Geophysical Research Abstracts,
Vol. 10, EGU2008-A-06877, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-06877
EGU General Assembly 2008

Prominent influence of trench sedimentation rate on heat flow and location of the thermally-defined seismogenic zone in convergent margin. Example of the North Ecuador – South Colombia Margin (1-4N)

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Analysing the thermal and structural variations along the North Ecuador – South Colombia (NESC) convergent margin (1-4°N) permits us to address fundamental questions associated with megathrust earthquakes on the margin. We investigate here **the influence of trench sedimentation rate and related thermal variations on the temperature distribution along the interplate contact and on the extent of the seismogenic zone?**

The NESC margin comprises three segments (called, the Manglares, Tumaco and Patia segments) showing different structural, sismotectonic and thermal patterns. Among other features, the Patia and Tumaco segments differs by the sediment accumulation in the trench that is up to three-times thicker in the later than in the former, implying a great change in sedimentation rate (cf Marcaillou et al., this session). Accordingly, heat-flow measurements and derived from bottom simulating reflectors show a two fold decrease in the trench and on the margin lower slope from the Patia to the Tumaco segment. Moreover, based on the sismicity distribution and the trenchward extent of the rupture zones for great subduction earthquakes, the seismogenic zone extends nearby the trench in the Patia and Tumaco segments, but is restricted 30 km landward in the Manglares segment.

For every segment, we carried out 2D steady-state thermal models constraints by heat-flow values and pre-stack depth migrations of multichannel seismic lines. This improved modelling procedure takes particularly into account for the pre-subduction cooling of the oceanic lithosphere related to sediment deposition and compaction.

These models suggest that:

1/ The temperature range from 60-150˚C to 350-450˚C, commonly associated with the updip and downdip limits of the seismogenic zone, extends along the plate interface over a distance of 160 to 190 $\pm$ 20 km.

2/ The updip limit of the seismogenic zone for the great subduction earthquakes during the 20^{th} century is associated with low-temperature (60-80˚C) processes.

3/ 60-70% of the two-fold decrease in measured heat flow from the Patia to the Tumaco segment is related to the abrupt southward increase in sedimentation rate in the trench. Such a change may induce a landward shift of the 60-150˚C isotherms, and thus the updip limit of the seismogenic zone, by 10-20 km.