

Palaeomagnetic Inclination Error in the Red-beds Deposits: A Contribution from the Ediacaran Sedimentary Rocks of the Western Part of the East European Platform

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Abstract

A primary goal of this palaeomagnetic study was to determine palaeolatitude of the Ediacaran basin, situated at the western part (present-day coordinates) of the East European Platform (EEP).

Palaeomagnetic samples were cut off from 11 unoriented cores, representing coarse-grained siliciclastic rocks, interlayering with basalts of Volyn Series/Group and equivalent – Sławatycze Formation in Poland. The whole sampled section represents ca 570–541 Ma (Late Ediacaran) timespan, practically post-dating the Ediacaran inertial interchange true polar wander hypothetical event (Robert *et al.* 2017). Fine-grained red mudstones of the Pinsk Series (mid-Riphean, 1.7–1.3 Ga) were also investigated.

We have identified components of the natural remanent magnetization (NRM) in 57 out of 83 specimens. On the basis of the inclination of the characteristic NRM components, we have calculated paleolatitudes for the Ediacaran basin, assuming validity of the geocentric axial dipole (GAD) hypothesis. Most of the characteristic NRM components show shallow-to-moderate inclinations, implying low palaeolatitudes, determining palaeogeographic reconstructions in Ediacaran times. However, basaltic rocks yielded steeper inclinations, in line with outcomes of Nawrocki *et al.* (2004). Since basalts and the sediments are nearly coeval, any explanation of inclination difference based on plate tectonics/continental drift may be excluded. We postulate that the difference is caused by the effect of palaeomagnetic inclination shallowing (Li and Kodama 2016). On the other hand, we have found that characteristic NRM for the mid-Riphean mudstones also show low-to-moderate inclinations, but this time in line with inclinations obtained for Subjotnian (1.6–1.3 Ga) volcanics of Scandi-

navia (Pesonen *et al.* 1989). This outcome suggests that a magnitude of the inclination error may be linked with a size of grains of siliciclastic rocks.

We note that many of paleopoles reported in the literature of last two decades comply all of the well-known, seven reliability criteria by Van der Voo (1990). They also imply subequatorial paleolatitudes, similar to our results obtained from the siliciclastic rocks of the EEP. However, observing important difference between palaeomagnetic inclinations obtained by us from sedimentary rocks and coeval basalts, we postulate that some of these results, obtained from sediments, may also be handicapped by a substantial (although varying between the facies) inclination error. Such conclusion is moreover supported by the fact that none of ChRM inclinations, determined for the Late Ediacaran sediments, show higher palaeolatitudes than these shown by Nawrocki *et al.* (2004) for basalts. This casts doubts on the earlier palaeomagnetic results obtained for the coarse-grained sedimentary rocks (specifically with application to Ediacaran palaeogeographic reconstructions), since they may also be affected by this type of error.

Keywords: Ediacaran, paleomagnetism, inclination error, sedimentary rocks.

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