



Annual variations of ^{222}Rn concentration in soils in Krakow, Poland

Paulina Wach (1), Michal Bonczyk (1), Przemyslaw Wachniew (1), Zbigniew Gorczyca (1), and Michal Gasiorek (2)

(1) University of Science and Technology, Krakow, Poland, (2) University of Agriculture in Krakow, Poland

Process of radon exhalation from the soil is controlled not only by a source term (content of ^{226}Ra in the soil and its vertical distribution) but also by physical properties of the upper soil layer (mineral structure, porosity, water content, permeability) and indirectly by meteorological conditions.

Depth profiles of ^{222}Rn concentrations at two field sites in Krakow with contrasting lithology and different degrees of anthropogenic impact were investigated. Stainless steel tubes with an internal diameter of 1 cm were used to pump soil air from the depths of 20, 30, 40, 60, 100 (or 120), 150 and 200 cm into the active volume of the RAD7 monitor. The analyzed profiles were used to derive soil flux of ^{222}Rn . Soil ^{222}Rn flux measurements were performed at both sites also with the aid of chamber method. In addition, regular measurements of soil temperature and volumetric moisture content were performed at the same depth intervals at which air was sampled. Soil profiles were sampled for the analyses of uranium series radionuclides activities and analyses of grain size distribution and other basic physicochemical properties. The obtained radon activity in the soil air exhibit substantial temporal fluctuations with highest values in spring and winter months. Changes in soil water content and groundwater levels seem to be a major control on the observed seasonal variations.