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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A map of radon flux at the Australian land surface" *by* A. D. Griffiths et al.

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Comments:

Radon is a useful tracer for studying atmospheric science. Detailed information on both spatial and monthly distributions of ^{222}Rn flux density from the land surface is helpful for accurate validation of the transport and mixing models. As the large-scale and long-term field measurements are impractical, estimation of the flux density and its distribution based on a reasonable mathematical model is preferable. Based on an improved model and the related databases, this work shows the best estimation results of ^{222}Rn flux density from the land surface of Australia.

Methods are well described and sound, even though both the accuracy and the representation of measurement results are still not satisfied. The diffusion model extended to two layers of the soil improved the estimation, and the introduction of calibration fac-

tor (c) also improved the estimation provided that the measured results were accurate and comparable to the calculated results. Results are also sound, but the descriptions and explanations of the results are still insufficient. Discussion on the map limitations and the uncertainties is generally satisfied. Effects of the change of soil temperature on ^{222}Rn diffusion (not emanation) and the variation of terrain on the estimation are desired to be further discussed.

Technical issues:

1. The description "In the absence of western Europe's high-density gamma dose rate network, Zhuo et al. relied on soil and climate maps to estimate fluxes" (p.14315) is not accurate. Actually, China has a more intensive database of terrestrial gamma dose rate than that of soil ^{226}Ra content. As the dose rate is not always directly proportional to the ^{226}Ra content, the authors preferred using the soil ^{226}Ra contents to estimate the ^{222}Rn fluxes.

2. Please denote "Other soil properties" in page 14321 in details.

3. Is it possible to show both the location and the geographic extent listed in Table 1 in Figure 2 or Figure 3?

4. It is better to add information on the month and year after the locations in Figure 6.

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