

## ***Interactive comment on “A European-wide <sup>222</sup>Radon and <sup>222</sup>Radon progeny comparison study” by Dominik Schmithüsen et al.***

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The authors presented a manuscript titled “ A European – wide <sup>222</sup>Radon and <sup>222</sup>Radon progeny comparison study” for a possible publication in the ATM Journal.

In this work they compared the performance of their one-filter <sup>222</sup>Rn progeny monitors HRD (an old version and a new version which has not difference from the measurement point of view) with one-filter <sup>222</sup>Rn progeny monitors located at seven North-European stations. Furthermore, the HRD monitor was also compared, at three stations, with a two-filter <sup>222</sup>Rn monitor (ANSTO).

The idea of the presented work falls into the scope of AMT and could be an interesting step forward to partially harmonize the atmospheric <sup>222</sup>Rn concentrations measurements in Europe. Nevertheless at the present state, I have some suggestions which

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could help the improvement of the manuscript and should be taken into account before the publication of the paper:

In this comparison study the HRD monitor is used as “reference” monitor to harmonize the radon data of these European stations. However, past studies have shown that the HRD monitor could underestimate the atmospheric  $^{222}\text{Rn}$  concentration under water saturated conditions because of the variability of the equilibrium factor between radon and its progeny (e.g. Xia et al., 2010).

In this regard Grossi et al., 2016, carried out a short comparison study between a  $^{222}\text{Rn}$  progeny (HRD method) and a  $^{222}\text{Rn}$  (electrostatic method) monitor at two European stations. It could give to the authors some insights.

For this previous reason, with the aim of harmonizing the radon data using the HRD monitor as reference system, could be interesting evaluate the linear relationship between the HRD monitors and the other methods differentiating not saturated (relative humidity (RH) <100%) and saturated (RH=100%) atmospheric conditions. This analysis could be carried out using the local meteorological parameters measures at each European station included in the present study. The suggested analysis could allow a deep characterization of the monitors’ response and could also be useful to estimate the effective dataset coverage.

Best regards Claudia Grossi

References Grossi, C., et al. (2016), Analysis of ground-based  $^{222}\text{Rn}$  measurements over Spain: Filling the gap in southwestern Europe, *J. Geophys. Res. Atmos.*, 121,doi:10.1002/2016JD025196.

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