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Atmospheric Chemistry and Physics Discussions

Interactive comment on "^{222}Rn calibrated mercury fluxes from terrestrial surface of southern Africa derived from observations at Cape Point, South Africa" *by* F. Slemr et al.

Anonymous Referee #1

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This paper uses concurrent measurements of GEM and 222Rn at Cape Point to deduce surface fluxes of GEM in southern Africa through interpretation of GEM-222Rn correlations. The scope and results of the paper are fairly limited but it still provides a useful addition to our scant knowledge of Hg terrestrial fluxes, with the first data for the southern hemisphere. The comparison to model estimates provides a valuable check on current understanding. I recommend publication after consideration by the authors of the following points:

1.P. 8218, line 27: "No relation whatsoever" would also tend to give you zero slope.

2.P. 8219, line 11-12: "Figure 3 shows the intercepts and the slopes of all GEM vs. 222Rn correlations in the upper and lower panel, respectively." It's the other way around in the figure.

3.P. 8219, lines 18-20: I don't see how plotting slope vs. intercept would diagnose the sensitivity of the flux to GEM concentration. The intercept presumably represents the background GEM, from marine or free tropospheric air. It doesn't tell me much about the GEM concentration actually interacting with the soil surface. This point about the lack of dependence of the flux on the GEM concentration is repeated in conclusions. One would in fact expect the dry deposition flux of GEM to be dependent on the GEM concentration through the dry deposition velocity. The current paper challenges that view but in my opinion it is not really justified in doing so.

4.P. 8220, lines 25-27: I am not convinced that RGM dry deposition would be negligible. With a concentration of 7 pg m-3 and a deposition velocity of 1 cm s-1 the RGM dry deposition flux would be 0.25 ug m-2 h-1, of comparable magnitude to the values presented here. So the claim that the GEM fluxes presented here effectively represent total mercury dry deposition fluxes may not be correct.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 8213, 2013.