



New constraints on the rifting evolution of the Porcupine Basin from wide-angle seismic data

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In the past few decades a large number of geophysical studies have presented new insights on the evolution of continental rifted margins allowing a better understanding of geological processes involved in lithospheric extension. Here we shed more light on this issue by presenting a novel study that explores rifting evolution in the Porcupine Basin from Wide-Angle Seismic (WAS) data acquired across the basin axis. The Porcupine Basin is a tongue-shaped basin SW of Ireland, with the major rift phase occurring in Late Jurassic – Early Cretaceous times preceding the onset of North Atlantic opening west of Ireland. Axial extension increases drastically southwards from crustal stretching factors of ~ 1.5 in the North to >6 in the South, where several authors suggest the presence of exhumed mantle, while others propose the emplacement of significant amounts of extension-related magmatism. Regardless of the process that may have occurred, along-axis crustal structure variations of the basin are consistent with a rift evolution. Additionally, the basin is small enough so both conjugate margins can be included in a single geophysical transect, which makes this basin an ideal location to examine the effects of crustal extension. In this study we use WAS data acquired along several East-West profiles and recorded by ocean bottom seismometers, and land stations in Ireland to assess the crustal structure of the basin from north to south. After modelling of crustal and mantle phases, we obtain 2D P-wave velocity models that reveal the crustal and uppermost mantle structure, together with the geometry of the main geological interfaces (i.e. sediment-basement and Moho). The outcome of this study not only shows the along-axis crustal evolution of the basin but presents new insights on the nature of the crust and uppermost mantle providing relevant information on the different processes involved in the opening of the basin (e.g. mantle exhumation). This project is funded by the Irish Shelf Programme Study Group (ISPSG) of the Petroleum Infrastructure Programme (PIP).