A PRELIMINARY RESULTS OF RADON FLUX MEASUREMENTS FROM SOIL, PERFORMED FOR THE FIRST TIME AT A FEW LOCATIONS IN SERBIA

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Motivation:

EC – Directive 2013/59/Euratom oblige EU member states to identify Radon Priority Areas –RPAs. Within the ongoing metrological project EMPIR 19ENV01 (traceRadon) one of the goals is to improve methods of RPA identification by including radon flux measurements. Recently performed literature review has revealed that only a few simultaneous measurements of indoor radon and radon flux were performed worldwide. In order to investigate relationship between radon flux and indoor radon concentrations, authors aimed to include radon flux measurements simultaneously with the indoor radon measurements. Thus, different radon flux measurements were tested at a few locations in Serbia, for the first time.

Materials and methods:

- Radon flux was measured at 4 different locations;
- **Direct measurements** were performed using:
  - **integrated devices**: •accumulation of radon in **charcoal canister**, • accumulation of radon in an H-chamber of 960 ml volume measured with a short-term ST **electret;** measurement time: 4-6 h
  - **continuous measurement**: • RTM1688-2 of SARAD GmbH with accumulation box. (measurement time: 2h)
- **Indirect measurements**: using gamma dosimeter (Szegvary et al): Automess 6150 AD-b

$$C(t) = \frac{E_A A}{\lambda V}\left(1 - e^{-\lambda t}\right) + C_0 e^{-\lambda t} \to 0$$

Integrated measurements

$$\bar{C} = \frac{E_A A}{V}\frac{T}{2}$$

Continuous measurements

$$C(t) = \frac{E_A A}{V} t$$

Indirect measurements: GDR

$$\mathrm{E} = 0.89 \cdot \mathrm{GDR}\left[\frac{\mathrm{nSv}}{\mathrm{h}}\right] - 11.01$$

Results:

		Radon Flux [Bq $m^{-2}h^{-1}$]			
Meas.	Det ID.	Location 1	Location 2	Location 3	Location 4
Charcoal	1	0.50 ± 0.20	3.35 ± 0.31	0.49 ± 0.20	0.75 ± 0.20
	2	0.51 ± 0.21	1.19 ± 0.22	0.43 ± 0.19	0.91 ± 0.20
	3	0.51 ± 0.20	1.88 ± 0.23	0.71 ± 0.20	1.86 ± 0.27
Electret	4	1.71 ± 0.36	9.82 ± 0.73	3.78 ± 0.56	4.0 ± 0.50
	5	0.80 ± 0.28	17.3 ± 8.1	1.71 ± 0.40	4.2 ± 0.57
Active device	RTM1688	4.13 ±0.42	107 ± 10	57.6 ± 4.2	80.9 ± 4.1
Indirect GDR	Automess 6150 AD-b	72	96	90	84
Rel. humi-dity [%]		37.6	19.3	23.5	18
C_{Ra} [Bq kg^{-1}]		34 ± 6	48 ± 2	30 ± 2	36 ± 2

Conclusions:

- Measurements performed in highly humid soil
- Large discrepancy between integrated and continuous measurements
- Integrated measurements gives much lower Rn flux compared to typical values reported worldwide (order of 10s of $Bqm^{-2}h^{-1}$)
- In a few cases, large variations within the same type of detectors; Could be due to an improper installation on the ground
- Good agreement between continuousand indirect measurements at lower humidity
- Measurements should be repeated in a drier period

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