

First we would like to sincerely thank this reviewer for his/her comments on our manuscript. Please see our replies below:

(1)

Page 5 Line no. 62, The 4-hour accumulation with the soil chamber seems to be enough to increase water content (moisture) of surface soil and to suppress radon exhalation from the ground surface, because the studied areas have so shallow water table less than 1 m depth. Are there any observation, analysis or discussion about the effect of this phenomenon in the referred material (Manohar et al.)? If not, it should be noted that the results of radon flux measured by the chamber method would be possibly underestimated.

The 4 hour accumulation period seems somewhat long indeed but this was chosen because of the (expected) low radium content in the soils. Furthermore the soil around our site is made up of compacted “marine” clay which, although porous, has a relatively low permeability and hence water flow is very low. We do not expect our measurements are underestimated significantly because we measured the soil water content 0.3 m below the chamber and did not observe any sudden increases in moisture content. Of course, the measured soil water content as well as the measured Radon flux might not be representative for the much larger region as measured by SPOT-EC. But that is actually a main point of our work. We added this to the discussion section of our manuscript and included an explanation on the accumulation period in the text..

(2)

Table 1 The error of radon flux excluded 12 values by SPOT-EC in LUT site might be 0.02 atoms cm⁻² s⁻¹, as written in the pages 8 and 15.

Correct (typo). Modified text.

(3)

Discussion about Fig. 7 Each “event” has different but not independent footprint from the others’. The footprints with longer fetches as well as shorter ones contain information about the flux from the ground just under, or closer to, the towers to different degree. Thus, is there any possibility that the estimated radon fluxes for more distant areas from the towers are, in the cases of this study, underestimated? The authors might be recommended to clarify this attention in this manuscript. It is agreed that the tendency of radon flux distributions expressed in Fig. 7 is qualitatively correct.

This is a good point. This was actually the rationale behind the original SPOT method, of which the SPOT-EC method is an extended version. With this method the flux for is calculated from (a collection of) single observation points instead of a regression fit through all observations in a longer period (e.g. diurnal or weekly). Using the regression fit method, nearby emissions would be oversampled whereas with the SPOT method we actually get the ‘real’ mean flux per event which is representative for the area covered by the sampled air mass. For this paper we have included all events that are thought to be representative for the area around our sites (using the selection criteria described in Sect. 2.3) in the calculation of the regional mean value. In principal we could also have calculated the mean value using only events representative for the mean flux of a defined distance from the tower. In that case we would have e.g. used only those events representing 20 km and further from the site (based on event duration times wind speed) but we choose to also include the events covering shorter distances because: (1) otherwise we would have had less data to calculate the mean value from, (2) the estimation of the covered area is only a rough estimate and (3) we wanted to compare our results with chamber measurements which were performed directly next to the towers.

Note also that polar plots in general do not provide a very robust illustration of the distance of

the emissions for a similar reason: in the case of a large emission source nearby the tower, also the points on the edges of the plot will be affected, because they represent the average emissions for the complete coverage of the event (e.g. up to 60 km from the site). High values at the edge of the plot might therefore wrongfully suggest that there are large emission sources at the end of the footprint. This was also discussed by van der Laan et al. (2014).

(4)

Page 14 Line no. 24: Typing mistakes break the sentence.

TECHNICAL CORRECTIONS:

Page 2 Line no. 21: The notation of “222Radon” and “226Radium” should be as “Radon-222” and “radium-226”, respectively.

Figure 1 Some expression of the scale of the map is desired.

Page 4 Line no. 22: “Point” would be “Pair”, as the authors call it in the abstract and the conclusion.

These comments were addressed already before the online discussion.

References

van der Laan, S., van der Laan-Luijkx, I. T., Zimmermann, L., Conen, F., and Leuenberger, M.: Net CO₂ surface emissions at Bern, Switzerland inferred from ambient observations of CO₂, delta(O-2/N-2), and (222) Rn using a customized radon tracer inversion, *Journal of Geophysical Research-Atmospheres*, 119, 1580-1591, 10.1002/2013jd020307, 2014.