Palaeoclimate reconstructions for the Late Miocene in the Southeast Bulgaria using pollen data from the Tundzha Basin

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The results of palaeoclimate reconstructions of Neogene freshwater deposits of the Tundzha Basin (South Bulgaria, SE Europe) are presented. We analysed pollen and spores complexes with the aim of obtaining data about the climate conditions. The palynological analysis was performed on clayey sediments of the Elhovo Formation intercalated between coal layers from core C-432 situated in the central part of the Basin. The climate data reconstructed by the Coexistence Approach indicate a warm temperate climate with mean annual temperatures around 16 ºC and with mean temperature of at least 5 ºC during the coldest month. With annual precipitation rates commonly around 1000 mm climatic conditions were overall humid. Partly seasonally drier conditions suggested for the topmost part of Elhovo Formation by previous studies, were not evident from recent analyses. The Early Pontian climate was about 3-4°C warmer than today, with rainfalls at least 300 mm higher. These data coincide with the warming trend recognised in other regions in Bulgaria during the Early Pontian. Thus the data from current study contribute to the elucidation of the evolution of the local and regional Late Miocene climate patterns and contribute to the palaeoclimate model for the Balkan Peninsula.

Upper Jurassic – Lower Cretaceous platform-to-basin integrated stratigraphy across the Bulgarian/Serbian border

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This report presents the results of integrated microfossil biostratigraphy, facies and microfacies analyses with the purpose of age determination, correlation and tracing out of the carbonate platform-to-basin transition in the Callovian to Valanginian carbonate sequences across the Bulgarian – Serbian border.

The Upper Jurassic and Lower Cretaceous are of wide occurrence in the western Bulgaria and eastern Serbia. The sediments deposited in a bathymetrically differentiated basin, associated with the gradual emergence of the southern landmass and the formation of the Central Moesian Basin. The shallow-water sections are located in the southwestern prolongation of the Western Moesian Carbonate Platform and belong to the West Srednogorie Unit (Bulgaria) and Vidlić/Tepoš Zone (Serbia). The main part of the carbonate platform is represented by the limestones of the Slivnitsa Formation (Bulgaria) and the Crni Vrh Limestones (Serbia). Both formations are built up by thick-bedded to massive light grey to whitish organogenic and less common micritic limestones containing a large number of benthic foraminifers and algae, colonial corals, rudists, brachiopods, crinoids, gastropods and other benthic forms. The age interval is Callovian to Valanginian based on foraminifera and calcareous dinocyst. Six successive foraminiferal zones are recorded. Seven facies (facial zones) with specific microfacies types are superposed within the platform carbonates: homoclinal ramp (peloidal); reef and perireef (bioclastic); subtidal lagoon (nonfossiliferous and oncoidal), intertidal flat (fenestral and foraminiferal); subtidal lagoon (foraminiferal); reef

(*Bacinella* and *Lithocodium*) and slope (bioclastic). The carbonate platform deposits are covered by the clayey limestones and marls of the Salash Formation of Valanginian to Early Hauterivian age.

The Callovian to Valanginian peri-platform pelagic carbonates were deposited on the northern Tethyan continental margin. In the Western Balkan Unit (Bulgaria) the pelagic record consists of the sediments of the Yavorets, Gintsi and Glozhene formations. Their correlatives in the Stara Planina-Poreć Zone (Serbia) are Kamenica, Pokrovenik and Rosomać formations. These are micritic and clayey nodular pelagic limestones formed in relatively deep basin conditions under quite low rates of sedimentations. Starting from the Late Berriasian, the basinal carbonate accumulation was quickly replaced by hemipelagic alternation of clayey limestones and marls which continued up to the Hauterivian (Salash Formation in western Bulgaria and Ržana Formation in eastern Serbia). Diverse ammonites and planktonic microfossils such as calcareous dinocysts, calcareous nannofossils and calpionellids were applied for detail zonations, stage and substage subdivisions. For the Oxfordian–Valanginian interval twelve calcareous dinocyst zones, five calcareous nannofossil zones and seven calpionellid zones are recorded. In the basin facies six microfacies within the pelagic carbonates are superposed: filamentous, *Globuligerina*-Radiolarian, *Saccocoma*, *Globochaete* and calpionellid and spicule microfacies. Stable sedimentary environment persisted during the whole Late Jurassic. Since the Late Berriasian a clear bathymetrical tendency occurred in the pelagic carbonates from west to east – platform slope, basin and a periphery of flysch trough.

The carbonate platform sedimentation started with the formation of a homoclinal ramp in the Callovian and passed through a rim platform during the early Kimmeridgian. The platform evolution includes three main stages – stepwise progradation, aggradation and retrogradation during the late Kimmeridgian to Valanginian. The phase of platform drowning started in distal portions of the platform. The drowning phases are documented by erosional surfaces, hiatuses and condensed glauconitic beds. The drowning of the platform shows westward youngering from the earliest to Late Valanginian.

Fossilized microorganisms preserved as fluid inclusions in epithermal veins, Vani Mn-Ba deposit, Milos Island, Greece

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Fossilized microorganisms preserved as fluid inclusions are found in barite–silica-Mn oxide veins in the marine rift basin-related Quaternary Mn-Ba deposit of Vani, Milos. Basin fill consists of 35-50 m thick sequence of glauconitic sediments sandwiched between volcaniclastic sandy tuffs, and bedding-parallel barite–Mn oxide(–silica) horizons, pebble horizons, and massive gravel. Exhalative barite-rich deposits characteristic of sea-floor venting, such as white smoker (sulphate) structures in glauconitic sediments, feeder veins, bedding-conformable horizons, and extensive microbial mat- related structures in sandy tuffs, were recognized. The feeder veins host the microfossils and consist chiefly of banded barite and minor colloform quartz, Fe-oxyhydroxides, and hollandite-group minerals and MnO_2 phases, and display epithermal textures characteristic of open-space precipitation. Curvi-linear, branched filamentous microfossils with distinct segmentation of septa and a turgid appearance of knob-like outgrowths occur associated with spheroidal spore-like microfossils and small twisted microstructures. Both filamentous and spheroidal microstructures are filled with aqueous (liquid ± vapour) and/or hydrocarbon phases. Oil and solid hydrocarbons in the fluid inclusions may represent decomposed biological material. Chitin was detected by the pigment Wheat Germ Agglutinin conjugated with Fluorescein Isothiocyanate (WGA-FITC) in