Salt tectonics in the Maritimes Basin, Canada

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The Visean Windsor Group of Maritime Canada and the correlative Codroy Group of Newfoundland contain substantial evaporite rocks, including gypsum and anhydrite, halite, and potash. The role of rising evaporite diapirs in the tectonics of the Maritimes Basin has long been recognized. However, recent advances in salt tectonics in extensional passive margin environments have focussed on the expulsion of the salt from intervening areas, between diapirs, which undergo corresponding subsidence. The sedimentary record of these "minibasins" thus contains critical information on the halokinesis. These advances add new perspectives to the study of evaporite tectonics in Atlantic Canada, where substantial strike-slip and convergent tectonic movements, due to the latest stages of Pangea assembly, are superimposed on extension, and add complexity to the history of halokinesis.

In the Cumberland sub-basin, seismic reflection data allow the timing of salt expulsion to be resolved. In the west, the Athol syncline contains the famous Joggins succession, which was rapidly deposited in accommodation space created by salt expulsion, showing that Windsor Group salt remained in place until the late Bashkirian before rapidly moving into diapiric salt walls. In contrast, in the eastern Cumberland sub-basin, relationships in the Tatamagouche syncline show that evaporite expulsion was already controlling sedimentation during late Visean to Serpukhovian deposition of the Mabou Group, and probably during deposition of the underlying Windsor Group.

Field relations in other parts of the Maritimes Basin, where the Mabou and upper parts of the Windsor Groups show striking thickness variations, suggest that this history of early evaporite expulsion is more usual, despite the stratigraphic continuity and regularity of limestoneevaporite-clastic cycles in the Windsor Group. At first sight the regularity of these cycles suggests that halokinesis did not begin until after the end of Windsor Group deposition. However, an alternative explanation is that minibasins already active during deposition of the middle and upper Windsor Group were simultaneously flooded by eustatic sea-level rises, related to glacial cycles on Gondwana.

The Maritimes Basin has not figured prominently in global assessments of evaporite volumes through time. This is partly because the least mobile, and therefore best preserved, evaporite sections are relatively thin. Relationships in the Cumberland basin suggest that the initial thickness of lower Windsor evaporites was comparable to those in better known evaporite successions in the Gulf of Mexico, early Atlantic Ocean, and Mediterranean Sea. The global significance of Maritimes Basin evaporites may thus have been underestimated.

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