north to south over the Beydağları platform during the early to middle Miocene, which followed by the development of the so called Fethiye Burdur Fault Zone (FBFZ). This fault zone is supposed to be a sinistral strike-slip fault zone that accommodated more than 100 km displacement between the Menderes Massif and the Beydağları platform during the exhumation of the Menderes Massif, mainly during the late Miocene. In addition, the FBFZ is collinear with the on-land NE continuation of the Pliny Trench along which the north subducting African slab is thought to be torn apart and retreated from somewhere around the apex of Isparta Angle to its present configuration as a STEP fault. In order to test already proposed evolutionary scenarios, and the feasibility of a STEP fault scenario and tectonic evolution of the region, we have conducted a rigorous paleomagnetic and kinematic study in the region containing more than 3000 paleomagnetic samples collected from 88 locations distributed evenly all over SW Anatolia and more than 2000 fault slip data measured mainly along the FBFZ.

According to our preliminary results, except for some local insignificant clockwise rotations - the region underwent counter-clockwise rotation during the early to Late Miocene. The rotation senses and amounts are almost the same everywhere implying that rotation took place uniformly everywhere, as a rigid body rotation or the region underwent no internal rotational deformation. Likewise, rotations in the west and the east of FBFZ are similar for the post-late Miocene implying no internal rotational deformation.

In addition to paleomagnetic data, the slickenside pitches and constructed paleostress configurations mainly along the FBFZ indicated that the faults within the FBFZ are mainly normal in character although minor lateral components are observed at the fault terminations or intersections. These fault slip measurements are also consistent with earthquake focal mechanisms suggesting active extension in the region. Thus, the FBFZ is characterized at the surface mainly by extension unlike previously proposed transcurrent deformation. We think, the FBFZ may represent a deep structure that formed at the ancient northern track of the STEP fault that reflected to the surface as a wide extensional zone displaying counter-clockwise rigid body rotation since late Miocene possibly due to fast Aegean slab retreat towards south. This research is supported byTubitak-Turkish National Science Foundation Grant Number 111Y239.