

The influence of regional fault systems in the evolution of the Maritimes Basin complex of New Brunswick, Canada, and adjacent offshore areas: Belleisle and Kennebecasis faults

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Centred beneath the Gulf of St. Lawrence, the late Devonian to early Permian Maritimes Basin complex is a successor basin to the Paleozoic Appalachian orogenic collage in eastern Canada, and has been the subject of exploration for hydrocarbons since the mid-19th century. The evolution of the Maritimes Basin complex is largely controlled by major orogen-parallel strike-slip faults through the Mississippian, followed by more general subsidence during the Pennsylvanian. 'Basin' and 'subbasin' are terms that have been employed in southeastern New Brunswick without formal definition. Here they are used as follows: a 'basin' has all or most of the geometric elements of a depocentre aside from just a thick sedimentary rock sequence preserved, while 'subbasin' contains a thick sedimentary rock sequence bounded not by features characteristic of a depocentre margin, but the abrupt truncation associated with a major fault. Where there is ambiguity, as under the Gulf of St. Lawrence, with limited borehole control, 'basin' is the default term.

In New Brunswick, to the southeast of the main Maritimes Basin, these strike-slip faults and several late Devonian – Pennsylvanian subbasins are exposed from pre-Carboniferous basement in the southwest, continuously into late Pennsylvanian cover sequences along the eastern coast of New Brunswick and eastward beneath Prince Edward Island and the Gulf of St. Lawrence toward the Magdalen Islands. Recently acquired and reprocessed industry seismic reflection profiles have provided, for the first time, well-resolved three-dimensional views of the central and eastern part of this area, permitting a more detailed analysis of the interaction of major faults with the upper Paleozoic cover. Two major fault zones, the Belleisle and Kennebecasis fault zones, can be traced from southwestern New Brunswick to Prince Edward Island, and their interaction with subbasin formation and evolution is the subject of this contribution.