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**Geophysical modeling in the Cabot Strait - St. Georges Bay area between Cape Breton Island and western Newfoundland, Canada**

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L. ZSAMBOKI<sup>1</sup>, S.M. BARR<sup>1</sup>, AND S.A. DEHLER<sup>2</sup>

1. *Department of Earth and Environmental Science, Acadia University, Wolfville, Nova Scotia B4P 2R6, Canada <108581z@acadiau.ca>* ¶ 2. *Geological Survey of Canada (Atlantic), Natural Resources Canada, Bedford Institute of Oceanography, 1 Challenger Drive, Dartmouth, Nova Scotia B2Y 4A2, Canada*

In this study geophysical methods are used to investigate the pre-Carboniferous rock units under Cabot Strait and St. Georges Bay to try to correlate them with onshore units in both northeastern Cape Breton Island and southwestern Newfoundland. Filtered magnetic and gravity

maps of the study area were generated using UNIX-based GMT software. The magnetic and gravity data were further enhanced using 1st and 2nd vertical derivatives, high pass - low pass filters, and horizontal and vertical gradients. The best results are produced by the 1st and 2nd vertical derivatives of magnetic data, as the first vertical derivative allows for sharper resolution of near-surface features, and the 2nd vertical derivative enhances local anomalies otherwise obscured by regional trends and helps with edge detection of source bodies. Based on the compiled maps and further constrained by seismic interpretations, 2D subsurface modeling is in progress with GM-SYS 4.2 2D modeling software; three models extend across the Cabot Strait, two models cover an enigmatic circular magnetic anomaly located 25 km offshore from Ingonish in eastern Cape Breton Island, and one model is in St. George's Bay in Newfoundland.

The 1st vertical derivative of the magnetic data show a linear magnetic high associated with Ordovician to Silurian metasedimentary and metavolcanic rocks of the Money Point and Cape North groups extending offshore to St. Paul Island. The Money Point Group also extends across the Cabot Strait to the Port aux Basques area of southwestern Newfoundland. The 2nd vertical derivative map reveals that the offshore Ingonish magnetic anomaly is composite and some components may link to units inshore. A linear magnetic high associated with the Neoproterozoic George River Metamorphic Suite extends offshore towards the anomaly, as do similar linear magnetic highs associated with the Neoproterozoic Birch Plain granite, Indian Brook granodiorite, and Ingonish River tonalite, and the Devonian Ingonish Island rhyolite. It is not yet clear which of these units contribute to the anomaly, or whether any of them can be inferred to extend to Newfoundland.