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The Stress Field of the Sunda Arc subduction zone inferred from earthquake focal mechanisms

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We use earthquake focal mechanisms to investigate the stress field of the Sunda Arc subduction zone. The final scope of our investigations is to get a three dimensional image of the stress field by resolving possible lateral changes along the arc as well as depth dependent changes. Thereby, emphasis is also placed on the Krakatau volcano and the Sunda Strait area because of its special position in the transition zone between frontal (Java) to oblique subduction (Sumatra).

To study the stress field we use moment tensor solutions of the Harvard moment tensor catalogue and apply the inversion method by Gephart & Forsyth (1984). Our dataset consists of 964 moment tensors with magnitudes between Mw = 4.6 to 8.3 from the time period 1977 - 2003 which cover the Java and Sumatra region. On the occasion of the recent magnitude 9 Northern Sumatra event of 26 December 2004 we extended our data by its moment tensor and 40 stronger aftershocks which cover the region of NW Sumatra, Andaman and Nicobar Islands.

In our presentation we will demonstrate the connections between the principal stress axes, the trench geometry and the plate motion for individual parts (Andaman Island, Sumatra, Java, Krakatau Sunda Strait) of the Sunda Arc subduction. Up to now, the following results can be inferred from the inversions:

1. Below Java there is a change in the orientation of the maximum principal stress axis S1 from subhorizontal in the shallow parts (0 - 200 km depth) to subvertical in the depth range of 400 - 670 km and vice versa for S3. 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) (e.g. Apperson & Frohlich,

1987).

2. The region of NW Sumatra, the Andaman and Nicobar Islands shows a N-S to NNE-SSW orientation of the S1-axis, which is in agreement with the NNE directed subduction of the Indian plate underneath the Burma microplate.