Sladena, A., Konca, A., Avouac, J., Sieh, K., Galtezka, J., Fang, P., Genrich, J., Ji, C., Natawidjaja, D., Bock, Y., (2007) **The 12 September 2007, Mw=7.9 Pagai-Sipora Earthquake, an Impulsive Rupture on the Central Sumatra Megathrust**, Eos Trans. AGU, 88(52), Fall Meet. Suppl., Abstract#U51A-0005

On 12 September 2007, at 23:40 UT, a large Mw=7.9 earthquake occurred offshore central Sumatra, 12 hours after a Mw=8.4 rupture that initiated about 200 km to the southeast. We analyze this event using teleseismic P and SH waveforms, together with GPS co-seismic displacements measured at cGPS stations from the the SuGAr network. The SuGAr network includes 5 receivers on the outer arc islands of Pagai and Sipora, in addition to stations on Sumatra mainland therefore providing an excellent coverage of the rupture area. Moreover, the high sampling rate of the stations (1 to 15 s sampling for most stations), allows to properly identify the respective contributions of the Mw=8.4 and major nearby aftershocks. Both seismic waveforms and the geodetic data indicate a moment release of about 1.1e21 N.m due to the rupture of two distinct asperities about 130 km apart along the subduction interface. The seismic waveforms require the first subevent to be extremely impulsive, with a short rise time of a few seconds at most, and a highly peaked slip distribution close to the epicenter. The geodetic and seismic data were inverted jointly to derive some kinematic model of the source that is found to reconcile well the two datasets. The first subevent is located near the eastern border of South Pagai Island with a maximum slip of 5.5 m released in less than a few seconds. The slip distribution due to that event abuts with the slip distribution due to the Mw=8.4 event. The second patch is located 130 km to the northwest, along the north- eastern coast of Sipora Island, with a maximum slip of 3.5 m. The rupture velocity is estimated to be about 2 km/s. Both the 2007 Mw=8.4 and Mw=7.9 events occurred within the estimated rupture area of the Mw>8.6 historical earthquake of 1833, a well defined patch that had remained locked during the interseismic period. A same portion of the megathrust can rupture in different ways.
http://tectonics.caltech.edu/slip_history/.