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Abstract

The Grenville Orogen in eastern Ontario is almost entirely overlain by Paleozoic strata, consequently its geology was poorly known because of low-resolution aeromagnetic coverage (800 m line spacing) and limited diamond drilling that penetrated to basement. To improve our knowledge of this area, in late 2013, 34 724 line-kilometres of aeromagnetic data were collected at 400 m line spacing over a 12 515 km² area from east of longitude 76°30'30"W to the Quebec border. These data were released in June 2014 as Ontario Geological Survey Geophysical Data Set 1075 and a series of hard-copy aeromagnetic maps.

We present an example of one of 3 new 100 000 scale geological compilation maps for the Precambrian geology of eastern Ontario utilizing the detailed aeromagnetic data and existing geological data. The Paleozoic strata are magnetically transparent, especially where thin (<400 m thick). The geology polygons on the map are underlain by a greyscale shaded-relief image of the first vertical derivative of the aeromagnetic survey in order to illustrate the geophysical expression of the geologically significant features. Sun angle is from the northwest (315°) with an elevation of 45°. Paleozoic rock units are not indicated directly on the map, although the Precambrian–Paleozoic unconformity is shown. Marginal notes and a table summarizing the tectonic history of the area are also provided.

Two main lithotectonic subdivisions of the Central Metasedimentary Belt are present, with Highway 7 approximately coincident with the boundary between the 2 subdivisions. To the south and southeast are medium-pressure granulite-facies rocks of the Frontenac terrane, whereas to the north and northeast are upper greenschist- to lower amphibolite-facies rocks of the Sharbot Lake domain. They are separated by the Maberly shear zone that formed at circa 1160 Ma.

Highlights include 1) the Maberly shear zone is not readily evident, but a 10 to 20 km zone in Frontenac terrane immediately to the south characterized by strong linear magnetic trends is likely a high strain zone in the hanging wall of the Maberly shear zone; 2) few faults and lineaments identified in the basement propagate into the overlying Paleozoic; 3) several large mafic dikes are present beneath the Paleozoic; and 4) 2 possible Monteregian (Mesozoic) intrusions occur near the Ontario–Quebec border.