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Early postseismic deformation after the Mw 7.2, October 23, 2011 Van Earthquake (Turkey) Observed by GPS measurements

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On October 23th 2011, a Mw 7.2 earthquake occurred in Van region of eastern Turkey. The earthquake is associated with reverse faulting with a minor left-lateral strike slip component on a NE-SW trending and northward dipping fault.
A geodetic network was established one month after the earthquake to monitor the near field postseismic surface deformation. Episodic Global Positioning System (GPS) measurements were performed on this new network in November 2011, January 2012, June 2012 and September 2012. GPS measurements indicate significant postseismic surface motion on the hangingwall of the coseismic fault with southwestward horizontal displacements reaching up to 21 cm, suggesting significant left lateral sense of motion in addition to reverse slip on the main fault.
Comparison of coseismic and postseismic GPS measurements reveals aseismic reactivation of a fault segment within the footwall block that splays from the main fault rupture running through the city of Van. GPS time-series up to one year are explained better with a logarithmic function, suggesting that the early postseismic deformation is likely controlled by afterslip. Preliminary elastic modelling of postseismic GPS data using Poly3D suggests that the postseismic deformation is mostly due to oblique (thrust with left-lateral) afterslip up to $\sim$70 cm at relatively shallow (< 10 km) depths compared to deep (> 15 km) coseismic slip.