

Abstract.

Spatial and temporal evolution of the Gulf of Guayaquil-Tumbes (GGTB) basin, is investigated in this work integrating a dataset of 2D and 3D seismic profiles, the geological information of the wells drilled in the area and the analysis of the previous old and recent studies.

The main sediment units and the main faults that controlled the opening and subsidence of it have been identified in high-resolution digital maps of the top and base surfaces and their isopachs at different ages. We identified for the first time the pre-kinematic, syn-kinematic and post-kinematic stages of the basin opening. This study provides first-ever evidence of the presence of Cretaceous, Paleocene and Eocene units outcropping in the onshore part of the Santa Elena Península and mud flows in the eastern part of the basin.

Unlike previous studies, we concluded that the GGTB is a pull-apart basin, controlled by transpressive and transtensive strike-slip tectonics, opening since the Lower Miocene and subsiding with the highest rate during the Lower Pleistocene with high sediment support. This investigation supports that the entire Neogene and Lower Pleistocene are syn-kinematic units.

This work proposes a new vision of the Gulf of Guayaquil, which could be used afterward for hydrocarbon exploration.