



First magnetostratigraphic results of the Berriasian in the Western Balkan Mts, Bulgaria

Първи магнитостратиграфски резултати за Бериаския етаж в Западна Стара планина, България

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Introduction and previous studies

The purpose of this integrated magnetostratigraphic and calpionellid study of the Upper Berriasian in Bulgaria is to provide data on magnetic polarity zones directly tied to calpionellid bioevents and zonation. The lower Berriasian and the Upper Tithonian have been largely worked in terms of magnetostratigraphy and calpionellids in the Western Tethyan Realm in relation to definition of the base of Berriasian (Grabowski, 2011).

The Upper Berriasian magnetostratigraphy remains only scarcely presented in the literature. Earlier results of magnetic polarity zones integrated to calpionellids were from the Southern Alps in Italy (Channell, Grandesso, 1987) where magnetozones from M19n to M13r were correlated with the first occurrences (FO) of subzonal calpionellid index-species, e.g. the sections of Xausa and Frisoni. Grabowski and Pszczółkowski (2006) and Grabowski et al. (2013) published magnetic zones from M18r to M16n correlated with calpionellids in the Pośrednie III and Rówienka sections, Tatra Mts in Poland. Berriasian magnetic zones from M19n to M17n were recorded integrated with calpionellids in the Hlboča section in the Carpathian Mts in Slovakia (Grabowski et al., 2010).

Upper Berriasian magnetic polarity zones integrated with nannofossils are known from the Southern Alps in Italy: Bosso and Arcevia sections (Speranza et al., 2005), Foza and Frisoni sections (Channell et al., 2010).

Results and conclusion

Subject of the present study is the lower part of the Salash Formation in Barlya section, Western Balkan Mts. Calpionellid biostratigraphy (Lakova, Petrova, 2013) has shown mid to Late Berriasian age of the part chosen for magnetostratigraphic examination. A 36-m thick interval has been sampled, the lower 5–6 m representing a transition between the Glozhene and Salash formations, and the rest – the basal part of typical Salash Formation, that is thin-bedded alternation of micritic and clayey limestones with chert nodules. Samples for magnetic studies have been collected at average intervals of 0.25 m, and calpionellid samples – at average intervals of 1.0 m from the drill core.

Magnetozones from M17r to M16n have been recovered. These correlate with the calpionellid Elliptica, Simplex and Oblonga subzones. Previous results have confirmed that the FO of *Calpionellopsis simplex* is in M16r and the FO of *Calpionellopsis oblonga* – in M16n. Fig. 1 shows correlation of GPTS for the Berriasian (Gradstein et al., 2012), previously reported Upper Berriasian magnetic zones and calpionellids and the preliminary results of Barlya section. The presence of M15r magnetozone is disputable and its presence must be confirmed in subsequent studies of the upper part of Salash Formation.

Even the base of Berriasian was shifted upper in the latest GTS (Gradstein et al., 2012) at the base of M18r as a working proposal of defining the J/Cr boundary it did not change the volume of the Upper Berriasian

