

Interactive comment on “TransCom continuous experiment: comparison of ^{222}Rn transport at hourly time scales at three stations in Germany” by S. Taguchi et al.

Anonymous Referee #1

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General comments:

In this paper the authors used radon measurements collected at three continental sites to evaluate the performance of 14 TransCom atmospheric transport models in simulating tracer transport in/close to the boundary layer. The primary focus of the present work is on the role of vertical mixing in regulating tracer transport. A number of new findings are presented: a) at Heidelberg the radon concentration is either negatively or positively correlated with the diurnal amplitude of PBL height in each model, depending on the season; b) at Schauinsland, the best correlation could be achieved when the simulated value is taken at the station altitude; c) significant inter-annual variations

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of radon flux is postulated to explain the temporal variations of the mismatch between modeled and observed values; d) in order to reasonably simulate the radon concentration at Freiburg, models need to well resolve the local stable boundary layer. The analysis made in this paper is very attractive to me and the method adopted is sound. These findings will benefit the transport modeling community in providing better evaluation strategy at these sites. I recommend the authors to make some minor revision before the final publication.

Specific comments:

1) Section 1, page 19258: You mentioned the radon flux map by Szegvary et al. (2007) is spatially and temporally resolved. Did Szegvary et al. (2007) or others apply this map in the ^{222}Rn transport simulation? I wonder if the temporal variability in exhalation rate at Freiburg and Heidelberg could change the seasonal cycle of simulated ^{222}Rn concentration significantly. Can this data be used to estimate the uncertainty related to local exhalation rate in this work?

2) Section 2.1, first and second paragraph (page 19259–19260): In my opinion, this part could be moved to appendix. First, the data correction used here may be useful for other related studies and can be cited as appendix directly. Second, it will make this section more readable for general readers or modelers not familiar with measurement technique.

3) Section 4.4, page 19266, line 1: Please define “NSD”.

4) Section 4.6, page 19269, line 25: You analyzed the relationship between normalized seasonal mean concentration and PBL-height diurnal amplitude at Heidelberg. Have you made the same analysis for Freiburg and Schauinsland? Will the relationship at Freiburg be different from that is observed at Heidelberg?

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Technical corrections:

- 1) Page 19258, line 10,14,15: Please use either “s-1” or “sec-1”, but not both
- 2) Page 19285, caption of Fig.5, line 1: add “(N.S.D.)” after “normalized standard deviation”, as it appears in the figure.
- 3) Page 19286, caption of Fig.6, line 4: “Measured “ should be “Simulated”

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 19253, 2011.