

Bukovo delta sediments as witness of climate and tectonic changes (SE Serbia, Dacian Basin)

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100th Anniversary of the Carpathian-Balkan Geological Association

**XXII International Congress of the
Carpathian-Balkan Geological Association
(CBGA)**

ABSTRACTS

Geologica Balcanica

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Bukovo delta sediments as witness of climate and tectonic changes (SE Serbia, Dacian Basin)

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A small portion of the Eastern Paratethys and its successor, the Dacian Basin, could be found east of the Southern Carpathians, near the Serbia-Bulgaria-Romania national borders. Previously, these sediments were only sporadically studied (Stevanović, 1980, Krstić *et al.*, 1992, among others), since most of the attention has been given to the prolific hydrocarbon Pannonian Basin to the west. Nevertheless, Bukovo delta sediments are important for the basin interconnectivity and as climate indicator and for regional event correlation. It is well-known that the Dacian endorheic basin water budget was under the strong influence of the regional climate and that the basin underwent significant water-level fluctuations (Lazarev *et al.*, 2020).

The Bukovo delta sediments are settled on the west Dacian Basin rim, which was affected by tectonic impact and constant uplift of the southern part of the Carpathians during the middle and late Miocene. Delta sediments crop out at two localities: Bukovo Stream and above the Bukovo Monastery. The Bukovo Stream coarse grained delta sediments of Khersonian age end up with a caliche horizon which points to a change in depositional environment and dry climate conditions dated at 8.6–8.4 Ma in Romania (Palcu *et al.*, 2019). The macrofauna is represented by *Mactra caspia*, *M. bulgarica*, *M. balcica*, *Congeria panticapea*, *Hydrobia turicaspia*, *Gibbula podolica*, *Pirenella disjuncta*, *Melania escheri*, etc. The given macrofauna association could allow recognition of *Mactra bulgarica* and *M. caspia* zones in the Lower Khersonian deposits.

A 500-m-thick section of the Meotian delta system above the Bukovo Monastery, dated by magneto-biostratigraphy at 7.65–7.5 Ma in the Romanian part of the Dacian Basin (Palcu *et al.*, 2019), represents a change in climate conditions towards a more humid one. The following mollusc fauna was found: *Psilounio subrecurvus subrecurvus*, *P. subrecurvus porrectus*, *Congeria beregovi*, *C. panticapaea bulgarica*, *Teisseyrinia serbica*, *Turicaspia korobkovi*, *Theodoxus stefanescui*, etc.

The Bukovo coarse-grained sediments rich in shallow-water fauna points to a littoral environment close to the material source, while foresets and topsets are indicators of delta environments. The presence of two different age deltaic systems (within a 1 km radius) separated by the Great Khersonian drying event indicates a highly dynamic area in terms of both tectonic activity and climate change.

Acknowledgements. This study was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (No. 451-03-68/2022-14/ 200126)

REFERENCES

- Krstić, N., Mihelčić, V., Dodiković, S. 1992. Gornjemeotski peskoviti sedimenti kod Bukova (Negotin). *Radovi Geoinstituta* 26, 148–158 (in Serbian).
- Lazarev, S., de Leeuw, A., Stoica, M., Mandić, O., van Baak, C.G.C., Vasiliev, I., Krijgsman, W. 2020. From Khersonian drying to Pontian “flooding”: late Miocene stratigraphy and palaeoenvironmental evolution of the Dacian Basin (Eastern Paratethys). *Global and Planetary Change*, 192, 103224.
- Palcu, D.V., Vasiliev, I., Stoica, M., Krijgsman, W. 2019. The end of the Great Khersonian Drying of Eurasia: Magnetostratigraphic dating of the Maeotian transgression in the Eastern Paratethys. *Basin Research* 31 (1), 33–58.
- Stevanović, P. 1980. Prinove za stratigrafiju i paleontologiju meotskog i panonskog kata u Srbiji i Bosni. *Geološki Anali Balkanskoga Poluostrva* 43–44, 97–140 (in Serbian).

