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Late Cenozoic migration of the Caribbean-North America-Cocos triple junction: the zipper and pull-up models (Guatemala)

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Our study deals with the crustal deformation produced by the migration of a triple plate junction implying a subduction zone and a transform fault system separating two continental plates. We have chosen the Caribbean-North America-Cocos triple junction as a case study. The Polochic-Motagua fault system are part of the sinistral transform boundary between the North American and Caribbean plates. To the west, these system interact with the subduction zone of the Cocos plate. The linearity of the subduction zone is explained by a mechanically strong oceanic plate that does not tear in the triple junction implying intra-continental deformation. Structural and geomorphic data allow us to propose two tectonic models involving the progressive capture of southern North American blocks by the trailing edge of the Caribbean plate (pull-up tectonics) and a progressive suturing of fault-bounded blocks to the trailing edge of the Caribbean plate associated with a continuous forearc sliver along the two continental plates (zipper model). As a result, the forearc sliver helps maintain a linear subduction zone along the trailing edge of the Caribbean plate. The Late Quaternary activity of the Polochic transform fault have been constrained by determining the active structure geometry and quantifying recent displacement rates. Slip rates have been estimated from offsets of Quaternary volcanic markers and alluvial fan using in situ cosmogenic 36Cl exposure dating. Holocene left-lateral slip rate and Mid-Pleistocene vertical slip-rate have been estimated to 4.8 $\pm$ 2.3 mm/y and 0.3 $\pm$ 0.06 mm/y, respectively, on the central part of the Polochic fault. The non-negligible vertical motion participates in the uplift of the block north of the fault in agreement with the proposed pull-up model.