

Bedding-parallel faults, breccia zones, large-scale recumbent folds and basin evolution: the case for extensional tectonics in the onshore Magdalen Basin in Nova Scotia

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Fault breccia up to 100 m in thickness occurs a few metres above the Horton-Windsor contact in the Windsor Group type-area, the Antigonish Basin and central and western Cape Breton Island. It marks the trace of a regional fault surface which we term the Ainslie Detachment. This essentially stratiform breccia zone may in places have little apparent effect on Windsor Group internal stratigraphic order. More commonly, it represents a zone of significant stratigraphic omission, juxtaposing Upper Windsor and post-Windsor rock units on basal Windsor lithosomes. In the hanging wall of the detachment, boudinage is common within breccia zones. Boudins of maximum dimensions of more than 10 m are rotated, which may provide a useful kinematic indicator. Where rheologic factors were appropriate, large scale, tight, recumbent folds are typical of hanging wall sequences. In the

subsurface, flat-lying, overturned beds, in continuous stratigraphic succession exceeding 300 m in thickness, attest to large scale folds in this tectono-stratigraphic position. Smaller-scale folds in outcrop record movement towards the north and northwest, i.e., downwards towards the Magdalen Basin. Rotation of pea-sized augen shows a similar, regionally consistent tectonic transport direction. Key stratigraphic omissions across the detachment surface and the down-to-the-basin movement sense clearly document extension on the Ainslie Detachment. The regional extent of the detachment suggests a probable role in the late-stage evolution of the Magdalen Basin, particularly relevant to basin-wide subsidence and to the accumulation of thick Westphalian coal measures.