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# Patterns of Cs-137 and Sr-90 distribution in conjugated landscape systems

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The main goal of the study was to reveal spatial patterns of 137Cs and 90Sr distribution in soils and plants of conjugated landscapes and to use 137Cs as a tracer for natural migration and accumulation processes in the environment. The studies were based on presumptions that: 1) the environment consisted of interrelated bio- and geochemical fields of hierarchical structure depending on the level and age of factors responsible for spatial distribution of chemical elements; 2)distribution of technogenic radionuclides in natural landscapes depended upon the location and type of the initial source and radionuclide involvement in natural pathways controlled by the state and mobility of the typomorphic elements and water migration. Case studies were undertaken in areas subjected to contamination after the Chernobyl accident and in the estuary zones of the Yenisey and Pechora rivers.

First observations in the Chernobyl remote zone in 1987-1989 demonstrated relation between the dose rate, 137Cs, 134Cs, 144Ce, 106Ru, 125Sb in soil cover and the location of the measured plot in landscape toposequence. Later study of 137Cs and 90Sr concentration and speciation confirmed different patterns of their distribution dependent upon the radioisotope, soil features and vegetation cover corresponding to the local landscape and landuse structure. Certain patterns in distribution and migration of 137Cs and 90Sr in soils and local food chain were followed in private farms situated in different landscape position [1]. Detailed study of 137Cs activity in forested site with a pronounced relief 20 and 25 years after the Chernobyl accident showed its stable polycentric structure in soils, mosses and litter which was sensitive to meso- and micro-relief features [2].

Radionuclide contamination of the lower Yenisey and Pechora studied along meridian landscape transects proved both areas be subjected to global 137Cs pollution while the Yenisey floodplain received additional regional contamination transported by the river [3]. Local zones of enhanced 137Cs accumulation in soil samples and some plant species were found in island systems, and the Yenisey upper delta island in particular. Hydromica identified in samples was considered significant for 137Cs accumulation in floodplain soils. The distinct tendency of secondary redistribution of the global 137Cs fallout in soils due to wind and water transport and subsequent accumulation, 137Cs accumulation in topsoil and slightly over the permafrost table were characteristic for both catchments. Therefore 137Cs proved to be an effective isotope tracer for studying and mapping technogenic contamination and the recent processes of water and particulate mass transport on the global, regional and local scales.

Obtained results may be useful for monitoring, eco-geochemical evaluation and regionalizing of the areas contaminated by artificial radionuclides.

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