Geophysical Research Abstracts
Vol. 20, EGU2018-14910, 2018
EGU General Assembly 2018

Co- and postseismic deformation of the 2014 Mw 6.9 Yutian earthquake, NW Tibet studied by high resolution optical and radar data

Xing Li (1), Wenbin Xu (1), Yann Klinger (2), and Sigurjón Jónsson (3)

(1) Department of Land Surveying and Geo-informatics, Hong Kong Polytechnic University, Hong Kong, China, (2) Laboratoire de Tectonique, Institut de Physique du Globe de Paris, Paris, France, (3) Physical Science and Engineering Division, King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia

The ∼2000 km long, ENE-striking Altyn-Tagh fault (ATF) is the most prominent active strike-slip fault system in northern Tibet. Two M_W ∼7 earthquakes occurred on the southwestern part of the ATF system in 2008 and 2014. These were the largest events to occur in the area since two M>7 earthquakes occurred in 1924 on a nearby segment of the ATF, ∼150km to the NE of the 2014 earthquake. Here, we present the first co- and postseismic ground deformation fields related to the 2014 M_W6.9 Yutian earthquake, generated from both high-resolution TanDEM-X radar (1.3 m) and SPOT-6 optical satellite images (1.5 m) that fully cover the ruptured fault. These data show that the seismogenic fault consists of two main fault segments with a 4.5 km step over in between them, close to the Xor Kol Lake. The lake is almost in the middle of the surface rupture where the largest coseismic offsets were found. We delineate the surface trace of the seismogenic fault from the computed image offset measurements and use the result to constraint the surface location of the modeled fault. We invert the coseismic data for optimal fault dip and spatially variable slip. We find that the majority of fault slip occurred in the upper 10 km with peak slip of about 2.5 m at 4 km depth. The estimated shallow slip of the slip model is consistent with the field observations. Studying Sentinel-1 postseismic time-series data acquired between 2014 and 2016, we find a clear evidence for shallow aseismic fault slip occurring at the southwestern end of the fault activated in the Yutian earthquake. Finally, we explore the influence the Yutian earthquake may have had on the ATF and on neighboring faults using the Coulomb stress change calculations. We find that the earthquake brought the fault segment between the 1924 earthquakes and the 2014 event closer to failure.