



Investigation of the Creep Along the Hazar – Palu Section of the East Anatolian Fault (Turkey) Using InSAR and GPS Observations

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Abstract

Investigation of surface creep along the East Anatolian Fault (EAF) is important to improve the existing earthquake hazard models in the region, which are related to the long-term behavior of EAF. To investigate the surface creep, interseismic velocity field along the Hazar – Palu section has been calculated using the permanent scatters approach of the InSAR method (PsInSAR) with the ENVISAT ASAR data between 2003 and 2010. The mean velocity fields obtained on three descending and neighboring tracks provide clear evidence for surface fault creep. The results indicate that a 100-km-long section of the Palu segment in the Elazığ – Bingöl seismic gap is exhibiting aseismic creep at rates reaching up to long term GPS velocity of the EAF (i.e. ~ 10 mm/yr). Preliminary analysis and modeling the velocity field and seismicity suggests that the fault may be creeping from surface all the way down to the bottom of the seismogenic crust. Thus, some section of the fault may be accumulated no strain at all and, therefore may not be capable of producing major earthquakes.

In order to monitor and control the creep rate, a new GPS network was established in 2015 with 6 fault perpendicular profiles along the fault. GPS sites were selected in the area less than 2 km away from the EAF. Far field continuous GPS sites will also be used in determining the long-term slip rate and locking and creeping depth along the EAF by combining the results of the near field data during the modeling studies. The first GPS measurements were carried out at 27 GPS sites in 8 – 13 September 2015. Together with the GPS the present day surface creep will be investigated with Sentinel 1 SAR data. For the first time, the earthquake hazard models will be improved with the multidisciplinary investigation of creeping characteristics along the EAF with this study (supported by TUBITAK no: 114Y250 project).

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