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Genetic Relations Between the Aves Ridge and the Grenada Back-Arc Basin, East Caribbean Sea

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The Grenada Basin separates the active Lesser Antilles Arc from the Aves Ridge, described as a Cretaceous-Paleocene remnant of the "Great Arc of the Caribbean." Although various tectonic models have been proposed for the opening of the Grenada Basin, the data on which they rely are insufficient to reach definitive conclusions. We present a large set of deep-penetrating multichannel seismic reflection data and dredge samples acquired during the GARANTI cruise in 2017. By combining them with published data including seismic reflection data, wide-angle seismic data, well data and dredges, we refine the understanding of the basement structure, depositional history, tectonic deformation and vertical motions of the Grenada Basin and its margins as follows: (1) rifting occurred during the late Paleocene- early Eocene in a NW-SE direction and led to seafloor spreading during the middle Eocene; (2) this newly formed oceanic crust now extends across the eastern Grenada Basin between the latitude of Grenada and Martinique; (3) asymmetrical pre-Miocene depocenters support the hypothesis that the southern Grenada Basin originally extended beneath the present-day southern Lesser Antilles Arc and probably partly into the present-day forearc before the late Oligocene-Miocene rise of the Lesser Antilles Arc; and (4) the Aves Ridge has subsided along with the Grenada Basin since at least the middle Eocene, with a general subsidence slowdown or even an uplift during the late Oligocene, and a sharp acceleration on its southeastern flank during the late Miocene. Until this acceleration of subsidence, several bathymetric highs remained shallow enough to develop carbonate platforms.