

Investigating the crustal deformation on the Hazar-Palu segment of the East Anatolian Fault (EAF), Turkey

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As well known, strike-slip faults are a fault type widely spread around the world. Many of them are located at boundaries between two tectonic plates. For instance, the East Anatolian Fault (EAF), the one in this study, forms a 400-km-long boundary between the Anatolian and the Arabian plates. It is a typical left-lateral slip fault with an ENE-WSW strike and a total offset of 33 km. As it is easy to obtain velocity solution from GPS raw data on a specific block or plate with the software, here is GAMIT/GLOBK, one can estimate the long-term slip rate as well as creeping zone, locking depth and the offset between two nearly-rigid blocks of a fault or between the fault's surface trace and the dislocation below the seismogenic zone by using inter-seismic GPS velocities and proper models. However, not many suchlike studies have been carried out along the whole EAF as those done on North Anatolian Fault (NAF) during the last 20 years. Most of them are focused on the area around the triple junction where the Dead Sea Fault connects to the EAF and the overall deformation using mainly InSAR. Moreover, there are only a few large earthquakes documented since the last century and InSAR based studies indicate that low seismicity can be related with a creep mechanism that may reach to 10 mm/yr creep rate, along different segments of the EAF. Based on the recent published GPS velocities, the slip rate on EAF is estimated about 8 to 10 mm/yr, which seems that the strain accumulation will not occur and therefore the creeping zone of EAF will not produce a remarkable earthquake. But the extent of the creeping zone is not well constrained, which still implies the potential of the seismic hazard arising.

The aim of this study here is to perform the velocity solutions from the present-day cGPS sites' data (Turkey's National Permanent GPS Network-ACTIVE data, i.e. TUSAGA-ACTIVE data) and new sGPS observations (up-to-date surveys based on proper profiles) on particular segment of EAF, the Hazar-Palu segment, which may be combined with the more recent InSAR observations, to develop an appropriate inter-seismic deformation model around this region with a multidisciplinary perspective.

Keywords: creep, GPS, East Anatolian Fault, slip rate