The control of the northern and southern Caribbean plate boundaries on the tectonic duality in the back-arc of the Lesser Antilles subduction zone during the Eocene

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The Eocene tectonic evolution of the easternmost Caribbean Plate (CP) boundary, *i.e.* the Lesser Antilles subduction zone (LASZ), is debated. Recents works have shown a peculiar period of tectonic duality in the arc and back-arc regions. A compressive-to-transpressive regime occurred in the north, while rifting and seafloor spreading occurred in the south (Grenada basin). The mechanism for this strong spatial variation and its evolution through time has yet to be established.

In this study, we use 3-D subduction mechanical models to evaluate whether the change in the trench-curvature radius at the northeast corner of the CP could have modulated the duality. We assume asymmetrical CP boundaries at the north (from east to west: oblique subduction to strike-slip) and at the south (subduction-transform edge propagator-like behavior). The initial trench-curvature radius R is imposed. We explore two end-members : R=200 km and R=600 km, the latter being equivalent to the present-day configuration.

Regardless of the imposed trench curvature, the southern half of our modeled CP undergoes a NW-to-W-oriented extension due to the tendency of the southernmost part of the South-America slab to rollback. In contrast, the tectonic regime in the northeast corner of the CP highly depends on the trench-curvature radius. A low radius promotes transtension-to-transpression, characterized by a NE-oriented compressive component of the principal stress, the magnitude of which also depends on the average friction coefficient at the northernmost subduction interface. A high trench-curvature largely reduces the compressive component and promotes an extensive regime similar to that in the south. We thus propose that an initially low-curvature radius of the NE-LASZ triggered the tectonic N-S duality during the Eocene and led to an ephemeral period of transpression/compression to the north, although an additional mechanism might have been required to locally enhance compression.

Mots-Clés : Subduction, tectonique, arrière-arc, modélisation numérique

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