Rogoznica Lake as a proxy for biogeochemical processes in euxinic marine environment

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Rogoznica Lake is a typical example of euxinic marine environment that depending on meteorological conditions fluctuates between anoxic holomictic and meromictic conditions. The lake is a small and shallow (10276 m^2, 15 m deep), naturally intensely eutrophicated karstic seawater lake situated on the Adriatic coast, Croatia (43°32'N, 15°58'E).

During the thermohaline stratification (spring, summer) the surface water is well-oxygenated while anoxia is occurring in the bottom layer. Anoxic deep water is characterized by high concentrations of reduced sulfur species (RSS, up to 5 mM, mainly in the form of sulfide); nutrients (NH_4^+, up to 350 uM; PO_4^{3-}, up to 53 uM; SiO_4^{4-}, up to 680 uM) and DOC (up to 6 mg/l) and POC (up to 4 mg/l) as a result of the pronounced remineralization of allochthonous organic matter produced in the surface water.

Geochemical, mineralogical, sedimentological and microbiological analyses have been made to view the difference between oxic and anoxic conditions in water column and sediment of the Lake. Due to relatively high accumulation rate of organic matter, and delicate exchange of water, the lake has almost permanent anoxic conditions below the depth of 12 m, and can be characterized as anoxic-sulphidic i.e. euxinic sedimentation environment. Changes in redox condition of the water column as well as sediments with depth affect the distribution and speciation of major redox-sensitive metals (Fe, Mn, Mo, U, V), RSS and dissolved organic C (DOC). In anoxic conditions sediment enrichment of trace metals that accumulate in sulfidic environment (Fe, Mo, V) is observed. Regarding the sedimentary enrichment of Mo (up to 81 mg/kg) the Rogoznica lake can be characterized as a typical anoxic and meromictic environment. Water column fluctuations between anoxic holomictic and meromictic conditions greatly influence biogeochemical procesess, water column distribution and deposition of major redox sensitive elements visible through seasonall records of well-developed maxima in sediment. *This work was funded by SPHERE 1205 project.*