



Deformation at the northern tip of the Sunda trench: Giant landslides and active bending normal fault at the termination of the Sumatra earthquake rupture.

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The last Dec. 26th 2004 earthquake rupture propagated from northern Sumatra to Andaman Islands. New marine geological evidences and location of the northernmost aftershocks indicates the rupture is still discretely present offshore southern Myanmar, and could have slightly remobilized pre-existing submarine landslides.

Here, the Andaman subduction zone connects northward with a N20°E trending narrow and steep margin interpreted as a major dextral shear zone with moderate shortening (Nielsen et al., 2004). This steep inner wall of the trench is marked by small wrench zones and localized submarine avalanches. The most significant ones are located at 15°35'N, and 17°15'N (including the Watthe avalanche).

Offshore southern Myanmar extremely recent deformation in the oceanic plate of the Bengal basin was evidenced in the swath bathymetry and echosounder data, indicating flexure of the down-going plate at the northern-most tip of the Andaman subduction zone. Activity of these NE trending grabens decreases rapidly northwards at the junction with the dextral shear zone outlining the trench in southern Myanmar. This fast transition from the Andaman thrust and fold belt of the subduction zone, to a dominant dextral slip fault zone along the Arakan trench in Myanmar, could mark the northernmost limit of the Sumatra earthquake rupture.

The cyclopean submarine landslides that extend individually over 45 miles from N to

S and 60 miles from E to W, are composed of cyclopean exotic blocks more than 300 m high, transported tens of miles down-slope. These avalanches were mapped in 2000 and 2005 on board the R/V Marion Dufresne demonstrating they were present before the Sumatra earthquake, and could be related to a previous seismic event along this dextral wrenched margin.

We have evidenced in the Watthe area a recent sedimentary apron that blankets the exotic blocks. This thin veneer of sediments that appears to have been very recently folded, as shown on the echosounder records could testify remobilization of the avalanche during the Sumatra earthquake. Processing of the signal indicates a water oversaturated layer at the sole of this 5 to 8m thick sedimentary blanket, cored at various sites. It corresponds to a gently folded layer of homogeneites lying above a water interface preserved into the core.

Our preliminary interpretation is to consider these southern Myanmar debris flows were emplaced before the Sumatra earthquake, but were partially remobilized during this main seismic event. The age of emplacement of these submarine landslides could provide information on previous mega-earthquakes along this very active trench. This dating work is still in progress.

References: C. Nielsen, N. Chamot-Rooke, C. Rangin, and the Andaman Cruise Team, *From partial to full partitioning along the Indo-Burmese hyper-oblique subduction, 2004. Marine Geology 209, 303-327.*