



Defining the nature and geometry of the Porcupine Median Ridge

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The Porcupine Basin is an elongate failed rift basin of Late Paleozoic to Cenozoic age, with the main rifting phase in the Late Jurassic to Early Cretaceous. It is located offshore SW Ireland. The Porcupine Median Ridge (PMR) is a ridge feature in the middle of the southernmost part of the basin. During the last three decades, this ridge has been successively interpreted as a volcanic structure, a diapir of partially serpentinised mantle, or a block of continental crust. Its nature still remains debated today. The interpretation of the nature of the PMR is important for both (1) academic research: to understand the final stages of the rifting of the basin; and (2) oil and gas industry: to improve the understanding of the thermal evolution of the basin for potential resources. We use seismic refraction profiles acquired across the southern Porcupine Basin to derive P-wave velocity models using tomography modelling, following a layer-stripping strategy. Coincident seismic reflection profiles help interpret the seismic velocities. We show seismic velocities up to 5.7 km/s in the PMR, with an average of 4.2 km/s in the PMR picked on the seismic reflection data. These are typical for igneous rocks. A series of seismic reflection profiles imaging the PMR is used to determine its location and geometry along the basin. The location of the PMR coincides with a local magnetic high, implying a magnetised feature. A high velocity zone (velocities up to 5.4 km/s) is observed in the sedimentary sequence, west of the PMR, which can be due to the presence of some magmatism intruded in the sediments but might not be directly related to the emplacement of the PMR. These observations argue in favour of an igneous nature of this ridge and the nearby high velocity layer. The project was funded by the Irish Petroleum Infrastructure Programme (PIP).