

## Variscan Tectonostratigraphy in the Avalon Terrane of Southern New Brunswick

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The basement-involved, Variscan fold-thrust belt of coastal southern New Brunswick can be attributed to dextral transpression associated with the regional strike-slip response to the Variscan event in Maritime Canada. Variscan deformation in the vicinity of Saint John, strongly influenced Westphalian sedimentation within the penecontemporaneous Mispec Group, and reflects sustained NW-SE shortening that coincides with a major compressive bend in the east-west Cobequid-Chedabucto fault system, on which there was significant right-lateral, Westphalian displacement.

Within the Mispec Group, purple to green lithic wackes and polymict conglomerates of the Balls Lake Formation are the product of alluvial fan sedimentation and display facies depicting deposition in proximal to mid-fan, mid-fan and distal settings. Grey lithic arenites of the Westphalian Lancaster formation are largely the product of a major meandering stream system but partially represent overbank sediments influenced by the distal fan. Fluctuations in relief of the fan source area produced interfingering and occasional lateral equivalency of these formations, while deformational fabrics within Balls Lake conglomerates suggest syntectonic sedimentation. Paleocurrents imply northwestward progradation of the Balls Lake fan into the basin drained by the Lancaster fluvial system in response to uplift of a southeasterly source.

The first deformation to affect the Mispec Group (D1), produced NW-directed, basement-involved thrust faults that structurally invert

regional stratigraphy. Associated lower greenschist facies metamorphism accompanied the development of a widespread, SE-dipping fabric (S1), variably expressed as a slaty cleavage, protomylonitic solution cleavage and orthomylonitic foliation. The fabric locally contains a strong mineral lineation (L1) of variable orientation, and is axial planar to NW-vergent, isoclinal minor folds and regional overturned structures (F1) that plunge gently NE and SW. Continued compression was accompanied by renewed thrusting (D2) and backthrusting (D3) and produced fold trains coaxial with F1 that verge both NW (F2) and SE (F3) and are, in part, conjugate. Associated S2 and S3 axial planar crenulation cleavages overprint S1 and dip SE and NW respectively.

On-strike variations in deformational style and timing with respect to metamorphism, coupled with steeply-dipping, en echelon zones of intense deformation, suggest the fold-thrust belt is segmented by right-stepping convergent wrench faults synthetic to the Cobequid-Chedabucto fault system. These faults shallow into thrusts to form positive flower structures, and locally terminate into thrusts associated with anomalous NW-SE trends in D1 and D2. The regional deformational history is consequently attributed to Variscan transpression along downward-steepening, en echelon thrust faults that subparallel the present Fundy shore. Thrust uplift in response to initial transpression is proposed to account for the southeasterly source area of the syntectonic, Balls Lake alluvial fan. Continued displacement

and telescoping resulted in structural inversion of regional stratigraphy, and allowed deposition of the Mispec Group

in advance of, and subsequent overriding by, an allochthonous Variscan terrain to the south.