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J. Salminen, R. Klein, T. Veikkolainen, S. Mertanen, I. Mänttari

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Mesoproterozoic geomagnetic reversal asymmetry in light of new paleomagnetic and geochronological data for the Häme dyke swarm, Finland: Implications for the Nuna supercontinent

Salminen, J.^{1*}, Klein, R.¹, Veikkolainen, T.¹, Mertanen, S.², and Mänttari, I.²

(1) Department of Physics, University of Helsinki, P.O. Box 64, 00014 Finland; Johanna.m.salminen@helsinki.fi; robert.klein@helsinki.fi; toni.veikkolainen@helsinki.fi

(2) Geological Survey of Finland, P.O. Box 96, FI-02151 Espoo, Finland; satu.mertanen@gtk.fi; irmeli.manttari@gtk.fi

* Corresponding author

Abstract

Baltica represents one of the key continents of the Mesoproterozoic supercontinent Nuna forming the core of it together with Laurentia and Siberia. This study presents new geochronological and paleomagnetic data obtained for Häme diabase dyke swarm in southern Finland. New U-Pb (baddeleyite) ages 1642 ± 2 Ma and 1647 ± 14 Ma for two reversely magnetized dykes are acquired. Demagnetization revealed a dual polarity remanent magnetization direction carried by magnetite. The combined normal (N) and reversed (R) polarity direction for 11 dykes (=sites) is $D = 355.6^\circ$, $I = -09.1^\circ$ ($k = 8.6$ and $\alpha_{95} = 16.6^\circ$) yielding a paleomagnetic pole at 23.6°N , 209.8°E ($K = 10.6$ and $A_{95} = 14.7^\circ$) with Van der Voo value $Q = 7$. N and R magnetized units for the Häme dyke swarm show asymmetry in declination values, probably caused by an age difference between the dykes. The Geocentric Axial Dipole (GAD) model indicates that all geomagnetic reversals should be symmetric (in inclination), yet it has been noted that this is not always the case (e.g. 1.57 Ga Satakunta and Åland dykes in Baltica). By analyzing global dual polarity paleomagnetic data we show that the GAD model is a valid assumption at 1.7 – 1.4 Ga and that the asymmetry between some

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