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Estimation of post-seismic deformations 23 October 2011 Van earthquake (Mw=7.2), Turkey under geodetic constrains

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The 23 October 2011 (Mw 7.2) Van earthquake occurred in the eastern of the Turkey. We present GPS measurements of horizontal postseismic displacements that provide new constraints on the rupture geometry. The postseismic surface deformation field is derived from survey-type GPS measurements carried out between November 2011 and May 2013 in a GPS network that established approximately one month after the earthquake in the near field.

The large post-seismic horizontal displacement reaches about 28.5 $\pm$ 0.1 cm in the region in the 1.5 years after the earthquake. GPS measurements indicate the early postseismic deformation is most probably due to shallow after slip that appears to decrease exponentially with time. Hence, the space-time evolution of the postseismic deformation, based on elastic dislocation models, is likely controlled by after slip on the fault following the earthquake. Modeling results predict aseismic thrust slip with significant oblique left-lateral component on shallow sections of the fault, suggesting that the afterslip is driven by coseismic stress changes.

Keywords: Van earthquake, GPS, postseismic deformation, afterslip, elastic dislocation