



The morphology of the Formigas Bank and its significance to the onset of Terceira Rift

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The Formigas Islets in the Azores constitute the emerged portion of a much larger submarine bank, lying on the southeastern-most margin of the Azores Plateau and on the western shoulder of the Terceira Rift. Until recently, the detailed morphology of this segment was largely unknown, given the lack of high-resolution bathymetry. Here we present a new compilation of high-resolution bathymetry from unpublished and recent datasets, which offers the unique opportunity to improve our understanding of the Azores Triple Junction, particularly concerning the southern tip of the Terceira Rift and its connection to the Gloria Fault. The new data also provides a much crisper image on the morphology of the Formigas Bank and its structures, and their relationship with regional tectonics. Our observations show that, in this area, the Terceira Rift trends NNW-SSE, and is ~30 km wide from shoulder to shoulder. The Formigas Bank itself has a roughly trapezoidal shape (9 km long x 4 km wide) delimited in the northern and its southern margins by curved scarps that trend westwards from E-W to NW-SE, possibly with a tectonic origin. Faults trending NNE-SSW and NNW-SSE clearly dissect the Formigas volcanic edifice including the E-W to NW-SE faults, compartmenting the bank into a series of mostly NNE-SSW elongated horst/demi-horst and graben/demi-graben structures, with their top found at increasing water depths towards the eastern side and towards the centre of the Terceira Rift. These structures are interpreted as the result of transtensive strain associated to development of the Terceira Rift, resulting in NNW-SSE trending normal faults and their conjugate pair NNE-SSW, which now control the more recent morphology of the bank. Moreover, the presence of these structures implies that the Formigas Bank was necessarily constructed by volcanism taking place before the onset (or at least the bulk) of the movements that gave origin to this ultra-slow spreading ridge. We therefore infer that the development of Terceira Rift took place after 4 Ma – the age suggested for the Formigas Islets on the basis of previously published K-Ar geochronology – when rifting at the Azores is thought to have abandoned the Princess Alice area to its present location further east, as suggested by recent geodynamic studies.

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