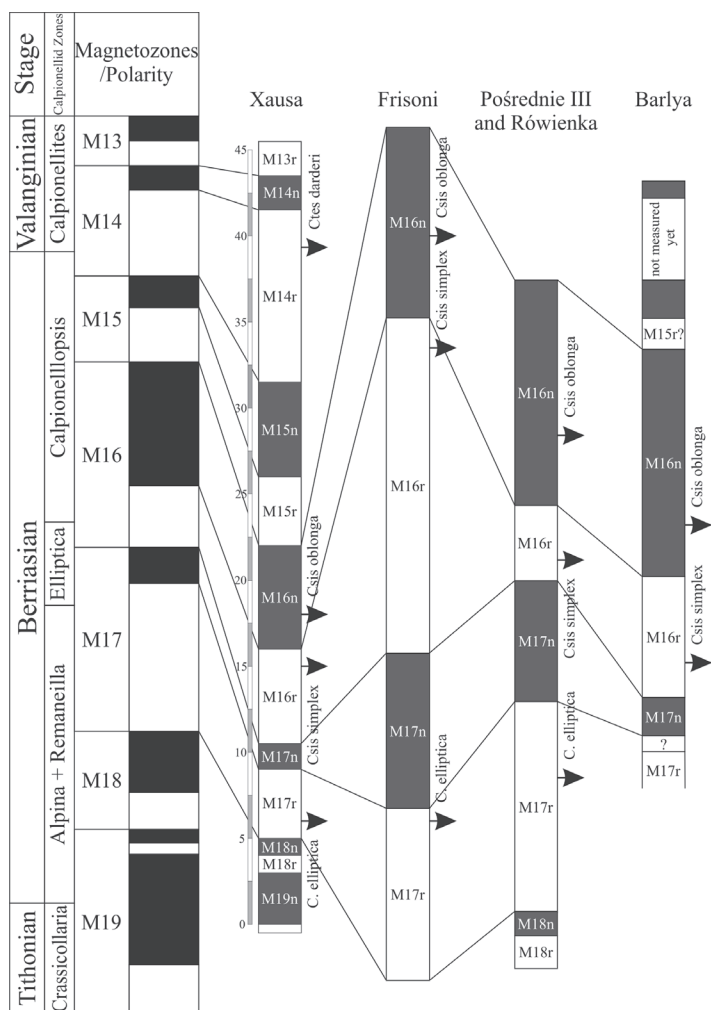


Fig. 1. Correlation of the GPTS with the Upper Berriasian magnetic zones and calpionellid events of Barlya section and sections of Italy and Poland

as involving magnetic polarity zones from M16r to M14r, Boissieri ammonite zone and its equivalent the Calpionellopsis Zone. Magnetostratigraphy of the Barlya section is to be completed in order to cover the Berriasian/Valanginian boundary interval.

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References

- Channell, J. E. J., C. E. Casselato, G. Muttoni, E. Erba. 2010. Magnetostratigraphy, nannofossil stratigraphy and apparent polar wander for Adria – Africa in the Jurassic–Cretaceous boundary interval. – *Palaeogeogr., Palaeoclimat., Palaeoecol.*, 293, 51–75.
- Channell, J. E. T., P. Grandesso. 1987. A revised correlation of the Mesozoic polarity chrons and calpionellid zones. – *Earth and Planetary Sci. Letters*, 85, 203–221.
- Grabowski, J. 2011. Magnetostratigraphy of the Jurassic/Cretaceous boundary interval in the Western Tethys and its correlations with other regions: a review. – *Volumina Jurassica*, 9, 105–128.
- Grabowski, J., J. Michalík, A. Pszczółkowski, O. Lintnerová. 2010. Magneto- and isotope stratigraphy around the Jurassic/Cretaceous boundary in the Vysoká unit (Malé Karpaty Mountains): correlations and tectonic implications. – *Geol. Carpathica*, 61, 4, 309–326.
- Grabowski, J., A. Pszczółkowski. 2006. Magneto- and biostratigraphy of the Tithonian-Berriasian pelagic sediments of the Tatra Mountains (central Western Carpathians, Poland): sedimentary and rock magnetic changes at the Jurassic/Cretaceous boundary. – *Cretaceous Res.*, 27, 398–417.
- Grabowski, J., J. Schnyder, K. Sobieñ, L. Koptíková, L. Krzemiński, A. Pszczółkowski, J. Hejnar, P. Schnabl. 2013. Magnetic susceptibility and spectral gamma logs in the Tithonian-Berriasian pelagic carbonates in the Tatra Mts (Western Carpathians, Poland): Palaeoenvironmental changes at the Jurassic/Cretaceous boundary. – *Cretaceous Res.*, 43, 1–17.
- Gradstein, F., J. Ogg, M. Schmitz, G. Ogg. 2012. *The Geological Time Scale*. Elsevier B.V., 1144 p.
- Lakova, I., S. Petrova. 2013. Towards a standard Tithonian to Valanginian calpionellid zonation of the Tethyan Realm. – *Acta Geologica Polonica*, 63, 2, 201–221.
- Speranza, F., S. Satolli, E. Mattioli, F. Calamita. 2005. Magnetic stratigraphy of the Kimmeridgian–Aptian sections from Umbria-Marche (Italy): New details on the M polarity sequence. – *J. of Geophys. Res.*, 110, B12109, doi: 10.1029/2005JB003884.