



A decade of postseismic deformation after the 1999 Izmit and Duzce earthquakes

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The North Anatolian Fault is a major continental right lateral strike-slip system located in northern Turkey. The fault has accommodated 12 large earthquakes (M6.7 and above) since 1939 with a dominant westward progression in seismicity culminating in the M7.4 Izmit and M7.2 Duzce earthquakes in 1999.

Coseismic displacements on faults impart an instantaneous stress change on the adjacent lithosphere. Post-seismic deformation is a transient response to this redistribution of stresses, and is a measure of the stress relaxation in the upper part of the lithosphere. High resolution measurements of the spatial and temporal character of the surface deformation following an earthquake can provide constraints on the mechanical processes involved with the dissipation of this stress in time and space.

We present a time history of postseismic deformation determined using Interferometric Synthetic Aperture Radar (InSAR) measurements using data from Envisat ascending and descending satellite geometries. Our results also show a roughly 30km by 40km section of the Sakarya basin, that lies on the northern side of fault, has been undergoing steady subsidence during the observation period.

We also show that the Izmit and western section of the Duzce rupture is undergoing aseismic creep at a rate of ~ 10 mm/yr during the period 2003-2010. This is a large fraction of the long-term slip rate on the fault (~ 25 mm/yr).

We present the preliminary results of numerical experiments investigating the impact of postseismic creep on the stress field of the crust in this region.