Geophysical Research Abstracts
Vol. 15, EGU2013-13993-20, 2013
EGU General Assembly 2013

Geomorphological signature of the Pleistocene thin-skinned tectonics in the northern Maturín Foreland Basin, Eastern Venezuela

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The Eastern Venezuela foreland basin and the Serranía del Interior fold-thrust-belt were formed as a consequence of the oblique collision between Caribbean and South American plates. The foreland basin is divided into the Guárico sub-basin in the west and the Maturín sub-basin in the east. The Maturín sub-basin is geologically well known due to geological survey and structural-stratigraphic modeling motived by the hydrocarbon exploration. We focus here on Plio-Pleistocene deformations of the area that remain poorly understood.

The study area stands on the northern edge of the Maturín sub-basin, in an area limited by the foothills of the Serranía del Interior to the north, and by the right lateral crustal Urica and San Francisco Faults to the west and east respectively. Between them, from the mountain to the deformation front, the thin-skinned tectonic wedge is mainly structured above the Pirital and Furrial thrust faults. The Pirital thrust fault involves a thick lithographic section that includes presumably pre-Cretaceous rocks whereas the Furrial Thrust is shallower and is associated with fault-bend-folds structures.

We support that the Maturín sub-basin remains an area of active continental shortening in which a post-Pliocene peneplain surface has been deformed by folds, which are developed above buried reverse faults. We use the drainage patterns in this region to show active deformations that would be difficult to identify by other means. In particular we show how uplifts and tilts associated to fault activity alter the drainage pattern and the geometry of remnant terraces near Tarragona, San Felix, Punta de Mata, El Tejero and Jusepín zones.

Given age, dip angles of the faults, and the vertical throw determined from the offset of the terrace and peneplain surfaces across the surface fault traces, we aim to estimate the cumulative shortening along the direction of tectonic transport and slip rates.

Industrial seismic lines show that superficial deformations are not systematically connected to fault in depth. This raise the question (1) of the origin of the ongoing shortening in the tectonic wedge and (2) of the potentiality of a strain partitioning between thick-skinned and thin-skinned active deformations.