
Geologic evolution and petroleum potential of the Orphan Basin, offshore Newfoundland and Labrador

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The Orphan Basin region, situated north of the Grand Banks of Newfoundland, has undergone repeated extensional episodes. Crustal stretching of the mainly Paleozoic platform started in Late Triassic to Early Jurassic. Subsequent extensional episodes lasting until the Paleocene deepened the basin and enlarged it, by westward (landward) propagation of rifting. Seismic interpretation integrated with potential field data initially focused on two main regional transects and then extended to the entire basin, provides a regional understanding of the basin's structural setting and evolution and indicates the presence of a viable petroleum system. Mapped hydrocarbon traps include large extensional anticlines which were also modified by compression. The presence of Jurassic source rock in the East Orphan Basin is convincingly supported by seismic correlation

to source rock intervals within the adjacent Jeanne d'Arc and Flemish Pass basins, and by paleo-oceanic correlation with the Porcupine Basin off the western coast of Ireland.

Excluding the Orphan Knoll, which has a thin Mesozoic section, and several of the elevated basement blocks devoid of Mesozoic sediments, the entire Orphan Basin has hydrocarbon potential. Based on the age of basin fill, presence of source rock, timing of maturation, and seismic character correlation to adjacent basins, the Orphan Basin is predicted to be primarily oil-prone in its eastern part, and largely gas-prone in its western part. The East Orphan Basin is under active exploration, while there are no exploration plans for the West Orphan Basin in the incoming years.