

# DEPENDENCE OF COSMIC RAY COMPONENT IN BACKGROUND OF ATMOSPHERE SURFACE FROM SOLAR MAGNETIC ACTIVITY

Zelinskii A.S., Yakovleva V.S.

Scientific adviser: Yakovleva V.S., doctor of technical sciences, associate professor  
Tomsk Polytechnic University, 634050, Tomsk, Lenin Avenue, 30  
E-mail: [vsyakovleva@tpu.ru](mailto:vsyakovleva@tpu.ru)

In scientific literature there are not estimates of changes of the flux density (FD) and of the dose rates (DR) of the secondary cosmic radiation (SCR) at the heights up to 50 m from the land surface (at a depth of atmosphere about 1030 g/cm<sup>2</sup>). Changes of FD and DR SCR are caused by change of Solar magnetic activity, one of characteristics of which are Wolf's numbers. These data are very important for interpretation of results of monitoring of a background radiation in the ground atmosphere. Modeling of passing of elementary particles through the atmosphere of Earth was made with use of the Monte Carlo method in the environment of Geant4 [1] for the winter (for December 2017).

Results are given in fig. 1 with designations: g – gamma radiation; e-(+) – beta (+) - radiation; p – protons; m-, m+ - muons. We are visible that FD and DR SCR reach the peak at Wolf's 0–25 numbers that will be coordinated with data of other authors. With growth of number of Wolf from 25 to 200 units of FD decreases from 16 to 45%, and DR – from 18 to 40% depending on a type of SCR.

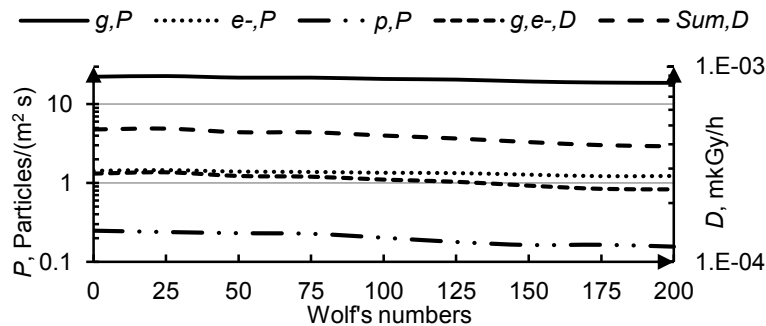


Fig. 1. Dependences of flux density and of the dose rates the SCR component from Wolf's number

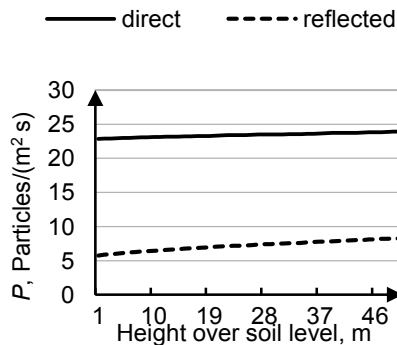


Fig. 2. Dependence of flux density of the direct and reflected photon radiation of SCR from height

The received estimates of dependence DR SCR from Wolf's numbers well be agree with work [2]. The maximum difference between extreme of functional dependences can exceed 40%, for example, the reduction of FD of photons in percentage is 18%. Together with growth of height over the level of the earth, also FD of reflected photon components is grows. Such difference between extreme of functional dependence reaches 35% for height of 50 m or in percentage increase reaches 45%. Besides, in work are carried out comparisons of deposits of secondary space radiation in are total a beta and a gamma backgrounds of soil isotopes and of atmospheric isotopes.

## LIST OF REFERENCES

1. Geant4. URL: <http://geant4.cern.ch> (Date of inquir: 26.10.18).  
SOURCES AND EFFECTS OF IONIZING RADIATION United Nations Scientific Committee on the Effects of Atomic Radiation UNSCEAR 2008 Report to the General Assembly, with Scientific Annexes VOLUME I, UNITED NATIONS New York, 2010.