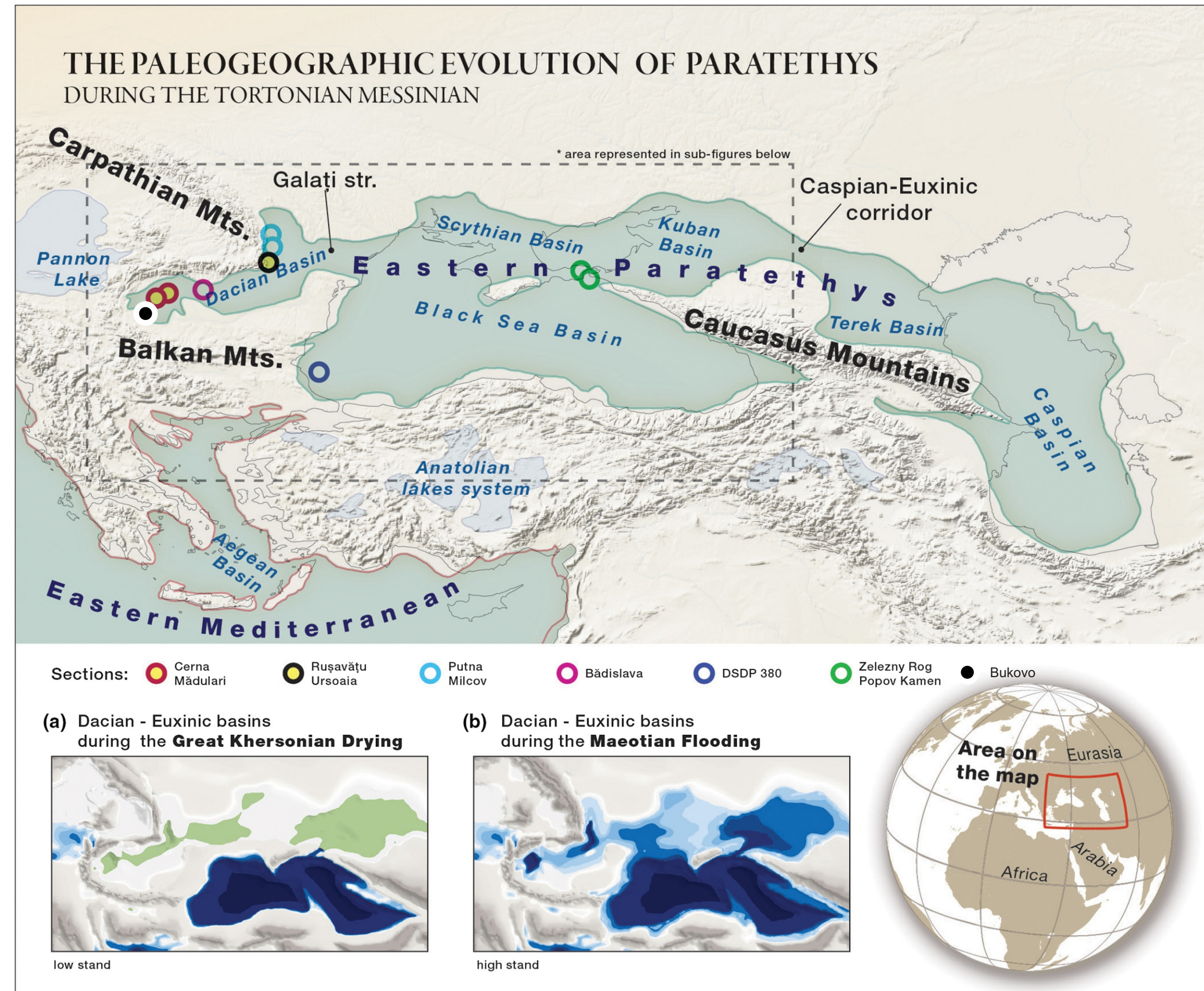
BUKOVO DELTA SEDIMENTS - WITNESS OF CLIMATE AND TECTONIC CHANGES (SE SERBIA, DACIAN BASIN)



