Different models for calculation of ^{222}Rn flux and validation with experimental data in Bratislava, Slovakia

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Radon (^{222}Rn) is a naturally occurring radioactive gas widely used as a tracer in environmental studies as an indicator of various geophysical, hydrological, and meteorological processes. It is used for monitoring atmospheric stability, for investigating groundwater-surface water interactions, assessing air quality, and detecting geological anomalies linked to seismic activity or uranium deposits. Moreover, radon flux is nowadays recognized as a perspective tracer for understanding carbon dioxide emissions from the soil i.e., radon tracer and radon calibrated methods.

Various theoretical models are applied to determine radon exhalation, including both analytical and numerical approaches based on the soil's properties (soil moisture, soil dry bulk density, porosity etc.) and uranium contents. In this contribution, we focused on the determination of radon flux using various theoretical models. In order to determine radon diffusion coefficient, several semi-empirical formulas were used.

These modelled results were compared and validated through field measurements performed continuously in Bratislava for four years (2021 – 2024). Further, the modelled and measured radon flux at our locality were compared with the European radon flux map.

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