



## **The ESMERALDAS experiment offshore-onshore North Ecuador - South Colombia: investigations on margin segmentation and earthquake generation**

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The Nazca plate converges toward the South American plate along a E-W direction at a rate of about 6 cm/yr. This process in northern Ecuador - southern Colombia has produced 4 megathrust earthquakes during the last century. The 500 km long rupture zone of the 1906 event ( $M_w = 8.8$ ) was partially reactivated by 3 thrust events occurring in 1942 ( $M_w = 7.8$ ), 1958 ( $M_w = 7.7$ ) and 1979 ( $M_w = 8.2$ ), which rupture zones abut one other. Marine geophysical data acquired during the last decade experiments (SUBLIME, 1998; SISTEUR, 2000 and SALIERI, 2001), among which seismicity, bathymetry, multichannel seismics and wide-angle data, image the tectonic structures of the margin and evidence that the overriding oceanic margin is segmented by transverse crustal faults, that potentially correlated with the limits of the major coseismic slip zones. From February to June 2005, we carried out the ESMERALDAS experiment in order to 1- characterize the 3D seismic structure of the margin and identify the velocity heterogeneities associated with the transverse accident and asperities, and 2- obtain the best possible hypocentral locations and focal mechanisms. These informations will be used to identify the deformation style of the active tectonic features

observed in the multichannel seismic profiles and, in turn, to characterize the global geodynamic setting of the area. The further objective is to better understand the generation and propagation mechanisms of the four large earthquakes that affected this part of the margin during the last century. This project is an active collaboration between France, Ecuador, Colombia and Spain. Field-work was done in cooperation with the Instituto Jaume Almera and the Unidad Tecnologica del Mar of Barcelona, Spain, the Instituto Geofisico de la Escuela Politecnica Nacional of Quito, Ecuador, the Instituto Oceanografico de la Armada of Guayaquil, Ecuador and the Instituto de Geologia y Minera of Bogota, Colombia. The experiment consists in the deployment of 2 seismological networks (including broad-band stations): 34 3-components portable stations were installed on land and 26 3-components Ocean Bottom Seismometers were distributed offshore. Other stations of the permanent local networks complemented our temporary network. Two different periods characterized the ESMERALDAS experiment. During the first period, the french R/V L'Atalante surveyed the study area, collecting underway geophysics and shooting large Air-Gun shots that were recorded by the two networks. In the second period, the networks has been kept in place until beginning of June to record the natural seismicity. The OBS network was retrieved using the colombian R/V Providencia . Gravimetry analysis clearly illustrates the margin segmentation. Due to complexity of seismic data processing, wide-angle results will be presented later-on this year.