

Outdoor radon variation in Romania

Elena Simion* and Florin Simion

National Environmental Protection Agency,
294 Splaiul Independentei, Sector 6, Bucharest, Romania

Abstract

The results of a long-term survey (1992 – 2006) of the variations of outdoor radon concentrations in semi-natural location from Romania are reported in the present paper.

Measurements, covering between two and four sessions of the day (morning, afternoon, evening and night), were performed on a daily bases by 37 Environmental Radioactivity Monitoring Stations from National Environmental Radioactivity Survey Network.

The method used was based on indirect determination of outdoor radon from aerosol samples collected on glass micro-fibre filters by drawing the air through the filters. The sampling was performed in a fixed place at a height of 2 m above the ground surface. Total beta counting of aerosol samples collected was performed immediately and after 20 hours.

Values recorded during the years of continuous measurement indicated the presence of several patterns in the long-term variation of outdoor radon concentration: diurnal, seasonal and annual variation.

For diurnal variation, outdoor radon concentration shows a maximum values in the night (early hours) and minimum values by day (in the afternoon). On average, this maximum is a factor of 2 higher than the minimum.

Late autumn – beginning of winter maximum and an early spring minimum are characteristic for seasonal patterns.

In the long term a seasonal pattern was observed for diurnal variation, with an average diurnal maximum to minimum ratio of 1.33 in winter compared with 3.0 in the summer months.

The variations of outdoor radon levels showed little correlation with the uranium concentration of the ground and were attributed to changes in soil moisture content. In dry seasons, because of the low precipitation, the soil was drying out in the summer allowing fractures to develop and radon to migrate easily through the ground.

Depending on microclimatic and geological conditions, outdoor radon average concentrations in defferent regions of Romania are from 1200 mBq/mc to 13065 mBq/mc. The smallest values are recorded in the mountain regions like Toaca (Ceahlau Mountain) and Babele (Bucegi Mountain), with approximately one order of magnitude.

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* Presenting author, E-mail: elena.simion@anpm.ro

