

Intensity of the Geomagnetic Field During Precambrian Time

D J Dunlop [*D J Dunlop*] (Department of Physics, University of Toronto, Toronto, ON L5L 1C6, Canada; ph. 905-828-3968; fax 905-828-5425; e-mail: dunlop@physics.utoronto.ca); Y J Yu (same address)

There are only 16 published Thellier-type paleointensity estimates for Precambrian rocks. Because of the episodic nature of orogenesis, these cluster in a few time intervals: 4 between 1240 and 850 Ma, 3 between 2170 and 1850 Ma, 8 between 2750 and 2450 Ma, and a single earlier Archean result (3500 Ma). Most of the late Archean-early Proterozoic results are from dikes but primary TRM was not demonstrated by baked contact tests, nor were successful paleointensity results obtained from the contact rocks. Two results are from very large intrusions with multiple phases and a long intrusion and cooling history. Late Precambrian results from the very slowly uplifted Grenville Province have an even longer cooling history but the partial TRMs can be dated fairly accurately by Ar/Ar geochronology. The geographic distribution is extremely biased, with almost all results from North America, Greenland and Baltica, and only one study each from Africa and Australia. The African result (Komati, S. Africa) is believed to be from primary TRM but the Australian result (Hamersley, W. Australia) is recognized to be a remagnetization. Numbers of acceptable results are often small and standard deviations large. Despite these limitations, the VADM's for all but three studies lie within a range 0.5-1.5 times the average Phanerozoic field, excluding the last 0.3 Ma, and only two results are conspicuously high ($>10 \text{ E}23 \text{ Am}^2$). There is no obvious record of onset and growth of a dynamo field in the Archean or early Proterozoic.

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