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Surface ruptures along the Maras segment of the East Anatolian Fault (SE Turkey) and kinematic modelling from Tectonic and GPS data

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We investigate the Maras segment of the East Anatolian fault (EAF) using quantitative geopmorphology and paleoseismic trenching. The ENE-WSW trending and ˜100-km-long fault segment consists on a quasi-linear rupture of gouge zone with ridges and young scarps that extend from the pull apart basin of Golbaci to the transpressive Amanos mountains and Imali village (east of Turkoglu. South of Kahramanmaras city, the fault crosses young deposits of the Aksu Basin and displays fresh scarps with offset streams. Detailed measurements of fault displacements ranges from 3.8 m to 1500 m and attest for late Pleistocene and Holocene tectonic activity. Paleoseismic investigations with trenching and geomorphic analysis along the EAF east and west of Turkoglu indicate the occurrence of recent surface faulting with offset late Holocene deposits and stream channels. These recent surface ruptures along the Maras fault segment may be correlated with the 29 November 1114 AD and 1513 AD large earthquakes. The kinematic modelling using new active tectonic results and GPS velocities at the junction between the EAF rupture segment, the Karasu Valley fault and the Dead Sea fault (DSF) indicate a good agreement between slip rates and tectonic blocks. Field investigations included the fault kinematics at the junction and reveal slip vectors consistent with the westward escape of the Anatolian block (with 9.0 mm/yr. slip rate along the EAF), the extension of the Karasu Valley (with 0.8 - 2.0 mm/yr. for the normal component of the Amanos fault) and convergence of the African and Arabian plates (5.4 ś 1 and 17 ś 2 mm/yr., respectively, McClusly et al., 2003). The junction can be interpreted as a triple point where the DSF transforms the Cyprus arc subduction into the East Anatolian strike-slip fault.