



1 Mid to Late Cenozoic evolution of a sediment starved slope system: the Rockall Trough, west of Ireland

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The Rockall Trough is the bathymetric expression of the undersupplied Rockall Basin, overlying an area of highly attenuated continental crust to the west of Ireland. A 2 km thick Cenozoic succession is found on the basin floor and this onlaps and thins onto the margins of the basin. Imaging and coring along the marginal slopes reveal widespread slope failure, and a series of large canyons occur along the eastern trough margin. Application of an established Cenozoic basin floor stratigraphy to the slope and base-of-slope has identified regional scale variations in the timing, nature and the controls on the slope failures that help constrain the onset of deep water conditions in this important gateway for ocean circulation.

In the NE Rockall region a large post-late Eocene basinward-thinning sediment wedge overlies a regional unconformity (C30). Internal reflector truncations and multiple onlap surfaces indicate a history of multi-phase failure. Canyons heavily incise the upper surface of the sediment wedge and the toe of the wedge is onlapped by slopeward thinning basinal strata. Further south, along the margin of the southern Porcupine Bank, there is no obvious base-of-slope failure wedge. A stratigraphic borehole drilled on

the north Porcupine Bank can be correlated to high-resolution seismic profiles and indicates that lower- to mid- Eocene carbonate strata have undergone rotational sliding. This unit has also been extensively eroded by bottom current activity and also canyon incision.

In contrast, the western opposing margin flanking the Rockall Bank also has slope failures but lacks canyons. At the base of slope the regional C30 unconformity defines the upper surface of a sediment body with external wedge morphology. This is of presumed late Paleocene to early Eocene age and has undergone significant onlap by the contouritic sediment of the Feni drift, which plasters the base of slope along the Rockall Bank. Internally this wedge has a different seismic character to that of the NE Rockall wedge, with rotational shear planes resolvable on industry seismic lines implying post formation collapse of the margin.

The formation of the base-of-slope wedges along both margins, although of different age and internal character, can be related to deep seated crustal and mantle geodynamics that drove differential subsidence, slope rotation and failure. Other factors that modify the sediment geometries include sediment supply and climatic control on bottom current circulation.

Overall the mid to late Cenozoic sedimentary architecture of the Rockall Basin highlights, and provides a record of, the sensitivity of undersupplied sedimentary basins to external forcing, such as tectonics and climate.