Strike-slip faults and the mid-Paleozoic reconfiguration of the Appalachians in Atlantic Canada

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Dextral northeast-southwest, roughly orogen-parallel strike-slip faults were active in the Late Devonian and Carboniferous, in both the northern and southern Appalachians. In the southern Appalachians, these faults cut through, and offset, structures related to promontories and reentrants in the Laurentian margin. In the Canadian Appalachians, however, the St. Lawrence promontory was not truncated, but instead formed a right-handed stepover, around which dextral strike-slip faults frame the deepest parts of the Maritimes Basin. This enormous sedimentary basin contains over 12 km of sediment, and accounts for nearly one third of the thickness of the crust beneath parts of the Gulf of St. Lawrence. Two main orientations of strike-slip faults are present: northeast-southwest orogen-parallel faults with major activity early in basin history, and east-west faults including the Cobequid-Chedabucto Fault Zone of Nova Scotia, which experienced major activity in the mid-Carboniferous.

Restoration of plausible amounts of movement on these strike-slip faults is possible using offset basin margins and extreme contrasts in facies. Using conservative estimates of offset, the Belleisle, Kennebecasis, Caledonia, Rockland Brook, Canso, Cabot, and other faults may be restored to possible mid-Devonian configurations. The resulting geometry places ~1 Ga rocks of the Blair River Complex in northwestern Cape Breton Island close to rocks of equivalent age in the Indian Head Range of Newfoundland, and rearranges contrasting components of Avalonia into two coherent belts. Widely separated, but similar, components of Ganderia in New England and New Brunswick are also juxtaposed in the reconstruction.

Despite the uncertainties inherent in the restoration, it is clear that offset in the Laurentian margin between the Québec reentrant and the St. Lawrence promontory played a major role in Appalachian tectonism throughout the Paleozoic, and that late Paleozoic strike-slip faults rearranged the configuration of

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Appalachian terranes produced by the Acadian orogeny. Restoration of the early Paleozoic assembly of the orogen should take these late Paleozoic movements into account. Misleading results may be obtained by attempting to restore early Paleozoic plate configurations based on present-day cross-sections.