

Pliocene-Quaternary tectono-sedimentary evolution of the Guayaquil-Tumbes forearc basin (Ecuador-Peru)

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Forearc systems develop largely offshore above subduction zones between the trench and the volcanic arc. The associated forearc basins are generally parallel to the trench and involve vertical movements (subsidence vs. uplift), influencing the dynamics of the wedge. The object of the study is the Guayaquil-Tumbes forearc basin belonging to the Ecuadorian-Peruvian subduction zone. This forearc basin has peculiar characteristics, developing on the southernmost segment of a great active continental strike-slip fault, the Dolores-Guayaquil Fault, delimiting two crustal domains, the North Andean and Inca slivers. The divergent motions of the two slivers generate extension in the upper plate whose interaction with the strike-slip tectonics and subduction remains poorly constrained. Two major rivers, Chira and Tumbes, draining the Andean reliefs towards the Pacific, generate huge Pliocene-Quaternary silico-clastic sedimentary filling trapped in the basin, having an important impact on the growth of the wedge and fault activity. The objective of this study is to constrain the structural architecture of the basin by determining the nature, geometry and age of the major structures that controlled its Pliocene-Quaternary development. This study is carried out through the interpretation of offshore seismic profiles correlated with well data. The results show that the structure of the basin is dominated by gravitational instabilities (classical raft tectonic) detached northwestward and westward, and active through the Pliocene-Quaternary times. The syn-tectonic sediments and erosional surfaces indicate that these instabilities are progressively younger toward the south. We propose that this gravitational sliding has been sustained by high sedimentation rates and by the modern propagation of the Dolores-Guayaquil Fault at depth. This major fault is interpreted as an immature strike-slip system that progressively develops towards the trench.

Mots-Clés : Forearc, Gravitational sliding, syn-tectonic sedimentation, Ecuador, Peru