



Deep structure of the subduction zone from Sumatra to the Bay of Bengal.

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We propose that the fundamental structure over the whole length of this 3 000 km subduction zone consists of a shallow flat 10-20° décollement below the sedimentary wedge connected through a sharp bend to a steep 40-50° plunging slab. In the exact upward prolongation of the slab, a seismically active fault plane goes to the surface with the same steep 40-50° dip. We consider this fault as the boundary between the sedimentary wedge and the consolidated island arc. This appears to us to be especially clear at the latitude of Nias Island, near the equator, from the detailed seismic relocation study of Fauzi et al. (1996). A similar structure has been imaged by the Japanese OBS survey near 5°N (Araki et al., 2005). We show it to be present at the level of the Andaman portion near 13°N and in the Bengal portion between 22 and 25°N using the hypocenters of Engdahl. To the west, the sedimentary wedge has a width that depends on the amount of clastics fed into the trench. Where it is wide, as opposite Northern Sumatra or northern Bengal basin, it is structured by several large splay faults, parallel to the active backstop fault that branch upward from the flat décollement. This is demonstrated on the Araki et al. OBS section near 5°N and by industrial data in southern Bangladesh. The backstop fault is sometimes associated near the surface with a pop-up structure that forms the outer arc islands, such as the Mentawai islands. Similarly, splay faults in the wedge are sometimes associated with seaward dipping thrusts and landward verging folds. The major unsolved question is how much slip, if any, is accommodated on the backstop fault and the associated wedge splay faults during great earthquakes. Alternatively the motion necessary on these faults may occur during intermediate smaller earthquakes or continuous slip, especially if they contribute to the partitioning of the subduction motion.

References: *Fauzi, R. MacCaffrey, D.Wark, Sunaryo, and P.Y. Prih Haryadi, 1996,*

Lateral variations in slab orientation beneath Toba Caldera, Northern Sumatra, GRL 23, 443-446.

Araki E., M. Shinohara, K.Obana, T. Yamada, Y.Kaneda, T. Kanazawa, and K. Suyehiro, 2006, in "Proceedings of International Symposium on Marine Geosciences-New observations Data and Interpretation", Organizing Comm.of International Symposium on Marine Geoscience, pp.50-53, Yokohama, Japan.