



Scientific Workshop 20th October 2020
EMPIR 19ENV01 traceRadon



*Literature survey
on the use of radon flux data for estimating
indoor and outdoor radon activity
concentrations*



Gordana Pantelić, Ivana Vukanac, Jelena Krneta
Nikolić, Maciej Norenberg, Zuzanna Baranowska,
Igor Čeliković, Miloš Živanović



WP4: Radon and radon flux in maps for radiation protection issues

Task 4.1: Identification of RPA

The goal: to develop improved methods for the identification of RPA using outdoor radon activity concentration data, radon flux data and radon flux maps.

Activity number	Activity description	Partners
A4.1.1 M3	VINS with the help of CLOR, UC and UoB will undertake a literature review on the use of radon flux data for estimating indoor and outdoor radon activity concentrations as well as the use of the geogenic radon potential.	VINS, CLOR, UC, UoB

Literature survey- **Identify Radon Priority Areas (RPAs)**

- Journal papers (resulting in data collected from 51 papers)
- Analysis of literature revealed great diversity in approaching outdoor radon origin and influence of different factors affecting outdoor radon measurements.
- Survey was somewhat complicated due to different terms used by different authors during several decades.
- The choice of keywords was challenging (**radon flux**, indoor and outdoor radon, soil gas concentration, geogenic potential)
- The information contained in the papers (the outdoor radon activity concentration measurements, radon gas and radon flux measurements and the updated radon flux maps) should serve as an input in the estimation of the geogenic RHI and in improving the identification of RPA.

no	Title	Autors	Year	Journal no, pp. Pages	DOI	key words	Country
21	A process-based ²²² radon flux map for Europe and its comparison to long-term observations	U. Karstens, C. Schwingshackl, D. Schmithüsen, and I. Levin	2015	Atmospheric Chemistry and Physics 15, pp. 12845-12865	doi:10.5194/acp-15-12845-2015	Radon flux	Europe

Main conclusion	indoor/outdoor Rn act. conc? yes / no	estimation based in radon flux/ geogenic potential	radon map	Comments
A high-resolution ²²² Rn flux map for Europe was developed, based on a parameterization of ²²² Rn production and transport in the soil. Observed seasonality is realistically reproduced by this approach and confirms the validity of estimating diffusivity in soil air based on the Millington and Quirk (1960) model. Using two different sets of soil moisture reanalyses underlines the strong dependence of ²²² Rn flux estimates on realistic soil moisture values. The spatial resolution of the soil moisture models used here restricts spatial resolution of the two realizations of our European ²²² Rn exhalation map. Many climate zones and soil types such as subarctic regions, wetlands and dry areas of Europe, could not be validated with observations. In cases when soil moisture data or reliable model estimates are directly available in the transport model this approach could also be applied using these measured or model-generated soil moistures. This may improve local or regional ²²² Rn flux estimates.	no	Radon flux	yes	

Partners will analyse the results of literature survey and other activities from WP2 and WP3, activities 4.1.2-4.1.5:

- to identify the best input data to be used as an estimate for indoor radon activity concentrations.
- analyse the correlation of data between outdoor radon activity concentration measurements, radon flux measurements, and the updated radon flux maps
- the use of outdoor radon activity concentration measurements, radon flux measurements and the updated radon flux maps in the estimation of the geogenic RHI
- select which data is best for use in improving the identification of RPA

A.4.1.6 Summary report on methodology for the characterisation of RPA including outdoor radon and radon flux data.



Thank you for your attention