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Atmospheric Measurement Techniques Discussions

Interactive comment on "An Automated On-line Instrument to Quantify Aerosol-Bound Reactive Oxygen Species (ROS) for Ambient Measurement and Health Relevant Aerosol Studies" *by* Francis P. H. Wragg et al.

Anonymous Referee #1

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This paper presents a new portable instrument to measure particle-bound ROS with the DCFH assay suitable for field deployment. The general method has been previously published, here the unique feature is the portable design. I would not characterize this as a significant advancement in instrumentation, but I can image that the design may be of general interest making the paper worthy of publication. The paper is very well written and organized, I have only a few minor comments.

Abstract line 63, not sure a 12hr limit allows for extended field operation. I would say it is more like extended field operation if an operator is on site every day.

Relating to this: How often does the filter need to be changed, are there issues with accumulation of non soluble species on the filter? How often do the chemicals need refreshing, ie, are the chemicals stable, are there issues with DCFH being stored beside the instrument for long periods, what is the effect of temperature where the system is operated on how long the chemicals are stable? . For example, what is the actual limitation on the extent of time the instrument can be run without attention? In the conclusion it appears to be only the size of the waste and chemical containers that determine the limit, implying really there is no limit if one gets bigger containers.

When adding variable amounts of liquid to the system, and given that some liquid added leaves the system as vapor, which also varies, discuss how overall liquid dilution is determined and factored into the ROS concentration calculation.

Line 78-79, need references.

Line 215, typo. Also, please add how LOD was determined.

Because this is a bulk reaction system, ie the sample is mixed within a fairly larger volume of water, time smearing of a sample is expected. Does the 12 min time resolution roughly correspond to some measure of response time expected for the volume of liquid in the collection system, say assuming it is perfectly mixed?

Lines 272 – 275 are not clear, ie are the numbers, 1.6 and 16.8, how much weaker the response is? If so, what does this imply for the method as a measure of aerosol ROS if the response is specific peroxide dependent? How does one know that in the ambient atmosphere the system is just mainly a H2O2 detector? (For more on this see last comment).

Fig 8. What are the error bars? How does one know if the variability observed in ROS is not just noise, rather than the instrument responding to something real in the aerosol? Eg, is the ROS correlated with mass (r=? could be added to the figure). Any other data collected at the site that could show the data variability makes sense?

Can one estimate the H2O2 concentrations at the site and compare the magnitude to recorded ROS (how do you know you are just not measuring mainly H2O2)? A much longer time series of data would greatly strengthen this paper. Diurnal profiles could be informative (ie, correlation with oxides). This is a major weakness of the paper since the authors are asserting the instrument is designed to run for extended periods with limited attention and a larger data set would prove highly useful in assessing the data generated; the small data set tends to undermine the premise of the paper.

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