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Tectonics and sedimentary distribution at the Ecuadorian inner trench slope, off the Gulf of Guayaquil: implications for the nature of the accretionary wedge and subduction channel.

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The purpose of this work is to study the shallow structure and sediment distribution at the Ecuadorian convergent margin off the Gulf of Guayaquil (GG), using multi-channel seismic reflection (MCS) and multibeam bathymetric data that were collected during the SISTEUR-2000 and SALIERI-2001 cruises.

The Grijalva Fracture Zone (GFZ) is a N55˚E linear structure of the oceanic plate that subducts obliquely beneath the margin in front of the GG. The subduction of the GFZ itself does not induce great deformation on the overriding plate, but it is a clue element because it separates ocean crusts of different ages and morphology that have a major influence on the frontal margin deformation and sediment distribution. South from the GFZ there is a remnant of the ancient Farallon plate ($>$34 Ma); whereas North from it the oceanic crust is younger, with ages varying between 0 Ma (at the currently active Cocos-Nazca Spreading Centre), to $\sim$24 Ma near the GFZ. Moreover, the morphology of the Neogene crust is quite irregular. This is due to the influence of the Galapagos hotspot (GHS), clearly reflected by the presence of the Carnegie Ridge, which traces the track of the GHS over the Nazca Plate and subducts beneath central Ecuador. On this northern segment, bathymetry varies range from $\sim$1.5 km bsl near the top of the ridge, to $\sim$4.4 km bsl at the trench. The pelagic and hemi-pelagic thickness varies as well from near zero at the top of the ridge to $\sim$500 m in the lowermost parts of the ridge's flanks. The width of the trench varies from 0 km to 16 km near the GFZ. In

contrast, the morphology of the southern Palaeogene crust is much smoother and the thickness of the sedimentary blanket is homogeneous, around ∼900 m. In this zone, the trench is deeper (∼4.7 km bsl) and more uniform than in the younger segment.

North from the GFZ, the inner trench slope presents semi-circular slump scars reflecting frontal erosion. This process takes place when subducting topographic features collide with the apex of the margin and breach the slope toe. Based on seismic facies, the nature eof the trench infill greatly changes along strike, from well-stratified turbiditic deposits, to chaotic debris flows derived from the margin slope, and pelagic-hemipelagic sediments. The very small wedge that has locally formed at the toe of the margin appears to consist of these various sediments. Consequently, the subduction channel that is fed by this heterogeneous sediment shows along-strike variations in both thickness and physical properties.

South of the GFZ, the margin slope morphology is smooth, but shows several linear canyons, which extend from the the continental shelf break to the trench. These canyons seem to be the main way for sediment transport from the Andes to the Ecuadorian trench. At the trench, MCS profiles image 600-800 m-thick horizontally stratified turbidites, overlaying unconformably the oceanic sedimentary cover. The turbidites are imbricated at the margin's toe to build a 8-10 km- wide accretionary prism, whereas the oceanic deposits underthrust the margin to feed the SC.

The thickness of the SC varies along the strike, between ∼200 to 800 m. This thickness variation may imply the incorporation of additional material during subduction by means of different processes like underplating and/or basal tectonic erosion of the underside of the overriding plate or the accretionary prism.