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Studies of radionuclide concentrations in the sediment samples from the St. Petersburg rivers

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The study of environmental pollution processes is one of the geoecology's key activities last decades. These studies are covered almost all components of the natural landscape. However, the most interesting results can be obtained during the study of the sediments samples taken from the different water objects. One of the fundamental issues in these investigations is to determine the age of the sediments formation and the rate of its accumulation in the last 100-150 years. To solve this task, the method with identification of non-equilibrium ^{210}Pb radionuclide is widely used, but its accuracy depends on the hydrodynamic regime and on the level of lead contamination. To avoid these problems. One can use the method with the registration of ^{137}Cs radionuclide and identification of its concentration in the sediment samples. The accumulation of ^{137}Cs on territory of Russian Federation is associated with the beginning of the atmospheric nuclear weapons tests since 1949. The highest intensity of these tests was in 1958 and 1963. In 1963 all atmospheric, space and under water nuclear weapons tests were forbidden, but underground tests were remained and the accumulation of radionuclides in natural objects was continued. In 1986, from Chernobyl nuclear power plant accident, the concentration of ^{137}Cs in the landscape components of western part former USSR territory has increased.
In this work with using the method of ^{137}Cs identification, the age and rate of cesium accumulation in three columns of sediment samples from the Olkhovka, Karpovka and Chernaya Rechka (rivers of St. Petersburg) have been obtained. The column thickness ranges were from 38 to 63 cm. The sediments consisted of sandy-clayey silts and was contaminated with oil hydrocarbons and heavy metals. The samples were taken in range of 3-6 cm. For precise measurements of activity of the radionuclides which was detected in the samples at low concentrations, a spectrometric complex based on a High Purity Germanium detector was used together with a specially developed efficiency calibration procedure. Detailed analysis of the obtained data allowed us to identify the concentration of ^{137}Cs in the samples and made the conclusion about this radionuclide accumulation into the sediments.
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