



## **River diversions, avulsions and captures in the Tortuguero coastal plain**

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The Tortuguero area is a coastal plain that forms part of the North Limón sedimentary basin, the back-arc region of the Caribbean side of Costa Rica. This coastal plain is characterised by an abnormal drainage pattern with river captures, diversions and shifts in channel directions. We are analyzing this anomalous drainage network adopting a classical geomorphological approach combined with geomorphometric techniques. The SRTM DEM at 1 arc-second of resolution (~30 m) from NASA, topographic maps 1:50,000, satellital images and the digital cartography of the drainage network have been used for inventorying the channel pattern anomalies. River segments were categorized according to sinuosity, orientation, slope changes and incision using GIS tools.

Initially, anomalies in the analyzed river courses suggested that buried thrust fronts could disrupt their natural pattern. However, we have not identified any evidence to link the activity of buried structures with the disruption of natural drainage. Blind thrusts detected through seismic subsurface exploration in the SE sector of the Tortuguero plain do not seem to produce changes in the sinuosity, orientation, slope and incision of rivers as those observed in the deeply studied tectonically active area of the Po Plain (Italy). The identified river pattern anomalies have been explained due to other alternative causes: (1) the migration of the mouths of Reventazón, Pacuare and Matina rivers is produced by sand sedimentation in the coast because of a successive ridge beach formation. This migration to the SE has the same direction than the main ocean currents those deposited the sand. (2) The anomalous course of Parismina river is most probably conditioned by the fracturation of the dissected volcanic apron of Turrialba volcano. (3) Channel migration and capture of Barbilla river by Matina river can be triggered by the tectonic tilting of the coastal plain towards the SE. The subsidence of the SE sector of the plain was documented before the Limón earthquake in 1991. (4) The Sucio, North Chirripó and Toro Amarillo rivers form a channel that takes an abnormal direction towards the NW instead of taking their natural direction towards the Caribbean Sea in the E. This anomalous behaviour is conditioned by the existence of a megafan recently recognized by using topographic data from the SRTM mission.

The developed analysis is the first step towards improving the knowledge about the processes behind the observed anomalies. Current research is analyzing the role of active vulcanism and tectonics on Tortuguero rivers behaviour. This has implications on the consequences of torrent-related hazards (flash floods and lahars) that may divert river channels and change the landscape of the coastal plain in only one event.