
Anomalous Zn concentrations in the West Barneys River intrusion, Antigonish Highlands, Nova Scotia

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This study investigates the association between an Ordovician granitoid intrusion and anomalous Zn concentrations in stream sediments in the West Barneys River drainage basin, Antigonish Highlands, Nova Scotia. Samples from this intrusion exhibit Zn concentrations up to 352 ppm, far exceeding the average granitoid Zn concentration of 60 ppm. Two lines of investigation were undertaken to determine the source of the anomalous Zn. First, a ground magnetometer survey was done to constrain the distribution of the four variably magnetic units comprising the intrusion (fine-grained alkali feldspar granite, granophyric alkali feldspar granite, coarse-grained alkali feldspar quartz syenite, and gabbro/quartz gabbro). The magnetometer survey identified locations of highly magnetic units (gabbro/quartz gabbro), and the boundaries of the intrusion. Second, because of sparse outcrop, a soil (instead of rock) geochemical survey was carried out to determine the locations of anomalous Zn concentrations. The geochemical survey involved 320 samples sieved to $-177\ \mu\text{m}$ and analyzed by aqua regia/ICP-MS. Soil Zn concentrations exhibit a mean of 189 ppm, but range up to 1094 ppm, and thus far exceed the global average concentration of Zn in soils (50 ppm). A comparison of the results of these two surveys provides insight into the spatial relationship of Zn concentrations and intrusive rocks. Anomalous soil Zn concentrations most commonly occur in or adjacent to West Barneys River in the western part of study area, an area underlain by quartz syenite and granophyric alkali feldspar granite. Results from this study identify the portions of the West Barneys River intrusion that may contain anomalous concentrations of Zn, and thus constrain where additional research into the cause of the anomalous Zn concentrations should be undertaken.