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New traceability chains for the measurement of radon at the environmental level

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In the framework of the EMPIR project 19ENV01 traceRadon(1) [1] stable atmospheres with low-level, activity concentrations of radon have to be produced for the calibration of radon detectors [2] capable of measuring the outdoor air activity concentration. The traceable calibration of these detectors at very low activity concentrations is of special interest, for the radiation protection community, as well as the climate observation community. Because radiation protection networks (like the EUropean Radiological Data Exchange Platform (EURDEP)) and climate observation networks (like the Integrated Carbon Observation System (ICOS)) need reliable, accurate radon activity concentration measurements, either for identification of Radon Priority Areas (RPA), for false alarm prevention or to apply the Radon Tracer Method (RTM) for the estimation of greenhouse gas (GHG) emissions.

Radon gas is the largest source of public exposure to naturally occurring radioactivity, and concentration maps based on atmospheric measurements aid developers to comply with EU Safety Standard Regulations. Radon can also be used as a tracer to evaluate dispersal models important for supporting successful greenhouse gas (GHG) mitigation strategies. One of the recently most applied technique for this propose is the Radon Tracer Method (RTM). To reduce the uncertainty of both radiation protection measurements and those used for GHG modelling, traceability to SI units for radon exhalation rate from soil, its concentration in the atmosphere and validated models for its dispersal are needed. The project traceRadon started in 2020 to provide the necessary measurement infrastructure [3,4]. This is particularly important for GHG emission estimates that support national reporting under the Paris Agreement on climate change.

As there is an overlapping need between the climate research and radiation protection communities for improved traceability at low-level outdoor radon and radon flux measurements the project traceRadon works on this aspect for the benefit of two large scientific communities. The results at midterm of the project are presented.

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