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**Salt-related growth fault history and structural inversion  
in the Penobscot area, western Abenaki Subbasin,  
offshore Nova Scotia**

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Earlier work in the western Abenaki Subbasin has established that the salt structures experienced two main phases of activity, one in the Jurassic-Early Cretaceous, the other in the Upper Cretaceous-Cenozoic, with a period of reduced activity in the “mid” Cretaceous (Aptian-Cenomanian). Although not the site of major salt structures, the fault systems in the Penobscot area are clearly linked to salt withdrawal to the north and south. Using recently publicly-released 3D seismic, this study examines the timing, magnitude, and location of growth fault displacement at Penobscot to gain a better understanding of salt movement in the area.

The amount of detail in the growth fault history is determined primarily by the number of seismic horizons that can be mapped reliably in the vicinity of the faults. This determines the number of time steps. Approximately 10 horizons were mapped in this study, stratigraphically ranging from the Upper Jurassic to Cenozoic. Two main, en echelon faults cross the Penobscot area. Numerous secondary faults complicate the structure, including a polygonal fault level at and just above the top of the Wyandot Formation. Corrections for time:depth relationships and folding in the vicinity of the faults are necessary to properly assess the growth history.

Early results of this work demonstrate that: 1) two main phases of fault motion are confirmed; 2) significant fault growth continued into the post-Eocene; 3) faults persist to within 150 metres of the modern sea floor; 4) there is evidence for fault inversion sometime in the Early Cretaceous (exact timing is yet to be determined). Whether the fault inversion is due to local salt tectonism or to broader tectonic events is unknown, but this study identifies the need for other studies in the region to better constrain the possibility of widespread structural inversion at this time.