Geophysical Research Abstracts
Vol. 14, EGU2012-1795, 2012
EGU General Assembly 2012

DISTRIBUTION OF NATURAL (U-238, Th-232, Ra-226) AND TECHNOGENIC (Sr-90, Cs-137) RADIONUCLIDES IN SOIL-PLANTS COMPLEX NEAR ISSYK-KUL LAKE, KYRGYZSTAN

L. Jovanovic (1), B. Kaldybaev (2), B. Djenbaev (3), and A. Tilenbaev (3)

(1) Ecologica Association, Belgrade, Serbia (bosko@matf.bg.ac.rs), (2) Issyk-Kul State University, Kyrgyzstan, (3) Institute of Biology and Pedology, Bishkek, Kyrgyzstan

Researches on radionuclides distribution in the soil-plants complex provide essential information in understanding human exposure to natural and technogenic sources of radiation. It is necessary in establishing regulation relating to radiation protection. The aim of this study was the radiochemical analysis of the content natural radionuclides ^{238}U, ^{232}Th,^{226}Ra and technogenic radionuclides content (^{90}Sr, ^{137}Cs) in soils near Issyk-Kul lake (Kyrgyzstan). Results of radiochemical analyses have shown, that the concentrations of thorium-232 are fluctuating in the limits (11.7-84.1)$\times 10^{-4}$% in the soils. The greatest concentration of thorium-232 has been found in the light chestnut soils. The content of uranium-238 in the soils near Issyk-Kul lake is fluctuating from 2.8 up to 12.7$\times 10^{-4}$%. Radium-226 has more migration ability in comparison with other heavy natural radionuclides. According to our research the concentrations of radium-226 are fluctuating in the limits (9.4-43.0)$\times 10^{-11}$%. The greatest concentration of radium-226 (43,0$\pm$2,8)$\times 10^{-11}$% has been determined in the light chestnut soil.

In connection with global migration of contaminating substances, including radioactive, the special attention is given long-lived radionuclides strontium-90 and caesium-137 in food-chains, and agroecosystems. Results of radiochemical analyses have shown, that specific activity of strontium-90 is fluctuating in the range of 2.9 up to 11.1 Bq/kg, and caesium-137 from 3.7 up to 14,3 Bq/kg in the soil of agroecosystems in the region of Issyk-Kul. In soil samples down to 1 meter we have observed vertical migration of these radionuclides, they were found to accumulate on the surface of soil horizon (0-5 cm) and their specific activity sharply decreases with depth. In addition in high-mountain pastures characterized by horizontal migration of cattle in profiles of soil, it was discovered that specific activity of radionuclides are lower on the slope than at the foot of the mountain. The content of natural radionuclides (^{238}U, ^{232}Th, ^{226}Ra) and technogenic radionuclides (^{90}Sr, ^{137}Cs) in the soils depend on many factors: the type and mechanical composition of soil, capacity of absorption, acidity, concentration of exchange forms of carbonates, organic substances. The radionuclides accumulation process in the plants depend on a specific accumulation ability of plants. During the researches it has been found that radionuclides accumulate in vegetative organs more than in reproductive parts of plants. According to the accumulation degrees of natural radionuclides plants taking place in the following decreasing series: sugar beet $>$ potatoes $>$ lucerne $>$ clover $>$ oats $>$ perennial herbs $>$ wheat $>$ annual grass crops $>$ barley $>$ corn.

Radiochemical analysis of the technogenic radionuclides in the plants has been determined that specific activity of strontium-90 is increased in leguminous plants (cobs of corn, lucerne) in comparison with other cultures. Caesium-137 is accumulated in beet roots, cobs of corn and lucerne.

Key words: natural radionuclides, technogenic radionuclides, soil-plants complex, Issyk-Kul lake, Kyrgyzstan