Geophysical Research Abstracts
Vol. 18, EGU2016-2037, 2016
EGU General Assembly 2016

Regular patterns of Cs-137 distribution in natural conjugated elementary landscapes as a result of a balanced surface and depth water migration

Elena Korobova (1) and Sergey Romanov (2)

(1) Vernadsky Institute of Geochemistry and Analytical Chemistry, Russian Academy of Sciences (GEOKHI RAS), Geochemical Dept., Moscow, Russian Federation (korobova@geokhi.ru), (2) United Enterprise "Geoinformation Systems", Belarus Academy of Sciences

Distribution of artificial radionuclides in the environment has long been used successfully for revealing migration pathways of their stable analogues. Migration of water in natural conjugated elementary landscapes characterizing the system of top-slope-resulting depression, has a specific structure and the radionuclide tracer is inevitably reflecting it by specific sorption and exchange processes. Other important issues are the concentration levels and the difference in characteristic time of chemical element dispersion. Modern biosphere has acquired its sustainable structure within a long period of time and is formed by basic macroelements allowing the water soluble portion of elements functioning as activators of chemical exchange. Water migration is controlled by gravitation, climate and relief while fixation depends upon the parameters of surfaces and chemical composition. The resulting structure depends on specificity and duration of the process. The long-term redistribution of chemical elements in terrestrial environment has led to a distinct geochemical structure of conjugated landscapes with a specific geometry of redistribution and accumulation of chemical elements. Migration of the newly born anthropogenic radionuclides followed natural pathways in biosphere. The initial deposition of the Chernobyl's radionuclides within the elementary landscape-geochemical system was even by condition of aerial deposition. But further exchange process is controlled by the strength of fixation and migration ability of the carriers. Therefore patterns of spatial distribution of artificial radionuclides in natural landscapes are considerably different as compared to those of the long-term forming the basic structure of chemical fields in biosphere.

Our monitoring of Cs-137 radial and lateral distribution in the test plots characterizing natural undisturbed conjugated elementary landscapes performed in the period from 2005 until now has revealed a stable and specifically polycentric structure of radiocesium distribution believed to reflect the character of radial and lateral water body migration and a high sensitivity of water distribution to surface parameters.

This leads to an unusual wavy type of Cs-137 distribution down, along and across all the slopes examined for surface Cs-137 activity at every measured point.

The finding is believed to have an important practical outcome allowing much more detailed evaluation of micronutrients distribution and optimization of their application.