

Meltzner, A. J., Sieh, K., Natawidjaja, D. H., Konca, A. O., Sladen, A., (2007) **Uplift and Subsidence during the September 2007 Mentawai Earthquakes from Field Observations**, Eos Trans. AGU, 88(52), Fall Meet. Suppl., Abstract#U54A-02

Rupture of the Sunda megathrust offshore southern Sumatra during the recent 16-hour sequence of M_w 8.4, 7.9, and 7.0 earthquakes resulted in uplift and subsidence of the Mentawai Islands and the Sumatran mainland coast. This region last experienced rupture on the megathrust during a pair of earthquakes in 1797 and 1833. Preliminary field accounts and initial continuous GPS data suggest that all uplift associated with the September 2007 earthquakes is within the region of uplift of the great 1833 earthquake. However, the magnitude of uplift is smaller and it does not extend throughout the entire length of the older, bigger rupture. Nor does it extend farther northwestward through the northwestern half of the uplifted region associated with the great 1797 earthquake. We will present field measurements of vertical deformation for the September 2007 events, derived from *in situ* measurements of coral microatolls and other biological and geological markers. This spatially dense set of observations will provide much tighter constraints on the deformation pattern than the sparse cGPS measurements alone. The field observations will permit a more robust comparison with the magnitudes and extent of uplift in 1797 and 1833, which are already known from fossil microatolls. New, better-constrained inversions for slip will be discussed in the context of strain accumulation rates over the past decade to half century. We anticipate that the refined sources will still be too small in both slip amount and rupture extent to have relieved most of the potential slip that has accumulated across the 700-km-long Mentawai patch since 1833. In light of this and other evidence for pre-historical earthquake couplets and triplets along the Sunda megathrust, we argue that the September 2007 sequence might be only the beginning of a new sequence of large ruptures of the Mentawai patch.