



New views on the Late Cenozoic tectonic history of northern Colombia

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The Late Cenozoic strain field in northern Colombia is often described as resulting from both the continuous subduction of the Caribbean plate, ongoing since Late Cretaceous at least, and the tectonic escape of the North Andean Block, starting in early Pliocene. Pieces of evidence from geological field work, interpretation of multichannel seismic reflection profiles, section restoration, seismotectonic data and analysis of satellite images allowed us to precise the timing and mode of interaction for these two main tectonic processes in northern Colombia during the last 5 Ma. This work was part of the GIRCAR project (Groupement Industrie-Recherche CARaïbes), funded by TOTAL S.A..

The San Jacinto fold and thrust belt is usually known as the older part of an accretionary wedge related to the Caribbean subduction. We argue that this fold belt is actually a left-lateral transpressive belt, active since Pliocene time, that reuse older structures formed during an older accretionary episode. This left-lateral transpressive fold belt may be interpreted as the western boundary of the North Andean Block escaping northward. The Sinu wedge, known as the offshore Plio-Quaternary part of the accretionary wedge, accommodates less than 3 mm/yr of convergence. This shortening is at least partly compensated internally by a number of contemporaneous normal faults. The morphology of the Sinu wedge is more likely the one of a gravity collapse, affecting the whole sedimentary pile, towards the deep Colombian basin. Additionally, the Late Miocene to Holocene Magdalena fan, deposited along the northwestern margin of Colombia, above the subduction zone, remains undeformed even after being abandoned. Also, GPS data demonstrate that no shortening is to be expected at present across the subduction zone. Finally, no significant earthquakes was recorded between 0 and 30 km along the subduction zone.

These observations can be well reconciled by postulating that the deformation, along the northwestern margin of Colombia, is not more controlled by the Caribbean subduction. We propose that the Plio-Quaternary tectonic escape uplifted the margin through left-lateral transpression, reworking inherited structures. The thick Tertiary sedimentary cover subsequently collapsed down in the Colombian basin when the critical slope was reached. Since Pliocene time at least, the Caribbean-South American plate convergence might be accommodated diffusely across the whole North Andean Block, and most prominently along the Venezuelan Andes and the Eastern Cordillera of Colombia, at the eastern boundary of the Block.