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Traveltime modelling of seismic wide-angle data collected in Porcupine Basin, west of Ireland.

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The Porcupine Basin west of Ireland has the shape of an inverted V, reflecting the southward increase of extension factors from 1.5 in the north to values greater than 6 in the south that are more commonly associated with rifted margins. As such, the basin provides a laboratory to investigate the evolution and symmetry of rifting leading toward continental separation and breakup: a series of east-west sections at different latitudes cross the basin where the maximum amount of extension is typical of a moderately extended rift in the north, a very extended deep rift basin in the middle and a pair of conjugate rifted margins in the south. Comparison between these sections thus represents the formation of a rifted margin at different stages in its evolution. In this presentation, we report the results from a Meteor cruise in 2004 that collected wide-angle seismic data along the profiles across the basin at a variety of latitudes along pre-existing seismic reflection profiles.

On the reflection profiles (see poster of V. Gaw et al.), a bright reflection (P) is imaged at mid-latitudes and appears to represent a detachment fault, and may in part follow the top of partially serpentinized mantle. This is consistent with our results and results from gravity modelling, and with numerical models of crustal embrittlement and mantle serpentinization during extension. Although overall the basin remains symmetric, the consistent westward structural dip of the detachment implies that, at high stretching factors, extension was asymmetric. Farther south, the "Porcupine Median High" (PMH) appears in cross-section to be a triangular construction overlying tilted fault blocks and onlapped by postrift sediment. Despite no evidence for synrift magmatism, this high has been interpreted as a basaltic structure. Instead, our data suggest the PMH might be a serpentinite-mud volcano or diapir: we suggest that such structures produce the serpentinite breccias found within the rifted continent-ocean transition of

non-volcanic margins.

The Meteor cruise collected six wide-angle profiles, recorded by over 100 instruments in total. 5 profiles run east-west at different latitudes and one runs north-south along the basin axis. Data quality is excellent. Traveltime modelling results of the wide-angle data from several profiles are shown on this poster. The models are based on a forward modelling technique. Already there are indications of very thin crust and relatively low mantle velocities beneath the centre of the basin, consistent with mantle serpentinisation occurring beneath highly faulted and extended crust.