Within twenty-two months after the 26 December 2004, Sumatra-Andaman earthquake, the 3.1 m of coseismic displacement at Point Blair had increased by 32 cm at an exponentially decaying rate (t=0.8 y). Remarkable postseismic uplift also occurred, initially exceeding 1 cm per week, decreasing to 1 mm per week a year later. By mid-2006 points near Port Blair had risen more than 20 cm, resulting in a 24% reversal of coseismic subsidence. Uplift at this and seven other GPS sites suggest an eastward shift in the neutral axis separating coseismic subsidence from uplift. We installed ten points after the earthquake, three of them as continuous sites. We find that slip near and down-dip from the termination of seismic rupture can explain the observed surface deformation.

Figure 1. Lower left: 6 cm of North, 30 cm of East, and 24 cm of up GPS motion at Port Blair Jan ’05 to Nov ’06. Top left GPS sites in the Andaman Islands with observed and estimated vertical deformation. Vertical deformation is predicted from the Port Blair relaxation time constant. The solid line indicates the neutral axis separating uplift from subsidence from Meltzner et al. (2003) with their estimated coseismic displacements in black (cm). The largest two numbers are GPS or tide gauge results. Predicted total postseismic uplift estimated from exponential rates derived from GPS data 2005-06 is indicated in red (cm). The dashed line indicates the current approximate location of the neutral axis. Right: Results of modeling Andaman horizontal and vertical GPS data as slip on the subduction boundary; Red vectors are total displacement predicted by fitting an exponential decay to the GPS data, using initiation time T0=2004.984 and characteristic decay time t =0.788 years from a parameter grid search. Ellipses are chi-square scaled 95% uncertainties on the pre-exponential constant displacement terms. Blue vectors are displacements predicted by a best-fit model of postseismic slip on the Andaman megathrust. Color within each discretized segment of the plate interface indicates the magnitude of the slip vector, and black vectors depict slip direction (projected to Earth’s surface).

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