Forearc basin development at the Northern Andes –southern boundary transform fault: Progreso basin, SW Ecuador

*Carlos Alberto Aizprua Luna[1,2,3], Cesar Witt[2]

1. Department of Geosciences and Petroleum, Norwegian University of science and Technology (NTNU), Trondheim, Norway , 2. Univ. Lille, CNRS, Univ. Littoral Côte d’ Opale, UMR 8187, LOG, Laboratoire d’ Océanologie et de Gé osciences, F 59000 Lille, France, 3. Facultad de Ingeniería en Ciencias de la Tierra, Escuela Superior Politécnica del Litoral, Campus Gustavo Galindo –km 30.5 vía perimetral, Guayaquil, Ecuador

It has been recognized that obliquity between convergent plates along active margins results in strain partitioning, both normal and parallel to the trench. Such active margins may develop large scale strike-slip faults that can be prolonged for hundreds of kilometers, commonly located along the volcanic arc, and bounding different forearc crustal slivers. The mechanisms proposed for the development of such large-scale faults have been discussed and well documented in regions such as the western North America, where the accretion of allochthonous terranes may have played a great role in the observed deformation styles. However, less is known along the area linking the large strike-slip faults and the actual trench, and how this may have controlled the forearc tectonic-stratigraphic evolution along the area. Few studies, like the Eocene Tyee forearc basin in Oregon, discuss the formation of sedimentary basins along a plate boundary transform fault, in connection to a system developed along the suture of an allochthonous oceanic terrane accreted to the continental margin. In the Northern Andes, a Late Cretaceous oceanic plateau sliver underlies the forearc region of SW Ecuador, with its southern limit interacting with the continental basement of South America. The great Progreso Basin is located along and across the inferred suture zone, and its study has provided us with an insight on the fault termination styles of large-scaled strike-slip faults, their associated tectonic elements, their link to the trench, and their influence on the stratigraphic record. Based on multi-channel seismic profiles, industrial borehole data, surface exposures, and recent radiometric age results, we attempt to make a paleogeographic reconstruction of the early stages of forearc basin evolution at the southern boundary of the Northern Andes sliver. The geological record of rapid shallowing of the forearc from deep marine deposits into fluvio-deltaic successions by Oligocene time, and restricted conditions of the forearc region through the development of perched extensional sub-basins, suggest a more complex systems than a simple transtensional strike-slip regime at the fault termination area. We suggest that the inherited configuration following the collision and accretion of an oceanic crustal sliver accompanied by the development of a local and thick accretionary wedge by Paleocene time, and the post-Oligocene transtensional regime along the southern boundary transform fault of the North Andean Sliver better explain the observed basin configuration at this region.

Keywords: Forearc basin, outer forearc high, strike-slip faults, accretionary wedge, tectonic scape

