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Paleomagnetic and structural study of the NEastern Caribbean plate as mean to give paleogeographic constrains for fauna dispersal.

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Since the Eocene, the northeastern corner of the Caribbean plate is shaped by the indentation of the buoyant Bahamas platform with the Greater Caribbean Arc, the suture of a portion of the Antillean subduction zone along Cuba and Hispaniola and the subsequent relocation of the plate boundary along the strike slip Cayman Trough. Puzzlingly enough, these major re-arrangements followed a plate motion reorganization (Boschmann et al., 2014). During this kinematic reorganization, the Lesser Antilles trench initiated (or subduction intensified) along the eastern boundary of the Caribbean plate and progressively bent, resulting in an increase of subduction obliquity from south to north (Philippon et al., 2020a). This curvature has been, and still may be, associated with deformation within the Caribbean plate. Interestingly, in the 10-15 Ma following the plate reorganization, a hypothetical, now submerged “landbridge” allowed the dispersion of terrestrial fauna from South America to the Greater Antilles: the GAARlandia landbridge (land of Greater Antilles and Aves Ridge). Although it has been recently shown that Puerto Rico and the Northern Lesser Antilles where connected once forming a land mass called GrANoLA around 33-35 Ma (Philippon et al., 2020b), these rapids and drastics geodynamical changes may have impacted the regional paleogeography, which remains to be constrained. The intraplate deformation in the north-est Caribbean region associated with the plate reorganization, the Bahamas indentation, and the plate boundary curvature likely hold the key to (part of) the evolution of this landbridge.
At present day, the N-Eastern border of the Caribbean plate shows parallel to the trench faults dissecting the plate in a sliver-like manner. This “sliver” is cross cutted by perpendicular to the trench faults in four crustal blocks: Gonave, Hispaniola, Puerto Rico and the Northern Lesser Antilles. Present-day and past kinematics of these blocks, and even their existence, are still debated.

In this study, in the course of the French GAARAnti project, we focus on paleomagnetically determined vertical axis rotations that affected Puerto Rico and the Northern Lesser Antilles blocks since the Eocene, and use these to inform kinematic reconstructions constrained by regional structural analysis and Ar^{40}-Ar^{39} geochronology. These reconstructions will be used to refine the paleogeographic evolution of the NEastern edge of the Caribbean plate since the

Eocene in order test the GAARlandia hypothesis.

A new set of paleomagnetic data (180 Oligo-Miocene specimens of sediments sampled in 18 sites) indicates that the Puerto Rico block underwent an early to mid-Miocene 10° counterclockwise (CCW) rotation. This result clearly differs from those of Reid et al., 1991 who concluded a Late Miocene 25° CCW rotation and that is currently used by the community to interpret the tectonic history of the northeastern Caribbean plate. The use of a larger dataset, that geographically covers the entire island, and of a more recent reference frame explain the difference observed between the two results. This new result will lead to a re-interpretation of the tectonic evolution of the region that will be integrated in a regional kinematic reconstruction.