



Unprecedented resolution for onshore GPS slip inversion of the 2009 Tohoku-Oki Earthquake

alon ziv

Israel (zivalon@tau.ac.il)

A new method is described for determining the slip distribution of large earthquakes using high-rate GPS ground displacement. A key ingredient of this method is the progressive extraction of the permanent ground displacement from the displacement time series. The resulting permanent ground displacement time series are then used as an input for a step-wise static fault slip inversion. At each time-step, the residual of the permanent ground displacements is inverted for the incremental static fault slip, which is then added to the total fault offset. Incremental slip distributions are of elliptical shape with maximum slip at their center, decaying to zero towards the edge. The main advantage of using a single slip patch per time-step is that it prevents the occurrence of spurious slip in parts of the model where the solution is unconstrained. The method has been applied for the 2009 Tohoku-Oki earthquake using onshore 1 Hz GPS data. The resulting slip distribution is extremely detailed, far more than previous GPS-only inversions. In addition, it shares many features with previous joint inversions of GPS (both onshore and offshore), Tsunami and seismic data sets.