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Heavy Metals and Biogenic Elements in Aquatic Systems of the Don River Delta

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River deltas are located in the lower parts of the cascade landscape-geochemical systems of the river basins, so their geochemical conditions often characterize the anthropogenic impact on whole river system. The Don River runs through the one of the most agriculturally developed and densely populated area of Russia, and flows into the Azov Sea – the smallest and shallowest sea in the world. These factors determine the geochemical features of aquatic systems of the Don River mouth area and the specificity of the "river-sea" geochemical barrier zone.

The paper presents results of the field studies of the geochemical structure of the Don River mouth area, which were conducted in frames of the RFBR project in 2012-2013. Major types of the deltaic water streams and bodies were studied in different hydrological seasons: spring floods, summer, autumn and winter low water periods. About 50 samples of water, suspended matter and 60 samples of bottom sediments have been collected and analyzed for heavy metals (Fe, Mn, Zn, Cu, Ni, Co, Pb, Cr, Cd etc.) and biogenic elements (nitrate, nitrite, ammonium, phosphates, silica, total nitrogen and phosphorus, dissolved oxygen and chlorophyll) content. To assess the toxicity degree and nutrient potential of water, bioassay test conducted by growing daphnia in water samples were held.

The study shows that the Don River delta water is characterized by the relatively low values of dissolved heavy metal content. Significantly higher values of heavy metals were determined in the vicinity of settlements only. Metal accumulation in bottom sediments can be associated mainly with the rate of water flow. Higher values were found in sediments of small channels with weak flow velocity and prevailing processes of the suspended matter deposition. The data on the seasonal dynamics of nutrients and spatial variability of their forms have been obtained. The maximum concentration of nitrogen, phosphorus, silicon, and other biogenic elements are observed in the winter low-water period when biological activity of the delta aquatic systems is impaired.