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Main active structures in the Barbados accretionary wedge of the Lesser Antilles Subduction: implications for slip partitioning

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At the Lesser Antilles Subduction Zone (LASZ), the American plates subduct under the Caribbean plate at a slow rate of ~2 cm/yr. No major subduction megathrust earthquakes have occurred in the area since the 1839 and 1843 historical events, and the LASZ is typically considered weakly coupled. 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. Marine geophysical studies conducted to date over the northern part of the BAW (Guadeloupe-Martinique sector) have mostly focused on resolving the geometry of the backstop. However, the structure of the wedge and the mechanical behavior of the subduction interface remain poorly known. Our study aims to describe the geometry of the BAW by a detailed morpho-tectonic analysis in order to place constraints on present and past dynamic interactions between the subducting and overriding plates.

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, complemented by existing bathymetry and seismic reflection data acquired by several previous cruises, with an emphasis on the inner wedge domain. The data reveal a 180 km-long linear structure between 15°15'N and 16°45'N latitude, imaged as a positive flower structure on several CASEIS seismic reflection profiles. We interpret this structure as a strike-slip fault and name it the Seraphine fault. The identification of a horse-tail structure linked to an eastward bend of the fault trace at its northern end, as well as left-stepping *en échelon* folds west of the Seraphine fault, allow to determine the kinematics of the fault as left-lateral strike-slip. The Seraphine fault could root at the toe of the backstop (at least in its central portion). CHIRP data show evidence of folding of recent sedimentary units that are linked to the Seraphine fault, supporting the idea of recent activity. While at odds with the low obliquity of the convergence in this area, the Seraphine fault could be the expression of slip partitioning, similarly to the Bunce fault observed father north along the LASZ where obliquity is much stronger.