



Seismicity and seismotectonics of the Sunda arc

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One of the world's major subduction zones is the Sunda arc which stretches over a length of more than 5000 km from the Arakan collision in the northwest to the Banda arc in the east. The Sunda arc is separated in two different zones, namely a frontal subduction beneath Java and an oblique subduction beneath Sumatra. In both zones the Indo-Australian plate is subducted under the Eurasian plate with subduction rates of 60 – 80 mm/a. The subduction is accompanied by pronounced seismicity. Whereas in the Sumatra area the hypocenters reach a maximum depth of 230 km, the hypocenters beneath Java exhibit a maximum depth of 670 km.

In our investigations we use moment tensor solutions of the Harvard moment tensor catalogue to study the stress field along the Sunda arc subduction. The dataset consists of 964 moment tensors with magnitudes between $M_w = 4.6$ to 8.3 from the time period 1977 – 2003. On the occasion of the recent magnitude 9 Northern Sumatra event of 26 December 2004 we extended our dataset by its moment tensor.

For the determination of the stress field we apply the inversion method by Gephart & Forsyth (1984). The huge dataset allows the building of subsets to study lateral and depth dependent changes of the stress field. First inversions for distinct depth intervals reveal a change in the orientations of the maximum principal stress axis σ_1 from subhorizontal orientation in the shallow parts (0 – 200 km depth) to subvertical orientation for the depth range of 400 – 670 km and vice versa for σ_3 . This result is in agreement with stress and strain conditions found in other subduction zones of the world which show down-dip extension in the upper part (0 – 300 km) of the subducting plate and down-dip compression in the lower part (400 – 700 km).