

Fault reactivation in suspect terranes: insights from the Avalon terrane in the Canadian Appalachians

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Suspect terranes commonly have faults with movement histories that reflect their original tectonic setting and subsequent re-activation during terrane accretion and dispersal. Since later movements tend to obliterate evidence of earlier motions, documenting fault re-activation is a difficult task. We present evidence from two northeast-trending fault zones within Avalonia. The Hollow Fault Zone of mainland Nova Scotia and the Bellisle-Kennebecasis Fault Zone of southern New Brunswick preserve evidence for reactivation in a variety of tectonic settings between the Neoproterozoic and the late Carboniferous. During this time period, Avalonia migrated from its original setting along the Gondwanan margin in the Neoproterozoic, was accreted to Laurentia by the late Ordovician, and was dispersed by sinistral followed by dextral strike-slip faults between the Silurian and the late Carboniferous.

Evidence of Neoproterozoic motion is preserved in pre-final crystallization deformation fabrics in igneous complexes which intrude the shear zones. This reflects strike-slip mo-

tion related to oblique subduction along the Gondwanan margin. Cambrian motion along the Hollow Fault is inferred to have controlled facies variations in an intra-continental rift sequence. Subsequent mid-Ordovician to earliest Silurian deformation is limited to these shear zones and is characterized by basin inversion in mainland Nova Scotia and formation of mylonites and injection of dikes into brittle fractures in southern New Brunswick. This deformation and magmatism is attributed to the sinistral accretion of Avalonia to Laurentia.

Evidence of mid-Silurian to late Carboniferous terrane post-accretionary dispersal is recorded in the mylonitic and cataclastic fabrics recorded in the shear zones themselves, the orientations of spatially related fold structures, local controls on sedimentary facies and offsets in stratigraphy. This motion was predominantly dextral in sense and was predominantly related to convergence between Laurentia and Gondwana associated with the amalgamation of Pangea.