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Paleomagnetic analysis of crustal deformation in the Anatolian accretionary collage and its neotectonic significance in the evolution of the Turkish sector of the eastern Mediterranean region

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Closure of the NeoTethyan Ocean in the Turkish sector of the Alpine-Himalayan Orogen by $\sim$12 Ma has been succeeded by deformation of a domain between the Eurasian Plate, presently bounded by the North Anatolian Fault, and the Arabian indenter. Facets of this deformation comprise crustal thickening and uplift to produce the Anatolian Plateau, establishment of transform faults, and tectonic escape as Arabia has continued to impinge into the collage of Anatolian terranes accreted by closure of NeoTethys. We compile a database of neotectonic paleomagnetic results from Anatolia to analyse this deformation. Large rotations (up to 5°/10,000 years) of small fault blocks occur along the intracontinental transforms but do not extend away from these zones and show that seismogenic upper crust is decoupled from lower continental lithosphere undergoing continuum deformation. Between the transforms large fault blocks exhibit lower rotation rates (mostly $<1^{\circ}$/100,000 years) varying systematically across Anatolia. Large anticlockwise rotations near the Arabian indenter diminish westwards to become zero then clockwise near the limit of tectonic escape. The view that the collage has rotated anticlockwise as a single plate, either uniformly or episodically, during the Neotectonic era is refuted. Instead, deformation has been distributed and differential as the collage adapted to changing tectonic regimes. Crustal extrusion to the west and south has expanded the curvature of the Tauride Arc and combined with back roll on the Hellenic Arc to produce the extensional horst and

graben province in western Turkey. Latitudinal motions are close to confidence limits but consistent with $\sim$800 km of northward motion of Anatolian terranes over 40 Ma, a figure including up to a few hundred km of closure linked to crustal thickening since the demise of NeoTethys.

Palaeomagnetic study shows that almost all volcanism within the Karasu Basin in southern Turkey occurred during the Brunhes Chron ($<$0.78 Ma), and combined palaeomagnetic and K-Ar evidence indicates a concentration of activity between 0.66-0.35 Ma with a subsidiary episode at $\sim$0.25-0.05 Ma (Tatar et. al. 2004). During this period the basin has rotated clockwise by $8.8 \pm 4.0^{\circ}$ as pinned blocks bounded by a series of cross faults between the Amanos Fault Zone and East Hatay Fault have rotated by ongoing strike slip motion on the bounding master faults. The volcanic activity is apparently focussed on points where these cross faults meet the intracontinental transforms, probably because rotational motions have opened spenochasms to act as magma conduits at these points. We are continuing paleomagnetic studies along eastern segments of the North Anatolian Fault Zone including the Erzincan pull apart where dozens of young volcanic cones are aligned on the northern margin of the basin.