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An improved geodetic source model of the 1997 Mw 7.6 Manyi Earthquake, Tibet

Nan Fang (1), Wenbin Xu (1), Rishabh Dutta (2), and Sigurjón Jónsson (2)

(1) Land Surveying and Geo-Informatics, Hong Kong Polytechnic University, Hong Kong, China, (2) Physical Science and Engineering Division, King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia

The 1997 Mw 7.6 Manyi earthquake has been studied extensively using a variety of different data. The published source parameters for this left-lateral strike-slip earthquake, however, vary significantly between different studies. For example, it is still a controversy what the dip angle of the seimogenic fault was in the earthquake. A sub-vertical fault is needed to explain the apparent asymmetry in the observed deformation across the fault, unless non-linear elastic properties of the crustal material are assumed. To get better information about the source parameters and their uncertainties, we have reprocessed available radar interferometric data (InSAR) from three parallel tracks to make coseismic interferograms that fully cover the earthquake fault rupture. From these interferograms, we find that very dense fringes centered on the central track (track 305) correspond to the location of the greatest moment release. Unlike previous studies, which mostly focused only on the InSAR phase signal, we also use image matching to generate range and azimuth offset maps of the coseismic displacements. Complementary to the interferograms, the offsets provide useful near-field ground deformation. The peak-to-peak range offset across the fault shows around 3.5 m displacement in the line of sight direction. The offset measurements also enable us to delineate well the surface trace of the seismogenic fault, which we find to be about 170 kilometers long. With these data, we are able to constrain better the source fault location, its strike angle, length, and the depth of its top edge in the modeling. After setting the maximum fault depth to 20 km, we only need to invert for the dip angle of the fault and spatially variable slip values. To fully consider the data errors, we use far field InSAR data and offsets to estimate covariance functions, which represent the noise characteristics of the data. Without the need of the estimating the fault's geometry, we use Bayesian inference to simultaneously estimate the fault dip and the slip distribution. Our preliminary results show that the slip is heterogeneous with two main asperities that reach $\sim$6 m of slip or greater at the central section of the fault rupture.