Influence of the height of a snow cover on the level of β-, γ-background and its variations in the ground-layer atmosphere

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Introduction. The indicator properties of radionuclides and ionizing radiation are known and are actively used to obtain new knowledge about the dynamic processes occurring in the atmosphere and lithosphere, as well as for the prediction of natural and man-made hazardous phenomena. The aim of the work was to study the dynamics of the fields of β- and γ-radiation in the surface layer of the atmosphere during the establishment, growth and descent of snow cover.

The coordinated monitoring of the meteorological, actinometric, atmospheric-electrical, radioactivity and ionizing radiation values of the TPU-IMCES SB RAS has been conducted since the end of 2008. Its technology is constantly being improved. At present, monitoring of the surface atmosphere includes synchronous continuous automated, with a high sampling frequency, measurements of the characteristics of meteorological fields and fields of α-, β-, and γ-radiation at a series of heights and depths.

In the annual cycle, variations of β- and γ-radioactivity have a weakly pronounced maximum in summer time. For the β- and γ-background, the transition to the winter season is accompanied by a synchronous decrease in the background levels at all heights.

There are obvious dependences between the height of the snow cover, pressure and the level of the atmospheric β-, γ- background. An increase in the height of the snow cover leads to the formation of a "failure" in the annual course of the β- and γ-background. The depth of the dip is determined by the height of the snow cover. During periods of stabilization of snow depth, the dispersion of the levels of the β-, γ-background increases significantly. Comparison of variations in the levels of the β-, γ-background and the neutron component of cosmic rays with a change in the height of the snow cover showed that this factor affects the neutron component, unlike the β-, γ-background, only slightly.

For the β-, γ-background, the change in atmospheric pressure affects only in the case of small heights of snow cover. For the neutron component, the change in atmospheric pressure leads to a consistent change in its level. This is due to the fact that the optical thickness of the atmosphere for primary cosmic radiation is much greater than unity.

Conclusion. A study was made of the dynamics of the fields of β- and γ-radiation in the surface layer of the atmosphere. The dependences of the characteristics of the β- and γ-radiation fields on the height of the snow cover and variations in atmospheric pressure are established.