

Slip Distribution of the April 14, 2010 Mw 6.9 Yushu (Qinghai, China) Earthquake Constrained using InSAR Observations

Sun, Jianbao

Jianbao, CHINA

A devastating Mw6.9 earthquake struck the Yushu area in the interior of the eastern Tibetan Plateau on April 14, 2010 and claimed more than 2500 human lives. We produce three coseismic interferograms using radar data from C-band and L-band satellites and identify three areas with concentrated deformation along the rupture. The easternmost one with the highest fringe rate lies around Yushu-Jiegu town where most casualties and damage occurred. By Adopting a two-step Maximum-A-Posterior (MAP) probability kinematic inversion method and using the fault surface traces obtained from field investigations to constrain the model, we obtain a preferred slip model composed of three segments. The eastern segment has slip near the surface with maximum left-lateral slip of up to ~ 1.72 m. The middle segment has a similar faulting style with its slip up to ~ 1.0 m at shallow depth but without reaching to the surface. The western segment is offset to the south on a parallel fault across a pull-apart basin, and has only small amounts of slip (< 0.6 m) reaching to the surface. Most of the slip occurred within 15 km depth, and is predominantly left-lateral. The total seismic moment release is estimated to be $2.23e+19$ Nm, consistent with the seismic estimate of $2.50e+19$ Nm. This earthquake attests to the active tectonic deformation process of the Xianshuihe-Ganzi-Yushu fault zone, which accommodates the eastward extrusion of the southeast domain of the Tibetan Plateau.