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## The seismic structure of the Galicia Interior Basin from new seismic images: Implications for the West Iberia margin formation

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The Galicia Interior Basin (GIB) off West Iberia, is considered an aborted rift formed in the context of opening of the North Atlantic rift system. Despite the Galicia Interior Basin being located in one of the best studied examples of magma-poor rifted margins (i.e., the West Iberia continental margin), its 3D structural variability and its role during continental rifting in the regional geodynamic context remains poorly understood. In this sense, Galicia Interior Basin represents the necessary link to understand the mechanisms of extension from the little extended shelf to the areas where continental breakup finally occurred.

Here we present new multichannel seismic data collected during FRAME cruise carried out onboard the Spanish “R/V Sarmiento de Gamboa” during summer 2018. The structure of the Galicia Interior Basin has been imaged using a 6-km-long solid-state digital multichannel streamer with 480 channels and two G-II gun arrays with a total volume of 3920 cu.in. fired every 37.5 m at 140 bar (2000 p.s.i.) pressure. The new post-stack time migrations of multichannel seismic profiles show the complex basement structure and deep sedimentary units across the region with an unprecedented detail. Additionally, we used state-of-the-art techniques to reprocessed a complementary set of vintage multichannel seismic profiles collected across the GIB. The integration of new and reprocessed seismic profiles provides the opportunity to study for the first time the 3D tectonic crustal-scale structure of the GIB.

Our images reveal syn- and post-rift sediment, tilted fault blocks, well-defined top-of-the-basement reflections, and also intra-basement and Moho reflections that offer new information about the variations in tectonic structural style during rifting. The data display an asymmetric structure and variations in the amount and distribution of crustal extension across the GIB. At the center of the basin – about 150 km landward from the continent-ocean transition – the continental basement has been thinned to 6-8 km associated with listric (in two-way travel time) normal faults without final breakup. Further offshore, the continental basement thickens again until ~20 km under the Galicia Bank, before entering the Deep Galicia Margin where continental basement thins laterally continuously to mantle exhumation and final breakup. The observed crustal structure and

margin configuration represents a challenge to current models of rifting and continent-ocean transition structure, and allow to speculate on the possible causes for rift failure at the GIB in the context of the opening of the West Iberia margin.