Application of Combined Enhanced Aeromagnetic and Digital Elevation Data in the Geological Interpretation of the Eastern Meguma Terrane of Nova Scotia[1]

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Aeromagnetic and digital elevation data are useful for regional geological interpretation. Combination of these data can further enhance geological features, allowing for interpretation beyond that of the individual data sets. Enhanced aeromagnetic data, consisting of calculated second vertical derivative data, have been overlain on a detailed digital elevation model (DEM), generated from 1:10 000 scale topographic information, to create a single map image for the eastern Meguma Terrane. The aeromagnetic data were gridded to 75 m and the digital elevation data were gridded to 40 m. Colour contour information was generated from the magnetic data, whereas the digital elevation data are presented as shaded relief.

These combined data sets reveal useful and interesting features that enhance geological interpretation of the eastern Meguma Terrane, locally revealing previously unrecognized features. For example, the combined data indicate a more complex, composite nature for northwest-trending faults than is obvious from the offset of aeromagnetic data alone. In addition, the DEM illustrates the presence of countless, parallel, northwest-trending linear features, resulting in a penetrative fabric at 1:250 000 scale. Several previously undocumented, regional-scale northeast-trending linear features are defined by the DEM. These linear features are locally coincident with abrupt changes in aeromagnetic data or geological contacts, implying that they represent faults. In the Carboniferous Musquodoboit Basin, these northeast-trending linear features locally correspond to mapped basin margins. In one area, significant attenuation of the aeromagnetic response from the underlying Meguma Group, resulting from overlying Carboniferous strata, is bounded by two northeast-trending features. This implies that these structures may influence basin geometry. Attenuation of the magnetic signal within this block indicates significant vertical displacement associated with an increase in the thickness of non-magnetic (e.g. Carboniferous) strata. Locally, linear features in the DEM define bedding-parallel ridges in the Meguma Group, providing detailed structural information for folds in areas with little or no magnetic relief. Aeromagnetic and (or) DEM data have distinct patterns over areas of known intrusions (e.g. Musquodoboit Batholith) that can be useful in defining pluton boundaries in areas with little geological control. Linear features defined in the DEM cut plutons or are coincident with the pluton boundaries, constraining the relative age of these faults. The combination of aeromagnetic and DEM data are a useful tool in interpreting the bedrock geology in the Eastern Meguma Terrane.

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