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Radionuclide Cs-137 in the Lake Deposits of the Altai Region

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The formation of the deposits in water areas is determined by weathering and transportation of the detritus from water squares as by waters so by a wind ways. Last one could reach a global scales. The entering of 1^{37}Cs to the atmosphere after nuclear weapon tests was resulted in the deponation on solid particles of micron size. The interaction was quite strong and gave the ability to ^{137}Cs for the migration through the earth surface in the middle latitudes [1, 2].

The alevrit and clay fractions of the bottom sediments (over 50-70%), which included the aerosols was able to deponate ^{137}Cs without losses being in contact with bottom and near bottom waters. Such fractions allow the sedimentation of ^{137}Cs. The examples of sedimented ^{137}Cs are the Lake Konstaca (Europe) and the Lake Teletskoe (Altai). The horizons with maximum concentration of ^{137}Cs were equal to the year of global pollution with ^{137}Cs (1963). The Chernobyl accident lead to the high content of radionuclides in the bottom deposits of Konstanca Lake [3].

The region of Steppe Altai was polluted by ^{137}Cs as in global, so in local ways. In the Steppe Altai there are about 500 lakes. We analyzed the bottom deposits from 70 of them ^{137}Cs was analyzed by means of scintillation spectroscopy based on NaJ (TI) 200x200 with sensitivity 1Bq/kg.

The soils of watersheds near the lake were also analyzed. The main attention was given to the soils of watersheds where the low level of ^{137}Cs losses was observed after 35 years of last air nuclear tests [1,2]. ^{137}Cs activity was counted for 1997. The level of global sedimentation of ^{137}Cs in the Steppe Altai was adopted as 50-60mCi/km^2, being 300-450mm every year. Three Lakes: Gorkoe, Kolevanskoe and Teletskoe situated in the different geographical zones are exposed by global and local pollution (Semipalatinsk) with nuclear products.

The Lake Gorkoe is located in the central plains part of the Steppe Altai. This lake has the highest watershed among other lakes with 1000km^2 of square. The depth of the lake is 2-5m. The greatest level of the pollutants in the bottom deposits was demonstrated for ^{137}Cs as 209mCi/km$^{2.}$

The soils of watershed was under the influence of wind erosion thus the content of ^{137}Cs 65 mCi/km^2 was not in the agreement with first exposition by pollutants [4].

Kolevanskoe Lake is located in the foothills of the Gorny Altai. The lake area is 4.5km. The depth average is 1.8, the depth maximum is 3.1m. The main quantity of pollution in the soils through the entire square of the watershed was 126mCi/km^2. The level of the pollution in the bottom deposits was 119mCi/km$^{2.}$

Teletskoe Lake is situated in the Gorny Altai and is considered to be low flowing water. The width average is 174m. The depth maximum is 330m. The level of the sedimentation is 1.3mm per year. The every year content of precipitation is 850mm. The counted average of the global background (at 1997) was 100mCi/km^2.

The bottom deposits at a height of 1-1.7m were sampled from the 50 points of water squarer. Alevrytic and clay fractions were shown to be 96% of the precipitate. The quantity of sedimented ^{137}Cs in the precipitate correlated with the level of sedimentation in the specific point of deep-water part of the lake (the depth 250-310). The mean quantity was 93±11 mku/km, with sparseness 55-150mCi/km^2. The content of radionuclides in the soils of the North bank of the lake was 50-175 [4].

The high quantity of ^{137}Cs was also observed in another 3 lakes. The content of ^{137}Cs in the bottom deposits was quite equal to those in the soils near the lake and was 1.5-4 times higher than the global level. The content of ^{137}Cs in the soils and the bottom deposits in the Steppe Altai has been usually equal to global level. In the region, where the counted levels of background varied from 50 up to 60, the stock of ^{137}Cs in the bottom deposits was 501±5 with variety mCi/km^2 on factor 56%.

The formation of the bottom deposits in the Teletskoe Lake undergone two ways. The thin disperse part of silts is formatted due to the fragments of basic rocks and play an important role as a diluent. The main contribution of this way was confirmed by the geochemical analysis of the bottom deposits [5]. The second way is formed by the river systems which sources are started on the Alpine slopes with rare forests. Such slopes have week ability to deponate ashen particles the additional springs of global and local sedimentation of ^{137}Cs in the silt.

The distribution of ^{137}Cs in the lakes of the Steppe Altai was mimicked by the dust storms. The accumulation of ^{137}Cs from the atmosphere was not reproduced in the columns of bottom deposits as it was shown for Lake. The additional spring of ^{137}Cs could be the wind erosions, which drifted radionuclides and changed its distribution in the water square of the lake.

Thus, in order to separate the global and local entering of radionuclides the analysis of ^{137}Cs distribution in soils and bottom deposits and additional geochemical tests are required. New attempts were made in the Lake Krivoe [6]. The new data was shown when activities of ^{137}Cs and ^{210}Pb were tested in the bottom deposits. The common springs for these radionuclides and an equal ways of their migration in the surface deposits were demonstrated.

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Figure 1. Geographical position of objects investigated.

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