

**The Athol Syncline: tectonic evolution of a Westphalian B-C depocenter
In the Maritimes Basin, Nova Scotia**

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High resolution seismic reflection profiles of the western Cumberland Basin, Nova Scotia, reveal considerable thickening of Westphalian B-C strata towards the axis of the Athol Syncline. This suggests that development of the syncline coincided with that of the depocenter in contrast with the stratigraphic relations typical of the Maritimes Basin where the general absence of Westphalian B-C strata indicates regional, Late Carboniferous uplift and erosion.

Seismically revealed post-depositional structural complications within the Athol Syncline include truncation of its southern limb by a near-vertical east-west zone of strike-slip faulting. This zone, the Athol-Sand Cove Fault Zone (ASCFZ), has been correlated to the west with a complex zone of faulting exposed on the coast of Chignecto Bay where numerous normal, reverse and oblique-slip displacements suggest predominantly brittle deformation and changes in the sense of strike slip. To the east, the ASCFZ splays north into the Springhill coalfield where it is responsible for complex patterns of normal, reverse and strike-slip faulting within

Westphalian B coal measures.

Major Late Carboniferous strike-slip faults adjacent to the Athol Syncline record dextral motion south of the Cumberland Basin (on the E-W Cobequid Fault) and sinistral motion along the basin's northwestern margin (on the NE-SW Harvey-Hopewell Fault). These faults are respectively interpreted to be synthetic and antithetic structures related to a regional dextral shear regime in which the ENE-WSW Athol Syncline and associated depocenter formed in response to the direction of local compression during basin development. However, kinematic analyses indicate that post-depositional motion on the ASCFZ was predominantly sinistral. Development of the Athol Syncline is therefore interpreted to have been controlled by dextral, syndepositional transpression during the Late Carboniferous, whereas the later, post-depositional ASCFZ records predominantly sinistral transtension and may be related to the opening of the Fundy Basin which reversed the sense of regional shear during the Middle Triassic.