RADIVOJEVIĆ Dejan¹, GANIĆ Meri¹ & RADONJIĆ Miloš¹

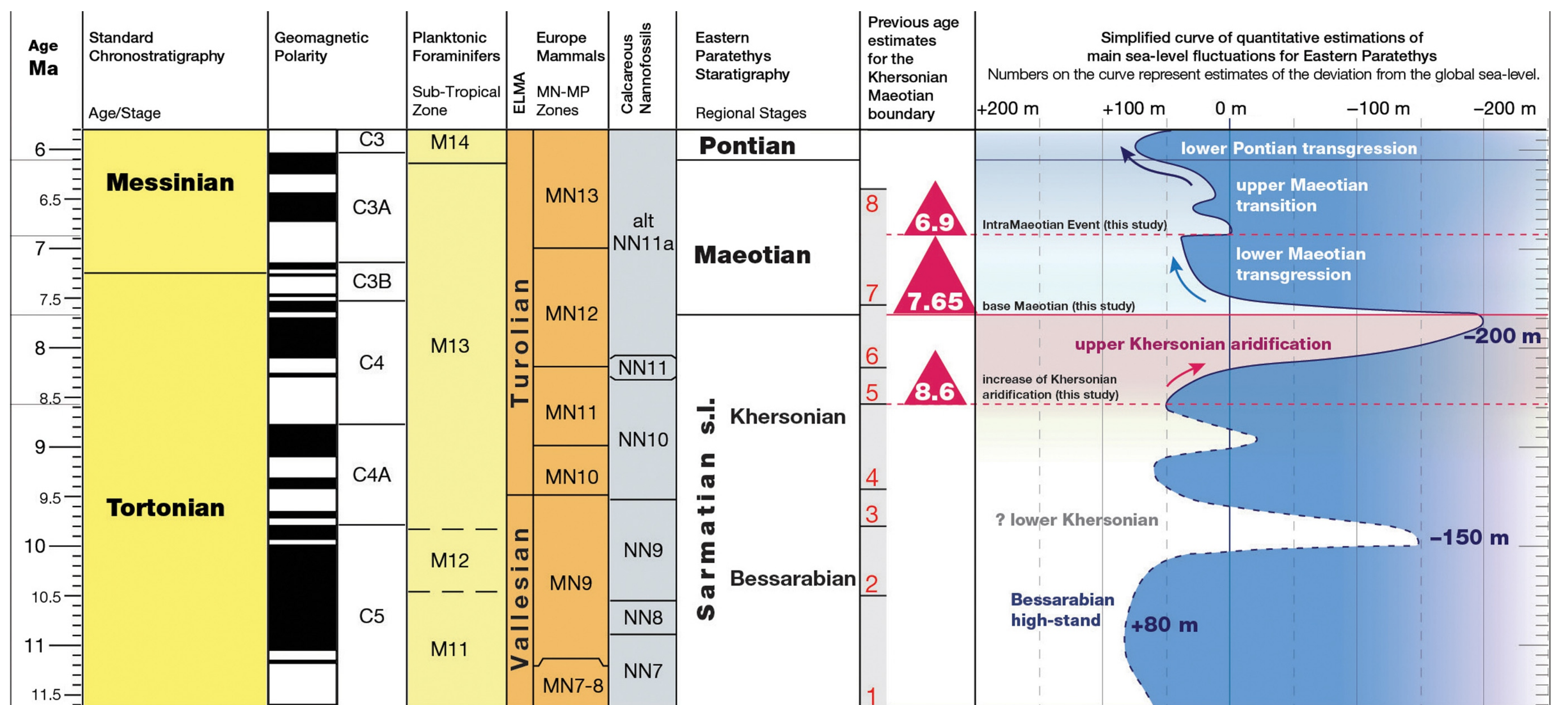
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A small portion of the Eastern Paratethys and its successor Dacian Basin could be found east of the Southern Carpathians, near the Serbia-Bulgaria-Romania national borders. So far, these sediments have been sporadically studied (Stevanović 1980, Krstić et al., 1992 among others) since most of the attention has been given to the prolific hydrocarbon Pannonian Basin to the west.



