VARIABILITY OF RADON (Rn-222) CONCENTRATION
IN THE NEAR-GROUND AIR LAYER
WITH REFERENCE TO SOIL HEAT FLUX VALUE

Keywords: exponential function, radon (Rn-222) concentration in the air, rural station Ciosny, soil heat flux, the city center of Łódź

Summary

The aim of the study was to find the relationship between radon (Rn-222) concentration and soil heat flux. Atmospheric concentration of radon was measured continuously (in 60-min intervals) at a height of 2 m above the ground using AlphaGUARD® PQ2000PRO (ionization chamber) at urban (city center of Łódź) and rural (Ciosny, 25 km north of Łódź) site in the period 2008–2010. Simultaneously, soil heat flux \( (Q_G) \) was measured by means of HFP01 Heat Flux Plate, Campbell Scientific Ltd. The diurnal pattern of Rn-222 concentration was revealed with a maximum in the early morning and a minimum in the afternoon. In general, the diurnal variation of near-surface Rn-222 concentration varied approximately in phase with the soil heat flux. The exponential function model was used to estimate a daily course of radon concentration on the basis of soil heat flux values in particular months. The period from March to November was characterised by a good agreement between the observed and model-predicted Rn-222 concentration (“index of agreement” by Willmott was used to evaluate the model). Measured Rn-222 concentrations in the rural station Ciosny fitted better to model data than those from the urban station in the city center of Łódź.