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An Oligocene ductile strike-slip shear zone: Uludag Massif, northwest Turkey – implications for lateral flow in mid to lower crust

A. I. Okay (1), M. Satı r (2), M. Zattin (3), W. Cavazza (3) and G. Topuz (1)

(1) Eurasia Institute of Earth Sciences, Istanbul Technical University, Turkey, (2) Institut für Geowissenschaften, Üniversität Tübingen, Germany, (3) Dipartimento di Scienze della Terra, Università di Bologna, Italy

okay@itu.edu.tr

Although strike-slip faults are common structures in continental crust their roots, the ductile strike-slip shear zones, are rarely exposed. When exposed they allow a rare glimpse of how the mid to lower crust accommodates localized deformation. A segment of an Oligocene ductile strike-slip shear zone, over 225 km long and with a 100 km of right-lateral strike-slip displacement, is exposed in the Uludag Massif of northwest Turkey. The shear zone forms a fault-bounded uplift of amphibolite facies gneiss and intrusive Oligocene granites and lies at the tip of an active oblique-slip fault. The gneisses show a pervasive subhorizontal lineation with a dextral sense of slip and a steeply dipping foliation; they are intruded by a subvertical syn-kinematic Oligocene granitoid. The shear zone nucleated in the amphibolite facies gneisses with peak P-T conditions of 7.0 kbar and 670 ˚C, and with Eocene (49 Ma) and Oligocene (36-30 Ma) Rb/Sr muscovite and biotite cooling ages, respectively. No metamorphism related to the shear zone activity is discernable. The 20-21 Ma apatite fission track (AFT) ages indicate rapid exhumation during the Early Miocene. 14 Ma AFT age from a gneiss clast from a neighbouring Neogene basin shows that the shear zone was on the surface by the Late Miocene. The Uludag shear zone lies ∼100 km south of the North Anatolian Fault, which accommodates the present westward motion of the Anatolian Plate. It illustrates that lateral flow of mid to lower crust can switch between shear zones on

time scales of 10 million years.