



## **Continental hyperextension, mantle serpentinitisation and seafloor spreading in the Porcupine Basin, offshore Ireland**

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The Porcupine Basin is a large V-shaped sedimentary basin offshore Ireland that first opened prior to the opening of the North Atlantic. Basement depth, and hence inferred crustal stretching factor, increases southwards in the basin, and the southern parts of the basin are little explored. We use new analyses of wide-angle seismic data from five profiles along and across the axis of the basin, together with coincident and nearby high-quality seismic reflection data and gravity data, to determine the crustal and uppermost mantle structure beneath the basin. The crustal stretching factor is c. 2.5 at the northern limit of the region sampled by our data, and increases to the south, with the crust in the centre of the basin thinning to 2 km or less. Here estimates of crustal stretching factor are more uncertain because of the difficulty of distinguishing crystalline basement from high-velocity Jurassic and older sediments. This decrease in crustal thickness is accompanied by a decrease in mantle velocities associated with mantle hydration. Further south still lies a zone reaching c. 40-km-wide zone where the nature or even presence of the crust is uncertain, and then a region of 6-9-km-thick crust with higher velocities than to the north that is interpreted as oceanic in nature. The top of basement continues to deepen to the south, despite this increase in crustal thickness, suggesting increasing age to the south. Thus rifting propagated from south to north and the axis of the Porcupine Basin appears to document the full sequence of events from a mildly stretched continental rift basin in the north through to hyperextension, possible mantle exhumation and magmatically robust seafloor spreading in the centre of the basin. This project was funded by the Irish Petroleum Infrastructure Programme (PIP).