Detailed structural analysis of a transpressional terrane boundary, Minas fault system, Nova Scotia

Ellie MacInnes and J.C. White
Department of Geology, University of New Brunswick,
P.O. Box 4400, Fredericton, New Brunswick E3B 5A3, Canada <c2u63@unb.ca>

The Minas fault zone, an east trending Paleozoic Appalachian terrane boundary, is an excellent example of a long lived zone of intense deformation of low metamorphic grade and significant displacement. Dextral transpression was dominant during the Acadian Orogeny as Meguma docked against Avalon. This transpressive fault zone was later reactivated and acted as the loci for the opening of the Fundy and Minas basins during the initial fragmentation of Pangea in the Triassic. The reversal of deformation environments created a convenient site for examination of basin inversion and subsequent redevelopment.

The principal rock unit within the fault zone is the Late Devonian-Early Carboniferous Horton Group (low grade facies Greville River and Rapid Brook formations respectively represent the products of distal and proximal facies of a single alluvial fan-fluviatile-lacustrine unit). Study of these sediments, which preserve a wide range of deformation intensities, (from relatively undeformed large-scale folds to high strain phyllonites), allows for a detailed microstructural examination within a large scale tectonic framework.

Through detailed structural mapping of this well exposed fault zone the complex overprinting and geometric relationships associated with protracted deformation can be ascertained. Distinctive variations in the styles of deformation are evident through a cross section of the shear zone. Strain partitioning played a crucial role in the development of the transpressive fault zone. Transcurrent motion was concentrated within the central portion of the zone. Within this zone intense deformation has accommodated high displacements and produced a wide range of fault rocks, including well developed sheath folds, S-C', fault gouge, breccias, phyllonites and intense repeated veining. There is a clear overprinting relationship between ductile and brittle regimes. Stretching lineations plunge moderately to the SW. A distinct boundary exists between the high strain central zone and the inbound portion, which displays low level deformation and very low-grade metamorphism. Large scale open folding and bedding plane thrusts are typical of this compression dominated area.