

Organic and inorganic geochemistry of Miocene sediments from the Lopare Basin (Bosnia and Herzegovina)

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The organic and inorganic geochemical composition of mainly marlstones associated with lacustrine evaporites from the Miocene piggy-back Lopare Basin, Bosnia and Herzegovina of Internal Dinarides, was investigated. This basin belongs to the Miocene Dinaric Lake system. The testing was conducted on total of 46 samples originating from two boreholes Pot 1 (depth of 193 m) and Pot 3 (depth of 344 m). The results show that the average element abundances of these two boreholes like B (668 ppm), Li (302 ppm), Sr (500 ppm), U (67 ppm), Cr (192 ppm), Ni (164 ppm), MgO (4.84 ppm), Na₂O (4.80 ppm) and CaO (9.83 ppm) are much higher than in the average of the upper continental crust (Taylor and McLennan, 1985; McLennan, 2001). These chemical compositions may result from at least two different sources: (i) ophiolites (oceanic source) occurring in the neighborhood in the north; and (ii) a reworked dacitic-andesitic pyroclastics source mixed with other continental basement components.

The sedimentation is influenced by strong evaporation resulting in a partly hypersaline lake, which formed either during a warm climatic period, the Miocene Climatic Optimum, or during the subsequent Badenian salinity crisis, a cool period. A brief episode of humid climate conditions resulted in filling-up of the basin and deposition of felsic sediments with Th enrichment. The organic geochemistry shows that the majority of investigated sediments contains predominantly immature to marginally mature algal organic matter deposited under anoxic and saline/hypersaline conditions. Values of geochemical saline and hypersaline indicators are: high Sr/Ba ratios (average value is 19.56), the average value for squalane/n-C₂₆ alkane ratio is 3.73, C₂₈ sterane average content accounts 30.56 % in total distribution of C₂₇–C₂₉αα(R) regular sterane homologues, gammacerane index average value is at 1.74, relative content of β-carotane in the overall distribution of hydrocarbons is at 7.00%, while isoprenoid alkanes in the range of C₂₁–C₂₅ are abundant. The paleoenvironmental indicators such as C-value, Sr/Ba, U/Th and organic geochemical parameters suggest that the investigated sediments of the Lopare Basin contain predominantly immature to marginally mature algal organic matter deposited under anoxic, saline to hypersaline conditions during arid/semiarid conditions. The source input of organic matter is mainly controlled by primary bioproductivity and arid climate whereas its preservation is closely related to stratified water column and highly reducing bottom water conditions during deposition. The stratified water column due to salinity/hypersalinity with anoxic conditions in the bottom water enhanced the preservation of organic matter.

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