A New Look at the Structural History of the Silurian Chaleurs Group in Northern New Brunswick: Evidence for a Complex Polyphase Deformation History and Dextral Shear Associated with F_3 folding

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The Silurian rocks that are exposed north of Bathurst were previously considered to contain only one generation of structures. These structures include km-scale, upright, fairly symmetrical folds and a cleavage that generally transects the folds. In fact these Silurian rocks define one of the type localities of transecting cleavage. An angular unconformity was interpreted to be present between the Silurian and Ordovician rocks on the basis of their contrast in structural history.

Detailed structural analysis of the Silurian rocks near Limestone Point and Nigadoo revealed the presence of a more complex deformation history than previously assumed, comparable to the one in the Ordovician. The large, upright structures that dominate the Silurian rocks refold locally rare, small scale, isoclinal folds (F_1), and are therefore labelled as F_2. Some of the large F_2 folds are downward facing, indicating the possible existence of large F_1 structures.

The origin of the earlier F_1 folds is still enigmatic although they fold thin, coral-rich limestone layers, which suggest deformation after lithification of the rocks rather than a soft sediment origin.

The regional cleavage in the Silurian rocks commonly crosscuts both limbs of F_2 folds. This transecting cleavage is locally axial planar to mesoscale folds, which have a consistent Z-asymmetry irrespective of the F_2 limb they occur on. These overprinting relationships indicate that the transecting cleavage and associated Z-folds represent a younger generation of structures (F_3) rather than being coeval with F_2, as has previously been suggested. The rare presence of an S_2 axial plane cleavage crosscut by S_3 also support such an interpretation. The S_3 and older structures are locally overprinted by north trending F_4 kink-bands and an associated S_4 fracture cleavage.

The S_3 cleavage in the Silurian rocks is statistically coplanar with S_3 in the adjacent Ordovician rocks. At the northernmost tip of Limestone Point, where Silurian calcareous sandstones can be seen to conformably rest on Ordovician siltstones at low tide, S_3 passes without significant refraction from Ordovician into Silurian rocks. Going from north to south across the 5 km wide belt of Silurian rocks north of Bathurst the trend of S_3 changes gradually from northeast to east-northeast in a clockwise fashion then turns back to the northeast in an anticlockwise fashion. The apparent sense of rotation of S_3 is the expected behaviour of a passive marker in a transcurrent, dextral shear zone. Strong dextral refraction of S_3 on a small scale, shallow-plunging extension lineations, NW-SE trending Riedel shears (R^1), the Z-

asymmetry of F_3 folds and the consistent anticlockwise orientation of S_3 with respect to the ENE-WSW trend of the Silurian rocks in combination also indicate a dextral sense of shear, approximately parallel to the boundaries of the ENE-WSW trending belt of Silurian rocks. This narrow, approximately 5 km-wide belt of Silurian Chaleurs Group sediments is therefore interpreted as the site of a dominantly transcurrent dextral shear zone during the F_3-related deformation.