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Atmospheric Chemistry and Physics Discussions

Interactive comment on "High-time resolved radon-progeny measurements in the Arctic region (Svalbard Islands, Norway): results and potentialities" *by* Roberto Salzano et al.

Anonymous Referee #2

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Define Sbeta, Lbeta and Cbeta at the first appearance. Actually they are defined much later, above Eq. 5. Do not use "radon daughter". Instead should be used "Radon progeny". Please give more details about Eqs. 6. How were these equations derived. From methodology section is not clear whether particular radon/thoron progeny determined, (i.e. could you determine Po218, Pb214 Bl214 etc) or you determine just total sum of beta counts due to radon, thoron and cosmogenic nuclide. Above Eq 1 was written that Tbeta is number of beta particles emitted by different nuclides. However, later in Eq 7, TïĄć has somewhat different meaning. In Eq. 7 TïĄć is number of counts due beta emitters in first and fourth measuring intervals. In Eq. 7 progeny concentration was multiplied with detection efficiency which produce count numbers.

What is the sense of decay parameters (ðİŚŚðİŚŰðİŚŻ) in Eq. 7 is not clear- please explain. I have experience with radon progeny measurements from beta emitters on filter. Very often, some physically non realistic results were obtained- due to i) variation of detection efficiency because of beta spectrum changing during the counting, and ii) counting statistic which is important source of errors particularly when the count rate is small. Authors devote significant care to the variation of detection efficiency, but the second fact is unavoidable. I can assume that count rates in measuring intervals are small, due to small radon concentration in open space. Then, statistical variations are large while this method is very sensitive on the number of counts. I would like to know did authors meet some physically unacceptable results or not. Bellow Eq. 9 was written "The estimation of the three components was obtained minimizing the chi squared indicator, calculated between the four counting intervals and the respective values simulated between the two endmember situations " . Can you explain in more details what is the meaning of the previous sentence. From this sentence follows that values were simulated. Then what was the purposes of the measurements. Counts obtained in 2nd and 3rd intervals were not used in calculations. Does this mean that those counts were taken from simulation (not from measurements) in order to avoid physically non realistic results.

I am not expert in climatology. so I will not comment second part of ms, which is related to trajectory of air masses etc.

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