Post Early Miocenevertical-axis clockwise rotation in the West Vardar Zone of Serbia

Vesna Lesić, Emo Marton, Vesna Cvetkov, Dragana Jovanović

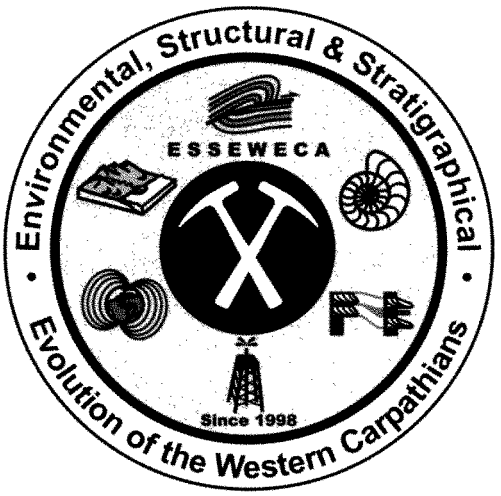
Structural &

ESSEWECA

Since 1998

Environmental, Structural and Stratigraphical Evolution of the Western Carpathians

Abstract Book



11th ESSEWECA Conference
29th - 30th November 2018
Bratislava, Slovakia

Edited by:

RNDr. Michal Šujan, PhD.

Mgr. Tamás Csibri

Mgr. Peter Kiss

Mgr. Samuel Rybár, PhD.

Department of Geology and Paleontology
Faculty of Natural Sciences
Comenius University in Bratislava, Slovakia

Conference was organized by:

Geological Club, Bratislava
with support of the Slovak Geological Society

United Nations Educational, Scientific and Cultural Organization

Slovak Commission for **UNESCO**

Slovenská komisia pre **UNESCO**

The conference is under the auspices and financial support of the Slovak Commission for UNESCO.

Scientific guarantee:

Department of Geology and Paleontology, Faculty of Natural Sciences

Comenius University in Bratislava

Scientific board:

Prof. RNDr. Daniela Reháková, CSc.
Prof. RNDr. Dušan Plašienka, DrSc.
Prof. RNDr. Michal Kováč, DrSc.

Organising committee:

RNDr. Michal Šujan, PhD.
Mgr. Tamás Csibri
Mgr. Margaréta Gregáňová
Mgr. Peter Kiss
Mgr. Samuel Rybár, PhD.
Mgr. Leonard Zahradník

ISBN: 978-80-223-4614-6

Post Early Miocene vertical-axis clockwise rotation in the West Vardar Zone of Serbia

VESNA LESIĆ[1], EMŐ MÁRTON[2], VESNA CVETKOV[3] and DRAGANA JOVANOVIĆ[1]

1 – Republic Geodetic Authority, Department of Geomagnetism and Aeronomy, Bulevar vojvode Mišića 39, 11000 Belgrade, Serbia

2 – Mining and Geological Survey of Hungary, Paleomagnetic Laboratory, Columbus utca 17-23, H-1145 Budapest, Hungary

3 – University of Belgrade – Faculty of Mining and Geology, Department of Geophysics, Djusina 7, 11000 Belgrade, Serbia

The Vardar-Tethyan mega-suture lies between the Eurasian and Gondwana margins. It is composed of remnants of obducted ophiolites and ophiolite mélange, distal parts of adjacent continental margins and post-obduction Late Cretaceous sediments and Cenozoic igneous rocks. The area covered by this study belongs to the West Vardar and Jadar-Kopaonik units *sensu* Schmid et al. (2008). In this 160 km long strip we sampled on the north in the wider Rudnik Mts. area seven localities of Late Cretaceous micritic limestones and one locality of flysch and seventeen sites of Oligocene-Earliest Miocene igneous rocks of different composition. In the south, in the wider Kopaonik Mts. Area we sampled eight sites of dacitoandesites and fifteen localities of granodiorites both of Oligocene age. Samples were drilled and oriented in situ both by magnetic and sun compasses.

In the laboratory samples were cut into standard size specimens, then subjected to standard paleomagnetic measurements which included the measurement of the natural remanent magnetization, followed by the measurement of anisotropy of magnetic susceptibility and stepwise thermal and alternating field demagnetization of pilot specimens. According to the behavior of the pilot specimens during demagnetization it was chosen which method was used to demagnetize the rest of the specimens from each locality/site. Magnetic mineralogy experiments were carried out on selected specimens. The demagnetization curves were then analyzed for linear segments which were used for statistical evaluation on locality/site level. The fold/tilt test was carried out on locality (when applicable) and regional level.

The obtained results show that the remanent magnetization both in the igneous rocks and sediments resides in magnetite. The locality mean directions for Late Cretaceous sediments are well defined and the remanence is of post tilting age. For both the Oligocene-Earliest Miocene and Oligocene igneous rocks (Rudnik Mts. area and Kopaonik Mts. area, respectively) localities/sites mean directions are also well defined. Although, they are somewhat scattered, the overall-mean directions for both groups are statistically well defined.

The conclusions which can be drawn out from our results are that the overall-mean directions and their statistical errors for the Late Cretaceous sediment localities and Oligocene-Earliest Miocene igneous sites from the Rudnik Mts. area and the Oligocene igneous localities/sites from the Kopaonik Mts. area indicate uniform rotations. The directions point to a 30-46°

clockwise vertical-axis rotation which must have occurred after 20 Ma since this is the upper K/Ar age limit of the igneous rocks. Opposite to this sense of rotation, the Adria rotated in the last 20 Ma in the counterclockwise sense (Márton 2006; Márton et al., 2011; Márton et al., 2017). Both of these vertical-axis rotations can be responsible for the large-scale extension in the southern Pannonian basin.

Acknowledgement: This work was supported by the Ministry of Science and Education of Serbia (Project No 176016) and by the Hungarian Scientific Research Fund OKTA K105245.

References:

Márton, E. 2006. Paleomagnetic evidence for Tertiary counterclockwise rotation of Adria with respect to Africa. *In:* Pinter, N., Grenerczy, Gy., Weber, J., Stein, S. & Medak, D. (Ed.). *The Adria microplate: GPS Geodesy, Tectonics and Hazards. NATO Science Series IV, 6,* 71–80.

Márton, E., Zampieri, D., Kázmér, M., Dunkl, I. & Frisch, W. 2011. New Paleoce-Eocene paleomagnetic results from the foreland of the Southern Alps confirm decoupling of stable Adria from the African plate. *Tectonophysics* 504, 89–99.

Márton, E., Zampieri, D., Ćosović, V. Moro, A. & Drobne, K. 2017. Apparent polar wander for Adria extended by new Jurassic paleomagnetic results from stable core: Tectonic implications. *Tectonophysics 700–701*, 1–18.

Schmid, S.M., Bernoulli, D., Fügenschuh, B., Matenco, B., Schefer, S., Schuster, R., Tischler, M. & Ustaszewski, K. 2008. The Alpine – Carpathian – Dinaric orogenic system: correlation and evolution of tectonic units. *Swiss Journal of Geoscience* 101, 139–183.