



Fig. S1. Fault geometry used for the co-seismic inversions Models 2–5. The geometry of the fault extends farther at depth and presents a downward increasing dip. Additionally, it has a more realistic downward slip distribution that tends to zero at the bottom of the fault plane. The structural representation of the fault is generated from the instrumental seismicity in the area (National Earthquake Information Centre (NEIC) hypocenters and Harvard Centroid Moment Tensor (CMT) focal mechanisms of earthquakes since 1973, including both aftershock and background foreshock seismicity). Fifteen trench-normal cross-sections of seismicity were constructed every degree along strike, depicted by green lines on the inset. The fault interface is represented with nodes of iso-depth at 0, 20, 40, 60 and 90 km of depth, shown by the grey curves on the inset. The general shape of the slab is bending downward, however, the seismicity infers variable steepness along strike. At the latitude of northern Sumatra the shallow part of the fault is relatively flat, its dip increasing toward the north. In the south, the strike of the plane rotates slightly anticlockwise with respect to the geometry of Model 1 (i.e., oriented WNW–ESE rather than NW–SE).