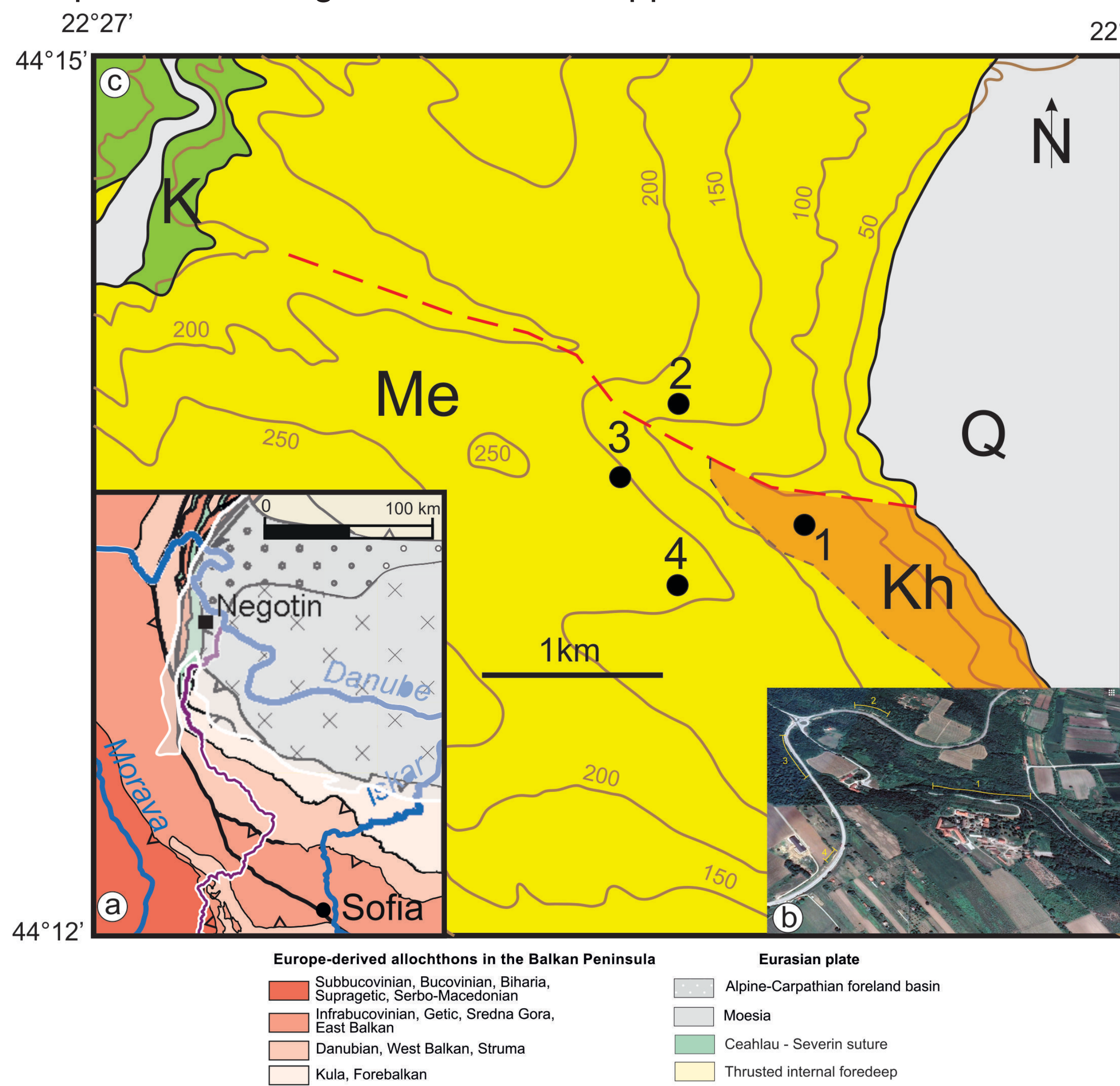
The palaeogeography of the Paratethys realm during the late Tortonian – early Messinian and their palaeoenvironments (from Palcu et al., 2018). Medallions show the contracted (a) and expanded (b) Paratethys basin

Nevertheless, Bukovo delta sediments are important not just for basin interconnectivity but also as climate indicator and for regional event correlation. It is well-known that the Dacian endorheic basin water budget was under the strong influence of the regional climate and that the basin undergo significant water-level fluctuations (Lazarev et al., 2020).



