

Remote sensing and GIS for terrane boundary assessment

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The Meguma and Avalon terrane boundary is defined by the Minas Fault system along which the St. Mary's Basin resides. The basin is composed of Horton Group sedimentary rocks characteristic of a strike-slip basin. The southern flank of the basin is in fault contact to the east and rests unconformably over the Meguma Terrane in the west. The Cobequid-Chedabucto fault system defines the northern boundary of the basin with the Avalon Terrane. An assessment of the basin and terrane boundary relationships has been carried out for the last two years utilizing field mapping and various digital datasets including: satellite imagery (optical and radar), geophysical (elevation, magnetics, radiometrics and gravity) and geology maps of various scales. The scale of the digital geophysical datasets for the region is ideal for terrane evaluation purposes. The variety of images provide insights into the tectonic history of different levels of the crust.

Hybrid "image maps" were used in combination with field observations to interpret the tectonic history of the terrane boundary. Results of this interpretation include the Late

Paleozoic collision of the Meguma Terrane with Avalon, followed by the initiation and dextral motion on the Cobequid-Chedabucto fault system (middle Carboniferous). The northern section of the basin was tectonically removed with continued east-west dextral motion, and may occur north of Guysborough Harbour. Sinistral motion on northwest-trending strike-slip faults in the Meguma Terrane resulted in a "mega-kink" in the boundary faults causing a restraining bend to form. With continued dextral motion between Meguma and Avalon a positive flower structure developed in the Guysborough area. Two north-east-trending lineaments are evident at the western end of the basin in the Salmon and Stewiacke River area. These lineaments parallel an axial planar cleavage trace and appear to rotate to a north-south trend in their southern limits. The rotation of these structures are interpreted as interference patterns associated with faulting in the Shubenacadie and Kennecook basins. A set of northwest-trending fractures occur throughout the basin and are interpreted to be Mesozoic transfer faults related to the opening of the Atlantic Ocean.