

Orphan Knoll: a window on the opening of the North Atlantic

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Orphan Knoll has stood as an isolated continental remnant since the initial breakup. It initially moved away from North America with the Irish and Porcupine Bank blocks. Spreading then failed west of Orphan Knoll and the spreading centre jumped to the east of the Knoll, separating Orphan Knoll and the Porcupine Bank conjugate margins. Thus, Orphan Knoll's eastward-facing steep slope represents an unsedimented continental margin and provides a record of the rocks beneath not only Orphan Knoll and Porcupine Bank but also parts of Orphan Basin and Porcupine Basin.

The top of Orphan Knoll at 2000 m is blanketed by a thin 180 m cover of Tertiary pelagic sediments. The whole top of the Knoll is marked by a field of bedrock mounds that generally border a thin (70 m), narrow graben of Cretaceous limestone capped by chalk. Dredge sampling of the bedrock

mounds in 1971 and 1978 obtained probable scree and a mix of ages. While Ordovician and Silurian-aged material could be recently ice-transported from Canadian or Greenland sources, the Devonian-aged material cannot be, and reflects nearby bedrock found higher up on the mounds. This record of Palaeozoic platform limestones on Orphan Knoll has palaeogeographic and palaeobiologic implications for the early Atlantic: it also speaks to possible source rocks beneath the conjugate margin basins.

The mounds have been suggested as erosional remnants of pinnacle reefs; they may also be remnant karst topography or salt diapirs reactivated by the 2000 m hydrostatic pressures on tight formations. A submersible sampling program is presently being planned to search for exposed bedrock of the unsedimented margin and the mounds.