



## **Seafloor deformation associated with great subduction earthquakes at the Ecuador-Colombia margin: results from the Amadeus cruise.**

**J-Y. Collot** (1, 2), M. Sosson (1), S. Migeon (1), G. Ratzov (1), A. Alvarado (2), Y. Legonidec (1), E. Lopez (3), F. Michaud (1, 2), P. Silva (2), N. A. Pazmiño (4), J-F Dumont (1), E. Santana (4), I. Martinez (5), B. Marcaillou (1), J-L Schneider (6)

(1) Géosciences Azur-IRD-CNRS-UNSA, France (collot@geoazur.obs-vlfr.fr), (2) IG-EPN, Ecuador; (3) Ingeominas, Colombia, (4) INOCAR, Ecuador, (5) Univ. EAFIT, Colombia; (6) Univ. Bordeaux I, France.

The AMADEUS cruise was conducted in Feb-March, 2005 on board the RV L'Atalante to address the tsunamogenic M8.8, 1906 Ecuador-Colombia subduction earthquake. The 1906 rupture zone was partly reactivated by three adjacent subduction earthquakes in 1942 (M7.8), 1958(M.7.7) and 1979 (M8.2). Previous investigations have provided clues for a segmentation of the margin, which closely matches earthquake rupture zones. The cruise collected 55000 km<sup>2</sup> of contiguous swath bathymetry coverage, extensive marine geophysical data, sedimentary cores and dredged rocks over part of the rupture zones. The data reveal the geomorphology of the deformation front, accretionary wedge, outer-basement high and forearc basin. The new bathymetric map supports the margin segmentation. It shows a tectonic contrast between an uplifting, margin-wide, fold-and-thrust belt associated with the 1979 earthquake rupture zone north of 1°50'N, and a wide, subsident fore-arc basin, which correlates with 1958 rupture zone. Because primary seafloor rupture during a large subduction earthquake is rare, an important goal of the cruise was the identification and detail investigation of margin crustal faults capable of producing secondary seafloor ruptures during a major event. Such faults are indicators of stress/strain accumulation and their tectonic history might be used to investigate the recurrence time of subduction earthquakes. The newly discovered NW-trending Manglares fault that cuts through an outer basement high, and the NE-trending, 60-km-long Ancon fault separating the outer basement high from the fore-arc basin correlate respectively with northward and

seaward limits of the 1958 rupture zone suggesting that the faults connect at depth to the plate interface and that their activity reflect the tectonics of the seismogenic zone. Large earthquakes are also expected to have caused numerous seabed failures within the area of rupture. Such feature may have contributed to local tsunami runup. No huge submarine landslide, but several 5-10-km-wide scars associated with debris toes and numerous small-scale slides were found during the cruise. The relatively short time interval (16-36 years) between large earthquakes, associated with growing anticlines might favor the presence of small to middle-scale landslides. Regions of slope instabilities with creeping sediment on the verge of failure are suspected.