



InSAR measurements and interpretation of postseismic motion following the Mw 7.1 Darfield (Canterbury) earthquake of 4 September 2010

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We analyze postseismic deformation following the 2010 Mw 7.1 Darfield (Canterbury) earthquake using InSAR observations acquired between September 2010 and December 2012. This time period spans the protracted sequence of aftershocks that affected the Christchurch region, some of which were very damaging, including the 22 February 2011, 13 June 2011 and 23 December 2011 events.

Short-term postseismic deformation that occurred between September 2010 and February 2011 has been studied previously using GPS and InSAR methods (Beavan et al., 2013; Motagh et al. 2013). Using the SmallBASeline Subset (SBAS) method, we generate an InSAR time-series to investigate late postseismic deformation following the 22 February 2011 Christchurch earthquake. We have processed additional TerraSAR-X images spanning over the interval between March 2011 and December 2012 in the Christchurch region.

Using the InSAR measurements, we investigate whether short-term afterslip on known fault planes in the upper/lower crust and/or poroelastic rebound can account for the observed postseismic deformation. Preliminary analysis of deformation occurring after the 22 February 2011 earthquake suggests that afterslip took place on the eastern end of the Greendale fault. The amount of postseismic deformation that is occurring on the fault is about 30 mm/year. In order to better constrain deformation in the vicinity of the eastern Greendale fault, the next phase of the analysis will focus on COSMO-SkyMed images.