Late Miocene stratigraphy of the Mediterranean and Paratethys (from Palcu et al., 2018)

The Bukovo delta sediments are settled on the west Dacian Basin rim, which was affected by tectonic impact and constant uplift of the southern part of the Carpathians during the middle and upper Miocene. Delta sediments were discovered at two locations: Bukovo Stream and above Bukovo Monastery.



Excerpt of Tectonic map of Dacia Unit and adjacent areas. The white line marks the Miocene sediments of the Dacian basin. b – Location map with sections position (yellow lines). c – Geological map of investigated area based on the Basic Geological Map of Yugoslavia. K – Cretaceous (Valanginian + Hauterivian), Kh- Khersonian, Me- Meotian, Q - Quaternary. Black dots mark the position of sections.

The Bukovo Stream coarse grained delta sediments of the Khersonian Age end up with a caliche horizon which points to a change in depositional environment and dry climate conditions dated at 8.6–8.4 Ma in Romania (Palcu et al., 2019).



Khersonian section, Bukovo Stream

The macrofauna of *Macra caspia*, *M. bulgarica*, *M. balcica*, *Congeria panticaepea*, *Hydrobia turicaspia*, *Gibbula podolica*, *Pirenella disjuncta*, *Melania escheri* etc. The given macrofauna association could allow division to *Macra bulgarica* and *M. caspia* zones within Lower Khersonian deposits.



Lower Khersonian fossil assemblage

A 500 m long section of the Meotian Age delta system above Bukovo Monastery, dated by magneto-biostratigraphy at 7.65-7.5 Ma in the Romanian part of the Dacian Basin (Palcu et al., 2019), represents the change in climate conditions toward a more humid one. The following fauna was found: *Psilounio subrecurvus subrecurvus*, *P. subrecurvus porrectus*, *Congeria beregovi*, *C. panticaepea bulgarica*, *Teisseyrinia serbica*, *Turicaspia korobkovi*, *Theodoxus stefanescui* etc.



Meotian fossil assemblage



Meotian sections, number 2-4, Bukovo Monastery.

Conclusions

The Bukovo coarse-grained sediments rich in shallow-water fauna points to a littoral environment close to the material source, while foresets and topsets are indicators of delta environments.

The presence of two different age deltaic systems (within a 1 km radius) separated by the Great Khersonian drying event indicates a highly dynamic area in terms of both tectonic activity and climate change.



Caliche horizon in Khersonian sediments.

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Reference

- Krstić, N., Mihelčić, V. i Dodiković, S., 1992. Gornjemeotški peskoviti sedimenti kod Bukova (Negotin). Radovi Geoinstituta, 26, 148-158, Beograd.
- Lazarev, S., de Leeuw, A., Stoica, M., Mandic, O., van Baak, C.G.C., Vasiliev, I., Krijgsman, W. 2020. From Khersonian drying to Pontian "flooding": late Miocene stratigraphy and palaeoenvironmental evolution of the Dacian Basin (Eastern Paratethys). Global and Planetary Change, 192, doi:10.1016/j.gloplacha.2020.103224.
- Palcu D. V., I. Vasiliev, M. Stoica, W. Krijgsman 2019. The end of the Great Khersonian Drying of Eurasia: Magnetostratigraphic dating of the Maeotian transgression in the Eastern Paratethys, Basin Research, 31(1), 33–58
- Stevanović, P., 1980. Prinove za stratigrafiju i paleontologiju meotskog i panonskog kata u Srbiji i Bosni. Geološki anali Balkanskoga poluostrva, 43-44, 97-140.