

5.3 Representative indoor radon survey in Gyergyóremete, Romania

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The primary goal of the Gyergyóremete radon programme was to pilot a representative indoor radon survey in Romania, that can be done in other places of the country. The 1992 census counted 2406 houses and 6550 residents in the village. Almost all houses are single floor wooden made houses without cellar. Representativity of the sample was ensured by random pull of 120 houses from the stock (hypergeometric statistical model). Etched track type radon detectors [1] (Radamon) were used to measure long time average ^{222}Rn concentration. Measurements were done in sleeping rooms at pillow level.

The detectors were distributed and collected by 10 to 14-years-old children of the local primary school with the help of some of their teachers. The children's group (called Rutherford Group) was divided into subgroups with three or four children in a subgroup. Each subgroup was responsible for 12 houses. In afternoon courses the children were trained on the very basics of the radon phenomena. The public was also informed about the planned survey through the local media (cable television and newspaper). Before the distribution of the detectors the children visited all the selected houses to check readiness of the residents to accept the detectors. Then the distribution, and later on the collection, of the detectors could be done almost in single day campaigns.

Exposure lasted from January to July 1999. The half year exposure time was chosen to reduce the number of lost detectors (known to increase linearly with exposure time), and to keep participating childrens and publics interest alive (likely to fall exponentially with exposure time). The starting and ending dates of the exposure period were selected to minimize biasing effect of seasonal variation of radon in homes. At the end 115 samples could be collected and were evaluated.

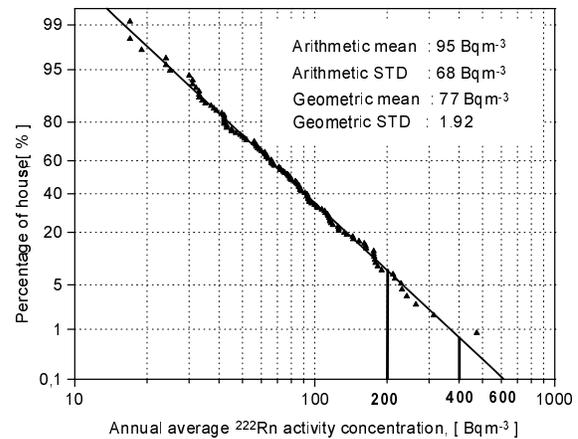


Figure 1. Complementer (downwards) cumulative distribution of annual average ^{222}Rn activity concentration measured in a representative (random pull) sample of the Gyergyóremete housing stock. The solid line is the lognormal distribution fit to the experimental data.

Figure 1 summarizes the results of our survey. We have found that the distribution of indoor ^{222}Rn activity concentration can be very well fitted with lognormal distribution. The correlation coefficient of linear fitting on linearized scales was $k = -0.9980$. The arithmetic mean (95 Bq m^{-3}) and the distribution together suggests that, though ^{222}Rn in Gyergyóremete's houses may have been significantly higher than estimated world average (about 40 Bq m^{-3}), but still, the area should not be classified as a radon prone area. The percentages of houses expected to have annual average ^{222}Rn activity concentration higher than 400 Bq m^{-3} is less than 1 %, and of those higher than 600 Bq m^{-3} can be estimated to be around 0.1 %.

OTKA T-029306 supported this work.

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[1] I. Csige and S. Csegzi, Radiation Measurements **34(1-6)** (2001) 437-440.