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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The diurnal evolution of ^{222}Rn and its progeny in the atmospheric boundary layer during the Wangara experiment" *by* J.-F. Vinuesa et al.

Anonymous Referee #1

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The Vinuesa et al. paper concerns essentially the diurnal evolution, in the atmospheric boundary layer, of the radioactive equilibrium between radon and its daughter products. Evolution of Radon concentration and of the radioactive equilibrium doesn't corresponds to the same scale. Radon 222 with its lifetime of 3.8 days move over long distance. Its concentration is function of the flux from ground, which can be variable along the travelling trajectory of the air mass and of the dynamic of the low atmosphere. Locally the variation of radon concentration is not only function of local conditions of the boundary layer stability, but also of the advection. Radon concentration is higher in a continental air mass than in a maritime one, in an air mass moving over a dry ground than over a wet, etc.

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Radon can be used as tracer of stability of the boundary layer but also as tracer of continental characteristic of the air mass. In the model of Vinuesa et al, radon advection is determined by the boundary condition, but there is no discussion about this problem of radon advection. The radioactivity equilibrium in the domain of the modelisation is also function of advection.

Radon daughter products are fixed on atmospheric aerosol. Radioactive equilibrium between radon and its progeny depends of the boundary layer stability, but also of the boundary layer condition at ground level. Dry deposition of aerosol particles, depending of particle size, ground rugosity, atmospheric turbulence near ground level; give a negative flux of daughter products at ground level. This parameter, the dry deposition, seems not to be taken into account in the model of Vinuesa et al.

In the text, So and Si are concentrations expressed in radioactive activity. It is not clearly explain in the text of the paper.

Results of Vinuessa et al. seem very difficult to apply for experimental applications. Radioactive disequilibrium, between 0,9 and 1 are very difficult to measure and a fortiori between Radon and ^{218}Po (RaA), near 0.99. In fact ^{218}Po and radon can be considered in radioactive equilibrium and ^{218}Po can be used to measure radon concentration.

In conclusion it will be necessary to clarify the paper and discuss about. radon advection, dry deposition of daughter products, and the possible application of the results.

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 8895, 2007.