

УДК 550.47

STUDIES OF REDUCED SULFUR COMPOUNDS
IN WATER BODIES WITH A EUXINIC ZONE
(Karelian coast of the White Sea)

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Meromictic water bodies of marine origin are most widespread across the territory of Russia; all of them have a unique structure and are the research subjects for scientists in various fields. All such lakes are characterized by a layered structure consisting of a mixing upper layer, a chemocline, and a monimolimnion, where sulfides and products of bacterial hydrogen sulfide transformation accumulate. Meromictic water bodies of the marine origin are formed as a result of the separation of small bays from the sea due to natural or anthropogenic processes. The transition from a stratified marine lagoon to a freshwater lake can take quite a long time, during which the hydrochemical structure and the composition of hydrobionts in the water bodies change significantly. The highly indented Karelian coast of the White Sea is rising as a result of the retreat of the last glacier. As a consequence of this process, stratified water bodies are formed from small bays and lagoons; over time, these may evolve into freshwater lakes. At the meromictic stage of separation, euxinic structure can develop in such water bodies. In the bottom layers, hydrogen sulfide accumulates in high concentrations (up to 600 mg/L), which is produced because of the sulfate reduction process. Various reduced sulfur compounds accumulate in the bottom sediments of the water bodies. Using several water bodies at different stages of separation from the sea as examples, it has been shown that as stable isolation from the sea develops, stratification of the water column forms and the amount of sulfides accumulated in the bottom layers increases. A sufficient amount of organic matter of various origins enters the bottom sediments (content in the upper layers up to 12%). As a result of bacterial sulfate reduction in lake sediments, various compounds of reduced sulfur are formed, namely sulfide, pyrite, elemental, and organic sulfur. At the initial stages of a lake separation from the sea, pyrite sulfur dominates in the total amount of reduced sulfur compounds, similar to marine bottom sediments. As the transition to freshwater lakes proceeds, organic sulfur begins to predominate, making the sediments similar in the distribution of reduced sulfur compounds to freshwater lake sediments. The study of meromictic lakes is a pressing issue in light of the changing climate. Research on such lakes is of great importance for understanding the processes occurring in water bodies formed not only naturally but also through anthropogenic (technogenic) means. It also provides an opportunity to predict the development of negative consequences associated with the artificial separation of marine areas.

<https://doi.org/10.46991/PYSUC.2026.SI1.047>

Keywords: separating lake, sulfate reduction, reduced sulfur compounds.

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