

**Abstract for the 2005 GAC-MAC-CSPG-CSSS conference in Halifax in May**

**Salt Tectonics at Passive Continental Margins: Results from Margin-Scale Numerical Models and a Case Study Application from the Northeast Nova Scotia Margin**

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Salt tectonics at passive continental margins is investigated using a 2D finite element model of frictional-plastic sediments overlying a viscous salt layer. We present results concerning the effects of sediment progradation and aggradation, water loading, and isostatic adjustment on these systems. In addition, results from a Nova Scotia margin case study combining numerical models and seismic data will be presented.

The effect of an overlying water column has been largely neglected in analogue models of salt tectonics. Water loading has three main effects on submarine systems: 1) a vertical loading effect equal to the weight of the water column; 2) a horizontal buttressing effect caused by the water load pushing against the margin slope; and 3) weakening of the sediments by increasing the pore fluid pressure. Collectively, these effects strongly modify the stability of salt-sediment systems.

Sediment progradation results in a diachronous evolution comprising four main phases: 1) initiation of salt flow and the formation of mini-basins and diapirs; 2) onset of overburden extension; 3) wholesale extension and rafting of the sedimentary overburden; and 4) the formation of a distal allochthonous salt nappe.

If the sedimentation style switches from a progradational geometry to a more aggradational geometry, then extending shelfal basins become underfilled producing large salt diapirs beneath the shelf. When sediment aggradation continues at an appropriate rate, these diapirs grow passively and keep pace with sedimentation until there is insufficient salt in adjacent structures to source the growing diapirs.

Isostatic adjustment, owing to overburden and water loading, causes subsidence, thereby increasing accommodation and sediment thickness. The isostatic subsidence causes the salt layer to be tilted landward, and therefore salt is forced to flow against gravity. This resistance decreases the seaward component of the flow and leads to the formation of more pronounced diapirs and mini-basins.

The insights gained from the numerical models have been applied to a case study investigation from beneath Banquereau Bank, northeast Scotian margin. In this area, a thick (up to 3.5 km) wedge of sigmoidal landward dipping reflectors sole out onto a regional salt weld. Based on numerical model results, this regional structure is interpreted to have formed when a large amount of sediment was deposited in the Jurassic, while the seaward end of the salt was under little cover. This allowed wholesale outward movement of the seaward sedimentary section, localized on the salt detachment, and continued until the salt layer was depleted.