A main slip partitioning system in the sedimentary wedge of the Lesser Antilles Subduction Zone

Gaëlle Bénâtre[1], Nathalie Feuillet[1], Hélène Carton[1], Eric Jacques[1], and Thibaud Pichot[2]

[1]Université de Paris, Institut de Physique du Globe de Paris, CNRS UMR7154, Paris, F-75005, France (benatre@ipgp.fr)
[2]Beicip-Franlab, Rueil-Malmaison, France

Keywords: Tectonics, Geomorphology

At the Lesser Antilles Subduction Zone (LASZ), the American plates subduct under the Caribbean plate at a slow rate of ~2cm/yr. At the front of the LASZ, the Barbados accretionary wedge (BAW) is one of the largest accretionary wedges in the world. The width of the BAW decreases northward, owing to the increasing distance to the sediment source (Orinoco river) and the presence of several aseismic oceanic ridges, in particular the Tiburon ridge, that stops sediment progression. The curved shape of the plate boundary leads to a strong spatial variation in convergence obliquity, ranging from 75° at the Puerto Rico trench to ~0° in the Guadeloupe-Martinique sector. In the northern part of the LASZ, the strong obliquity is accommodated in the sedimentary wedge by a left-lateral strike-slip fault, the Bunce fault. In the Guadeloupe-Martinique sector, a left-lateral strike-slip fault, the Seraphine fault, has also been observed in the BAW despite the low obliquity. Our study aims to understand how slip partitioning is accommodated in the northern LASZ, in the area (approximately from 17°N to 18.5°N) located in between the mapped Bunce fault and Seraphine fault traces.

New high-resolution bathymetric data (gridded at 50 meters), CHIRP data and 48-channels seismic reflection profiles were acquired over the BAW in the Guadeloupe-Martinique sector during the CASEIS cruise (10.17600/16001800) conducted in 2016 with the IFREMER vessel N/O Pourquoi Pas? We present results from the analysis of these new data set, complemented by existing bathymetry and seismic reflection data acquired by several previous cruises. CHIRP data show evidence of folding of recent sedimentary units, which are linked to the Seraphine fault, supporting the idea of recent activity. The data also reveal a relay zone in the 17°- 18.5°N area. The two large left-lateral forearc faults - Bunce fault and Seraphine fault - could thus be connected through a transpressive domain coinciding with the transition between strong and weak convergence obliquity. Overall, slip partitioning within the forearc domain of the LASZ would extend over about 700 km from the western tip of the Bunce fault to the southern termination of the Seraphine fault offshore Martinique.