

## **Multi-scale levels of Cs-137 contamination of landscapes of the Bryansk Region (with reference to results of air gamma survey)**

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As a result of the Chernobyl accident on April 26, 1986, large amounts of radionuclides were released into the atmosphere, resulting in high contamination in Belarus, Ukraine, and Russia.

High variability of environmental parameters and multi-scale nature of initial fallout significantly contributed to very complicated Cs-137 patterns. The first maps of radioactive contamination due to the accident at the Chernobyl nuclear power plant, built in May 1986, already identified a heterogeneous nature of the contamination zones [1]. A complex combination of factors, such as the nature of the deposition (dry, wet), various volumetric activity of radionuclides in the atmosphere during the deposition of aerosols on the earth's surface, led to the formation of multiscale fields of radionuclide contamination, where each scale correlates with "pollution spots" having their own specific nature].

Air gamma survey was conducted with a grid 100x100 m and it allowed to reveal different levels of scale "spots" of Cs-137 contamination associated with the movement of polluted air and the influence of the underlying surface - forests, river valleys. Cs-137 contamination field has an extraordinary feature - uniqueness of its spatial structure in different districts of the Bryansk region.

A maximal area of "cesium" spots up to 30-50 km in size and with a contamination density of more than 1000 kBq/m<sup>2</sup> is observed in the western part of the Bryansk Region. Their spatial structure is extremely heterogeneous, the differences in the local density of Cs-137 contamination being due to those in intensity of precipitation (wet deposition).

The central part of the Bryansk Region with the density of contamination below 37 kBq/m<sup>2</sup> (up to 3-5 kBq/m<sup>2</sup>) is an example of a condensing zone of "dry" deposition.

With a larger scale, allowing individual elements of Cs-137 contamination to be shown in a more distinct way, it is possible to observe the relationship of contamination with a number of landscape factors. Specifically, one can find apparent relationship of Cs-137 contamination density with forests, where there is an increased deposition activity.

An air gamma survey with a range of pollution 7,4-90 0 kBq/m<sup>2</sup>, conducted in the central and southern part of the Bryansk Region, revealed a complex pattern of contamination density, which is presented as a sequence of "spots" of irregular shape with a high level of radioactive contamination, as well as elongated "bands", whose orientation shows a direction of the movement of air masses, i.e. west-eastward or to the northwest- south-east. The distribution of Cs-137 contamination can be clearly related to the valley of the Sudost River, thus showing relevance of landscape factors for the formation of technogenic pollution with radionuclides.

The analysis of transformation of the original Cs-137 contamination formed as a result of the deposition of radioactive aerosols in April-May 1986, due to the effect of landscape factors, has been performed.

1. Izrael Yu. A., Kvasnikova E.V., Linnik V.G. 2012 Radioactive contamination in Russia //Changing the natural environment of Russia in the 20th century (in Russian). Eds. V. . Kotlyakov, D.I. Lyuri. Moscow: Publishing House Molnet. Pp.202-220.