



3D structure at the front of the Colombia-Ecuador subduction zone and relation with the 1958 earthquake rupture zone

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During the last century, four great earthquakes shook the Colombia-Ecuador subduction zone. The 500 km long rupture zone of the first of this seismic events, the 1906 earthquake ($M_w = 8.8$), was partially reactivated, from south to north, by a sequence of 3 thrust events in 1942 ($M_w = 7.8$), 1958 ($M_w = 7.7$) and 1979 ($M_w = 8.2$). The rupture zones of these three last earthquakes abut between them and a control of their extension by structures on the upper plate was assumed.

The Esmeraldas experiment (March - April 2005) was designed to obtain a 3D image of subducting and upper plate structures in order to discuss their role in the seismic cycle. Based on tomographic inversion of first arrival traveltimes we obtained the first 3D velocity model of the Ecuadorian subduction zone in the region of the 1958 earthquake rupture zone.

Two remarkable characteristics show up: an outer basement high at the margin front and a low velocity zone in the margin, above the décollement. This low velocity zone has a dip similar to the slab that supposes an origin related to subduction processes.

We are developing hypotheses on the origin of these two structures and on the coincidence of the low velocity zone with the rupture zone of the 1958 earthquake.