Geophysical Research Abstracts,
Vol. 11, EGU2009-11190-1, 2009
EGU General Assembly 2009

New paleomagnetic data from Bornholm granitoids testing whether the East-European Craton rotated during the 1.50-1.45 Ga Danopolonian orogeny

N. Lubnina (1), S. Bogdanova (2), and A. Cecys (2)

(1) Moscow State University, Geological Department, Russia (natlubnina@yandex.ru), (2) Department of Geology, Lund University, Sweden (svetlana.bogdanova@geol.lu.se, audrius.cecys@gmail.com)

According to the palaeogeographic reconstructions, the East-European Craton (EEC) was part of the Palaeo- to Mesoproterozoic supercontinent Nuna / Columbia (Hoffman, 1997; Rogers and Santosh, 2002). Particularly important was the period between 1.5 and 1.3 Ga, when incipient break-up of this supercontinent occurred (Condie, 2002) but the EEC ("Baltica") still remained in close connection with other continental blocks. During the entire Mesoproterozoic, however, the EEC featured different geodynamic regimes in its presently western and eastern parts. In the west, these were convergent, while rifting prevailed in the east (Bogdanova et al., 2008).

Previously, paleomagnetic studies of the Mesoproterozoic Ladoga Lake mafic rocks in NE Russia and the Dalarna mafic dykes in Sweden have disclosed a regular trend from the older Dalarna dykes to the younger dolerites of Lake Ladoga, suggesting an anticlockwise rotation of about 20 degrees. That rotation could either have affected the entire EEC as a result of the Danopolonian orogeny at ca. 1.50-1.45 Ga or have been associated with local block-displacement events in the Pasha-Ladoga graben (Lubnina et al., 2005, 2007).
In the present study, we have tested these alternative possibilities by carrying out new paleomagnetic studies of Mesoproterozoic granitoids from the Danish island of Bornholm in the South Baltic Sea, which is a key area of the Danopolonian orogeny. On SW Bornholm, the 1.46 Ga Ronne granodiorites, which are cut by NNW trending thin dolerite dykes have been sampled in the Klippelokke quarry. Remanence measurements were performed using a 2G cryogenic magnetometer at the Palaeomagnetic Laboratory of the Department of Geology, Lund University, Sweden. Conventional progressive thermal or alternating field (AF) demagnetizations were applied to all specimens. During the stepwise thermal and AF demagnetization experiments, two components of NRM were isolated in the majority of the granitoid specimens. The low-temperature/coercivity component points to the NE moderate positive inclination. The paleomagnetic pole recalculated from this component (Plat=52.7 Plong=160.7 dp=5.4 dm=3.2) corresponds to ca. 250 Ma poles of the EEC. The second, high temperature/coercivity component points to the NE with shallow negative inclination. The mean direction of this component is Dec=13.9 Inc=-38.5 K=27.6 a95=6.7. The paleomagnetic pole is close to the poles obtained from the Mesoproterozoic Lake Ladoga and Dalarna mafic rocks.

The mafic dyke cutting the Ronne granitoids demonstrates mainly one stable high-temperature/coercivity component with the NE moderate positive inclination. The mean direction of this component (Dec=21.7 Inc=41.9 K=87.3 a95=5.2) is similar to that of the low-temperature component of the granitoids. Therefore it correlates with the Permo-Triassic poles of the EEC. The baked granitoids show the same stable component as the mafic dyke. Thus, the positive indirect contact test evidences a primary origin of the high-temperature component in the host granitoids, which is also supported by the close coincidence of the obtained Mesoproterozoic pole with the coeval poles of the Dalarna and Lake Ladoga rocks.
The newly obtained paleomagnetic data from the 1.46 Ga Bornholm granitoids favour an anticlockwise rotation of the entire East-European Craton as a probable consequence of the Danopolonian orogeny. However, some local rotation of different blocks within the EEC like those in the Pasha-Ladoga graben cannot be ruled out entirely.

This is a contribution to the project "The Precambrian structure of Baltica as a control of its recent envi-

ronment and evolution" of the Visby Programme (the Swedish Institute) and RFBR project 07-05-01140, a.

References

Bogdanova, S. et al., 2008. Precambrian Research 160, 23-45.
Condie, K.C., 2002. Gondwana Research, 5(1): 41-43.
Hoffman, P.F., 1997. In: Earth Structure: an Introduction to Structural Geology and Tectonics, New York, pp. 459-464.
Lubnina, N. et al., 2005. In: Supercontinents and earth evolution Symposium 2005, Geol. Soc. Aust., p.75.
Lubnina, N. et al., 2007. Geophys. Res. Abstracts, EGU2007-A-08308.
Rogers, J.J.W. and Santosh, M., 2002. Gondwana Research, 5(1): 5-22.