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Post-seismic Deformation following the June 2000 Earthquake Sequence in the south Iceland Seismic Zone

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We observe post-seismic deformation on two spatio-temporal scales after two Mw=6.5 earthquakes that occurred in the south Iceland seismic zone on June 17 and 21, 2000. At the first scale we see a rapidly decaying deformation transient lasting no more than 2 months and extending about 5 km away from the two mainshock ruptures. This local, month-scale transient is captured by several radar interferograms (InSAR) and is also observed at a few campaign GPS sites located near the two faults. The second scale takes place over a characteristic time of about a year and is only detected by campaign and continuous GPS measurements. Different mechanisms are needed to explain the observed post-seismic deformation. The month-scale deformation pattern has been explained by poro-elastic rebound due to pore-fluid flow in response to the main shock induced pore-pressure changes [*Jónsson et al.*,2003]. In contrast, the year-scale deformation can be explained by either afterslip at 8-14 km depth or visco-elastic relaxation of the lower crust and upper mantle in response to the coseismic stress changes. Models with lower crustal viscosities of $\sim 10^{19}$ Pa s and upper mantle viscosity less than $\sim$3 x 10^{18} Pa s yield the best fit to the combined horizontal and vertical post-seismic velocity field. Afterslip models provide a better fit to the post-seismic signal during the first year (2000-2001) than visco-elastic models, whereas visco-elastic relaxation is the more plausible mechanism to explain the deformation observed during 2001-2004.