Status of GPS Based Investigation on the Recent Sequence of Earthquakes on the Sumatran Trench

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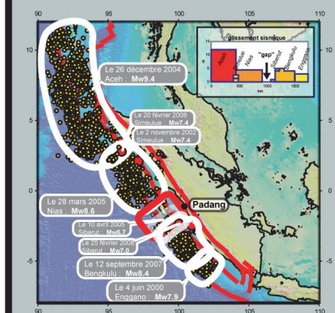
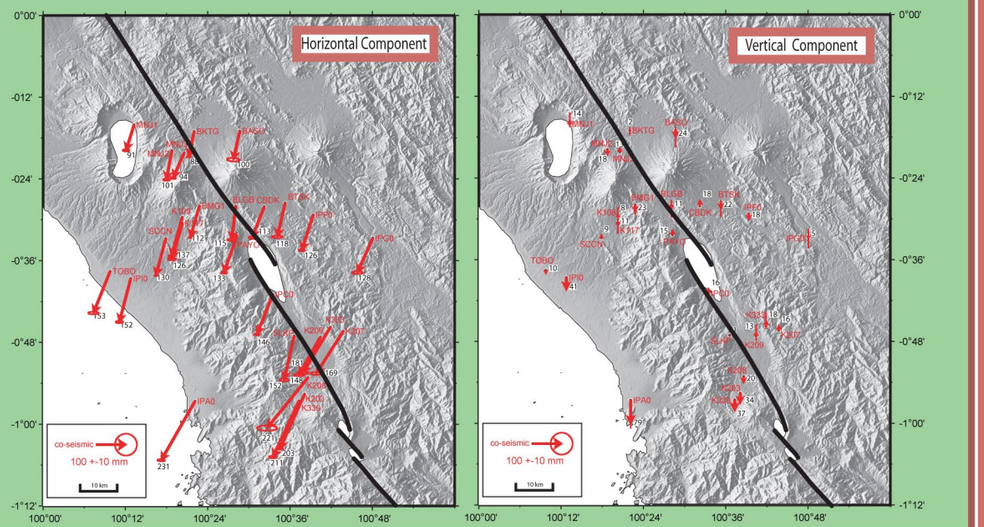
Outline



Within only a few years, almost all the length of the Sumatran trench accomodating the Indo-Australian/Sundaland convergence ruptured. After the giant earthquake of December 26, 2004 and the March, 28 Nias earthquake, the last sequence of earthquakes along the Mentawai Islands (Sept. 12, 2007) broke the remaining gap. According to the distribution of aftershocks, it is not completely clear whether the last sequence of earthquakes reproduced the 1833 rupture (Sieh, 2006), i.e. leaving an untouched section of 100-200 km roughly in front of the Siberut Island and city of Padang (capital of west Sumatra). Immediately after Sept. 12, 2007, we re-occupied with GPS a network of 30 benchmarks we had installed in the Padang area and surveyed initially in June 2007. From these measurements, we expect to be able to constrain the rupture of the earthquake, and especially to quantify the co-seismic slip near the northern end of the rupture. We have installed 4 cGPS stations along the Sumatran coast around Padang to monitor post-seismic deformation in this area, and help determine if this area slipped or is still accumulating strain for a future earthquake. Along with preliminary GPS results, we show here the role played by Coulomb stress change on past and future earthquake triggering on both the trench itself and the Great Sumatra Fault, the continental structure that accommodates the strike-slip component of the oblique plate convergence behind the

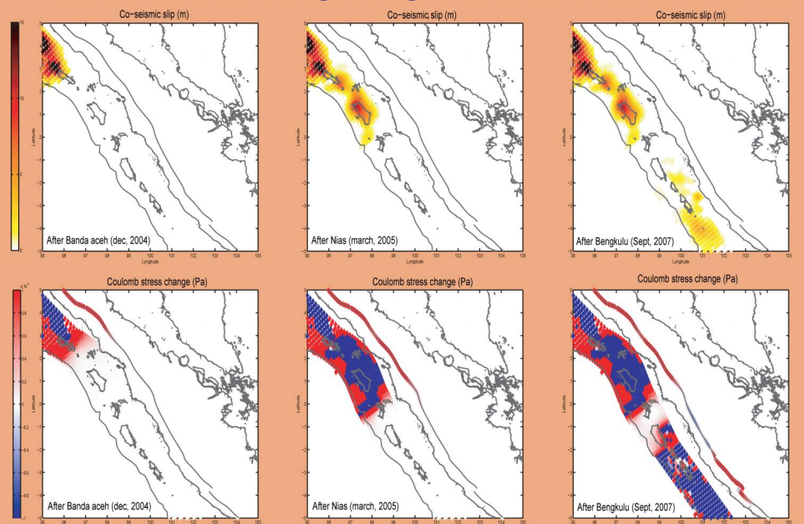
Co-seismic Displacement From GPS Observations Sept.-Oct. 2007



TOP
Red circles give the location of both the 8.4 and 7.9 Sept. 2007 earthquakes. Yellow circles give the aftershocks distribution one month after the main shock.

RIGHT
Horizontal and vertical GPS measurements following the Sept. 2007 crisis. Timeseries for 4 permanent stations are also shown.

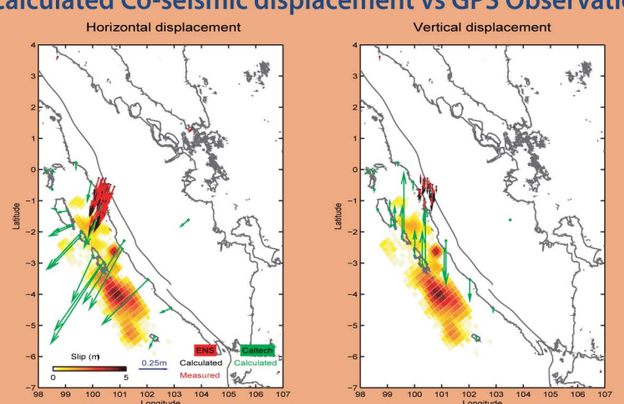
Evolution of Stress Change along the Sumatran Trench and Fault



First row: Co-seismic slip distribution obtained by Chieh et al. (2007), Briggs et al. (2006) and Ji (2007) for Banda Aceh, Nias and Bengkulu earthquakes respectively.

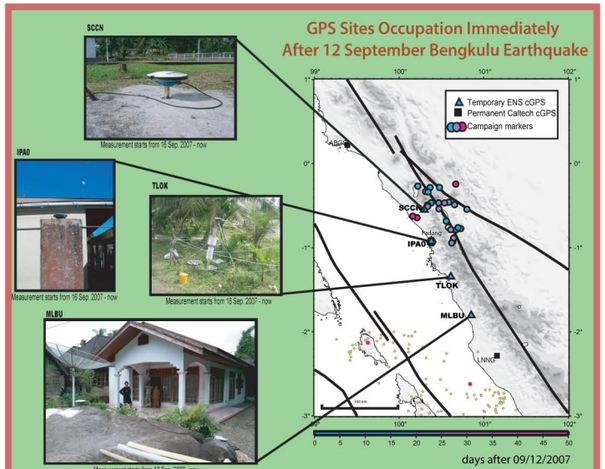
Second row: Associated Coulomb stress change using μ'=0.4

Calculated Co-seismic displacement vs GPS Observation



Horizontal and vertical displacement using the Co-seismic slip obtained by Ji (2007)

GPS Sites Occupation Immediately After 12 September Bengkulu Earthquake



Timeseries 4 CGPS West Sumatra