We wish to thank Claudia Grossi for her review and comments on our manuscript. Our replies to her concerns and suggestions are given below (marked in red):

The authors presented a manuscript titled "A European – wide ^{222}Radon and ^{222}Radon progeny comparison study" for a possible publication in the ATM Journal. In this work they compared the performance of their one-filter ^{222}Rn progeny monitors HRD (an old version and a new version which has not difference from the measurement point of view) with one-filter ^{222}Rn progeny monitors located at seven North-European stations. Furthermore, the HRD monitor was also compared, at three stations, with a two-filter ^{222}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 ^{222}Rn concentrations measurements in Europe. Nevertheless at the present state, I have some suggestions which 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}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}Rn progeny (HRD method) and a ^{222}Rn (electrostatic method) monitor at two European stations. It could give to the authors some insights.

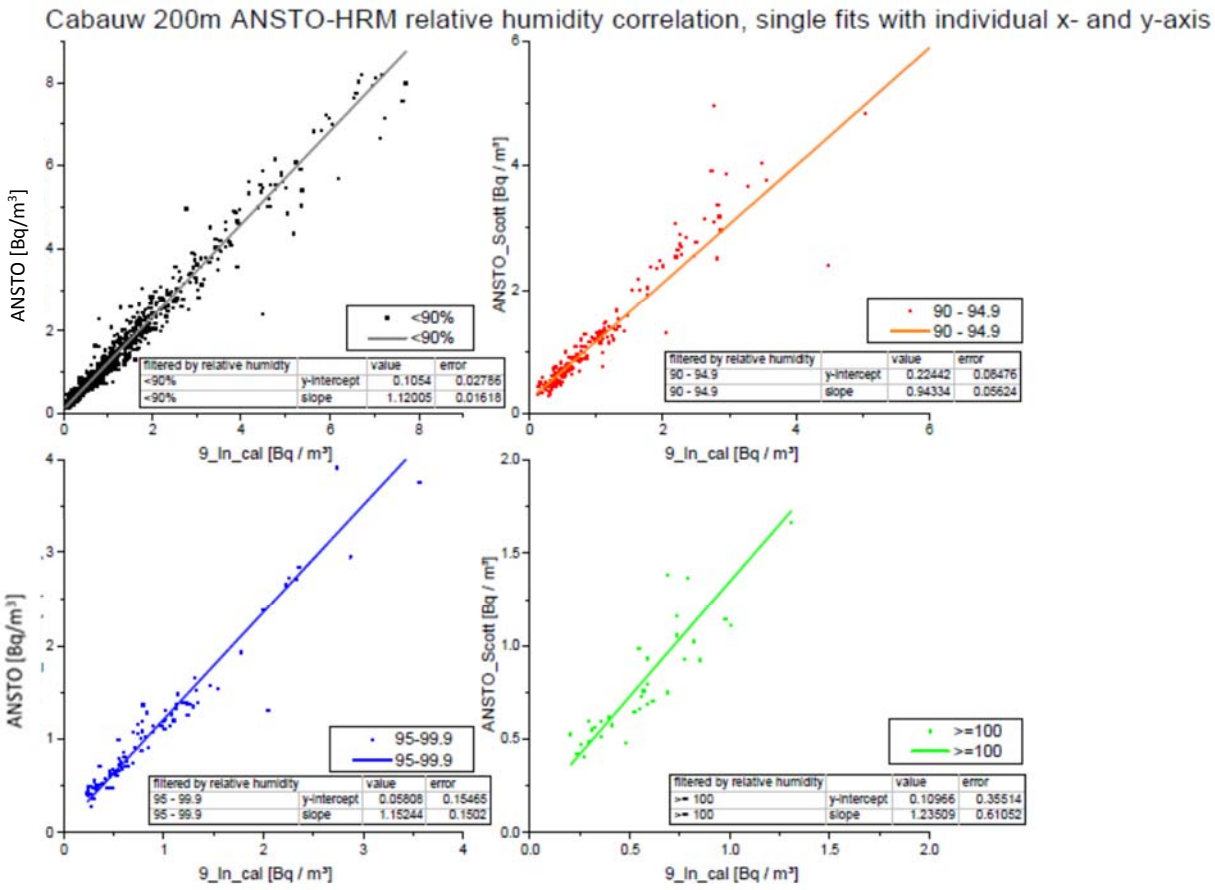
The Heidelberg Radon Monitor (HRM) was used here as "reference" or comparison instrument because several were available to us for this extended study period and the system is very easy and convenient to transport. We are well aware of the problem that a monitor measuring only ^{222}Rn progeny is prone to uncertainties due to aerosol loss and potentially variable disequilibrium between the measured progeny and atmospheric ^{222}Radon itself. We believe this is discussed in a comprehensive way in our manuscript. In fact, we do not use our monitor as THE reference, but provide, in our Table 2, correction factors also to the ANSTO scale, which we feel are the monitors measuring atmospheric ^{222}Rn most precisely and accurately.

In fact, we are not surprised about the comparison results in Grossi et al. (2016) from the Polish mountain station Kasprowy Wierch, where ^{222}Radon progeny loss can be substantial at high atmospheric humidity (i.e. when the site is in cloud). We have monitored a similar situation during the comparison campaign at Lutjewad and mention this in the text of our manuscript. However, our main goal of the current study was to determine mean differences of the measurements with the different systems run at northern and central European stations, as well as first estimates of mean disequilibrium factors that are also including such extreme situations.

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.

Nevertheless, following the reviewer's request, we have re-analysed our comparison records with ANSTO systems at Cabauw 200m and Heidelberg 30m and selected for several humidity ranges

between <90% and >100% (only very few data are available for >100% humidity at Cabauw and none in Heidelberg). The Figure below shows the evaluation for different humidity ranges at Cabauw. The slope for the >100% humidity data is about 10% higher than for all data. The mean value as reported in Table 1 of our manuscript is not significantly influenced by these situations.



For Heidelberg, separation between data above and data below 95% humidity did not show any significant difference. We did not further analyse the data sets for the one-filter systems, because these are potentially biased in the same way as the HRM (as discussed in the text).

Best regards,

Ingeborg Levin, Dominik Schmithüsen and co-authors

References

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

Xia, Y., Sartorius, H., Schlosser, C., Stöhlker, U., Conen, F. and Zahorowski, W.: Comparison of one- and two-filter detectors for atmospheric ^{222}Rn measurements. Atm. Meas. Techn. 3, 723–731, 2010.