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## Mesoproterozoic Nuna Supercontinent and the Geomagnetic Field in Light of Recent Paleomagnetic Data from Diabase Dykes of Finland

Johanna M. SALMINEN<sup>1</sup>, Robert KLEIN<sup>1</sup>, Toni VEIKKOLAINEN<sup>1</sup>,  
Lauri J. PESONEN<sup>1</sup> and Satu MERTANEN<sup>2</sup>

*1 Department of Physics, 00014 University of Helsinki, Finland;*

*2 Geological Survey of Finland, 02151 Espoo, Finland*

The number of good quality paleomagnetic data of the Mesoproterozoic supercontinent Nuna (e.g. Columbia, Hudsonland) has increased in recent years enabling more reliable global continental reconstructions (e.g. Hoffman 1997; Evans and Mitchell 2011; Zhang et al. 2012; Pisarevsky et al. 2014). Supercontinent Nuna included Baltica, Laurentia, Siberia, proto-Australia and Antarctica, Amazonia and West Africa, Congo-São Francisco, North China, Kalahari and India cratons. Baltica and Laurentia are thought to represent two of the most important building blocks of this supercontinent in a single geologically valid NENA (North Europe- North America) juxtaposition between ca. 1.75-1.27 Ga forming the core of Nuna with Siberia (e.g. Gower et al. 1990; Evans and Mitchell 2011).

Recent high quality, precisely dated Mesoproterozoic paleomagnetic poles of Baltica support the NENA connection. These include the pole from Åland ( $1575.9 \pm 3.0$  Ma; U-Pb) diabase dykes (Salminen et al. 2015) and coeval pole from Satakunta diabase dykes (Salminen et al. 2014) in Finland; a pole for the Mesoproterozoic Satakunta sandstones in Finland (Klein et al. 2014); and poles for Lake Ladoga basalts and intrusives ( $1459 \pm 3$ ,  $1457 \pm 2$  Ma; U-Pb) in Russia (Salminen and Pesonen 2007; Lubnina et al. 2010).

One striking feature of the 1.576 Ga high quality paleomagnetic data for Åland and Satakunta is the asymmetry of polarity, i.e. the mean directions of normal (N) and reversed (R) polarities are not antiparallel at 95% confidence level and do not pass the reversal test (McFadden and McElhinny 1990). One possible reason for such an asymmetry could be an unusual behavior of the geomagnetic field at the Mesoproterozoic, which would hamper the paleomagnetic reconstructions.

Antipodality of N and R directions is expected in the case where the geomagnetic field is represented by the geocentric axial dipole (GAD), whereas steepening or shallowing of inclinations can result from the contamination of GAD by zonal multipolar fields. We used 26 global dual-polarity paleomagnetic results from PALEOMAGIA database (Veikkolainen et al. 2014a) to detect possible deviations from the GAD hypothesis (Hospers 1954) applying the quantity called inclination asymmetry (Veikkolainen et al. 2014b). The asymmetry tests indicate that GAD is a relatively good fit at the Mesoproterozoic (1.7-1.4 Ga) and therefore zonal multipolar fields do not explain the observed asymmetry.

One other possible reason for asymmetry is an unremoved secondary component, which could explain the asymmetry for Åland and Satakunta data. Additional support for component mixing comes from the secondary component distribution, which is streaked in part toward the N-polarity direction. A third reason can be a small but significant age difference between N and R magnetized dykes which could explain the asymmetry. However, the actual age span for the Mesoproterozoic dykes for Baltica awaits further precise age dating.

In addition to results from Åland, Satakunta and Lake Ladoga we present here new high quality Mesoproterozoic paleomagnetic and geochronological results from the Häme dykes ( $1642 \pm 2$  Ma,  $1647 \pm 14$  Ma; U-Pb) in Finland that do not show asymmetry. These results also support the NENA connection placing Baltica on equatorial latitudes at 1.64 Ga.

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\* Corresponding author. E-mail: johanna.m.salminen@helsinki.fi

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