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THE UNDERWATER GUARACAYAL DEPRESSION, SUCRE STATE, EASTERN VENEZUELA: AN ACTIVE PULL-APART BASIN ON THE EL PILAR FAULT

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The El Pilar fault belongs to a major right-lateral wrenching system that accommodates the eastward relative displacement of the Caribbean plate with respect to South America. This fault extends in west-east direction for some 350 km in northeastern Venezuela from the Cariaco trough to the Paria gulf, at the border with Trinidad. Only some 80 km of its active trace crops out between the gulfs of Cariaco and Paria, and very locally at the restraining stepover of the Caigüire hills in Cumaná. Consequently, most of its extension is underwater, bounding the south side of the Cariaco trough on the west, crossing the Cariaco gulf in its central portion, and bounding the Paria gulf on the north at its eastern tip. An over a 100-km-long, high and very high resolution reflection seismic survey was acquired with the venezuelan R/V Guaiquerí II in the Cariaco gulf in early 2006, aiming at better characterizing the underwater El Pilar fault trace(s). The acquisition was performed with a 1'-longitude spacing across the east-west elongated gulf. In addition, three long east-west profiles were recorded. Without any data processing, the El Pilar fault has been clearly identified based on the large number of sea-bottom features and brittle deformation recorded by the gulf Quaternary sedimentary fill. After disruption of sediment bedding, the second most frequent and conspicuous evidence of very recent tectonic activity of the fault are few-meter-high sea-bottom scarps, as well as few-hundred-meter-long, east-west elongated ridges. Those scarps are more prominent at a submarine releasing stepover of the fault that bound a 10-15 m deeper depression –named Guaracayal- than the 80-m-deep flat bottom of the central sector of the gulf. This small pull-apart basin, which is about 8 km long in the east-west direction, 2 km across and located at a dextral fault overlap, confirms the sense of motion of the El Pilar fault. The seismic profiles also reveal significant gas seepage, diapirism (or liquefaction) and eventually hydrothermalism, along the El Pilar fault.

Keywords: Active faulting, Pull-apart basin, El Pilar fault, Venezuela