Results from time integrated measurements of indoor radon, thoron and their decay product concentrations in schools in the Republic of Macedonia

Zdenka Stojanovska[1,*], Zora S. Zunic[2], Peter Bossew[3], Francesco Bochicchio[4], Carmela Carpentieri[4], Gennaro Venoso[4], Rosaline Mishra[5], R.P. Rout[5], B.K. Sapra[5], Bety D. Burghele[6], A. Cucoş-Dinu[6], Blazo Boev[7] and C. Cosma[6]

+ Author Affiliations

*Corresponding author: stojanovskazdenka@gmail.com

Abstract

As part of a survey on concentrations of radon, thoron and their decay products in different indoor environments of the Balkan region involving international collaboration, measurements were performed in 43 schools from 5 municipalities of the Republic of Macedonia. The time-integrated radon and thoron gas concentrations (C_{Rn} and C_{Tn}) were measured by CR-39 (placed in chambers with different diffusion barriers), whereas the equilibrium equivalent radon and thoron concentrations (*EERC* and *EETC*) were measured using direct radon-thoron progeny sensors consisting of LR-115 nuclear track detectors. The detectors were deployed at a distance of at least 0.5 m from the walls as well as far away from the windows and doors in order to obtain more representative samples of air from the breathing zone; detectors were exposed over a 3-month period (March-May 2012). The geometric mean (GM) values [and geometric standard deviations (GSDs)] of C_{Rn}, C_{Tn}, EERC and EETC were 76 (1.7), 12 (2.3), 27 (1.4) and 0.75 Bq m^{-3} (2.5), respectively. The equilibrium factors between radon and its decay products (F_{Rn}) and thoron and its decay products ($F_{Tn}^{>0.5\ m}$) were evaluated: F_{Rn} ranged between 0.10 and 0.84 and $F_{Tn}^{>0.5\ m}$ ranged between 0.003 and 0.998 with GMs (and GSDs) equal to 0.36 (1.7) and 0.07 (3.4), respectively.