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PALEOMAGNETISM OF THE LORRAIN FORMATION, QUEBEC, AND IMPLICATIONS FOR THE LATITUDE OF HURONIAN GLACIATION

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Paleomagnetic investigations of Huronian ($\sim$2.3 Ga) sediments in Canada have yielded several interpretations regarding their paleogeography. While earlier studies suggested moderate to high paleolatitudes of deposition, and therefore accorded well with the glaciogenic origin of some of the units, our recent study shows that more comprehensive data better accord with a low-latitude origin*. The paleomagnetism of the Lorrain Formation, in particular, is central to the issue because it conformably follows the glaciogenic Gowganda Formation and records various remanence components. This red bed unit contains magnetite and hematite that have retained six well defined ancient remanences since their acquisition in the Proterozoic.

In general, Huronian strata are not sufficiently deformed to provide unambiguous fold-tests, except for some overprint magnetizations that are favourably directed and well defined, which prove to be post-folding in age** (e.g., Lorrain components D and F). However, paleomagnetic results for a hematitic breccia at the base of the Lorrain, immediately overlying a paleosol at Ville-Marie, Quebec, further constrain the paleo-latitude of deposition of this important unit.

NRMs of the hematitic breccia are fairly well grouped in the NE quadrant, moderately to steeply downward directed. On thermal demagnetization, most directions become shallower until about 600°C where the direction stabilizes and demagnetizes towards the origin. The more stable component present within the breccia is directed shallowly to the ENE, is carried by hematite and is interpreted to have formed when the breccia was deposited or soon thereafter. Bedding-corrected sample mean directions yield D = 52.1°, I = 70.3°, α_{95} = 2.8°, N = 75 for the lower unblocking temperature

B-component (maximum T_{ub} of $\sim$580°C) and D = 59.5°, I = 2.4°, α_{95} = 6.7°, N = 47 for the high temperature A-component (maximum T_{ub} of 675°C). The latter result implies a low paleolatitude for the Lorrain Formation.

Recent claims of uncertainty in the paleolatitude of the Lorrain Formation*** are based on a paleomagnetic study of a single sample, leading to the mistaken association of the Lorrain D and A components. As we have shown in comprehensive paleomagnetic studies*,**, these components and others are statistically distinguishable, which serves to caution against damning one component on the basis of a field test applied to another completely different component.

* Schmidt & Williams, EPSL 172, 273-285, 1999;

** Williams & Schmidt, EPSL 153, 157-169, 1997;

*** Hilburn et al., Eos, Trans. AGU, 83(47), 2002.