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Morphotectonic variations along the North Ecuador – South Colombia margin (1-4N̊); control on the location of the thermally-defined seismogenic zone.

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The North Ecuador - South Colombia convergent margin (1-4˚N) shows along strike variations in tectonic, thermal and seismogenic features that offer a great opportunity to study the relation between subduction zone tectono-structure, thermal regime and location of the thermally-defined seismogenic zone. Multichannel seismic reflections and conventional bathymetric data were collected in 2000 and 2005 during the SISTEUR and AMADEUS cruises. 5 selected lines perpendicular to the margin were processed with a pre-stack depth migration using a preserved amplitude approach (alias Ray+Born diffraction tomography). The first heat flow measurements in this area were also acquired, completed by heat flow derived from numerous bottom simulating reflectors.

The margin is divided in Patia, Tumaco and Manglares segments.

1/ Tectonically, they particularly differs by the tectonic regime at the deformation front: The northern Patia segment is fronted by a 35 km- long active accretionary prism, the central Tumaco segment by a less than 10 km-long active accretionary prism, while no accretion occur in the southern Manglares segment. It is noteworthy that this regime is independent from the sediment thickness in the trench which is thinner where the prism is longer.

2/ Thermally, these segments also shows clear variations in heat flow that is, in the

trench and in the lower slope, two-fold lower in the central Tumaco segment than in the others.

3/ Sismogenically, large subduction earthquakes have ruptured the plate interface beneath the Manglares segment in 1958 and the Tumaco-Patia segments en 1979. Based on the aftershocks distribution and the rupture zone location, the seismogenic zone extends trenchward nearby the deformation front in the Patia-Tumaco segments but is restricted 30 km landward in the Manglares segment.

The integrated interpretation of heat flow and sismic data indicate that:

1/ The thermal segmentation is mainly related to the sedimentation rate over the oceanic plate: particularly thick sediment loading in the trench of the Tumaco segment results in very heat flow values. This induces a cooling effect along the interplate contact that can shift landward the updip of the seismogenic zone by 10-20 km (cf Marcaillou et al, this session).

2/ The tectonic regime at the deformation front controls the depth and thus the temperature of the decollement: the active accretion in the Tumaco-Patia segments generates a 2 km-deeper decollement than in the Manglares segment. The decollement shallowing from the formers to the later induces a cooling effect along the interplate contact and a 30 km landward shift of the updip limit of the thermally-defined seismogenic zone. This shift is consistent with the landward shift of the aftershock zone and the rupture zone of the 1958 earthquakes in the Manglares segment in comparison with the 1979 event in the Patia-Tumaco segments.