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Atmospheric Measurement Techniques Discussions

Interactive comment on "Development, characterization and first deployment of an improved online reactive oxygen species analyzer" *by* Jun Zhou et al.

Anonymous Referee #1

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The paper from Zhou et al., describes the development of a new online system for measuring the ROS concentration of PM. The paper makes a comparison between the newly developed online system and conventional offline system for ROS measurement. It also highlights the advantages of using an online system for measuring ROS concentration and the negative effects of long filter storage time on the offline ROS measurements. The authors then put the instrument in the field and used it many campaigns, which demonstrate the workability of the instrument. From reading the paper, it seems to me that the authors are confused with their terminology. They have been using the term oxidative potential and ROS interchangeably, which are actually different. Oxidative potential is the capability of the PM to generate the reactivee oxygen

species. What the authors are measuring is the ROS, which is already in the particulate phase. The species like quinones, metals can generate the ROS in a suitable reductive environment so they could considered as the precursors of ROS, but the author's instrument specifically measure the particulate ROS and not the potential of such species to generate ROS. In that sense, I think the experiments conducted using Fe are meaningless. Another concern is that the authors have not talked anywhere about the collection efficiency of their PILS. If they have done these tests in previous papers then they should report those figures again in this paper. The reviewer feels that more details regarding the online instrument operation procedure and field set up needs to be added.

Some of the specific comments are below:

Page 3, lines 10-15: It was mentioned that PILS is also called mist chamber. PILS is generally used to refer to a very specific aerosol collection device (Orsini et al.,2003). Whereas, mist chamber aerosol collector is usually used when referring to Cofer Scrubber (or mist chamber) (King et al.,2013). The device mentioned in this study is also an aerosol particle collector (Takeuchi et al., 2005), however the nomenclature used in this paper could cause some confusion for the readers. Hence, instead of referring as PILS it would be better to refer to it as aerosol/particle collector. Page 10: Lines 5-10: The air stream 1.7LPM was mixed with OF-UPW and sprayed into the mist chamber with 0.3 ml/min. Was there any loss in volume of OF-UPW which was filtered from the hydrophilic filter? What was the volume of extract used for ROS concentration analysis? Was the same volume used for both online and offline analysis? The ambient air sampling duration adopted for the online system and the minimum sampling time required to get a ROS concentration which is above the detection level of the online system, should also be mentioned. Regarding the hydrophilic and hydrophobic used in this study, how frequently was it required to replace them? Was there clogging of filter pores (ie. pressure drop) which could affect the air flow. More details about the daily maintenances (frequency of filter replacements, frequency of replacing the solvents

etc.) and discussion about the portability of the system can be included. Some more discussion about the extent of automation of the system (was all the online system experiments described in this paper performed without any manual assistance?) would be beneficial.

References Takeuchi, M., Ullah, S. R., Dasgupta, P. K., Collins, D. R., & Williams, A. (2005). Continuous collection of soluble atmospheric particles with a wetted hydrophilic filter. Analytical chemistry, 77(24), 8031-8040. Orsini, D. A., Ma, Y., Sullivan, A., Sierau, B., Baumann, K., & Weber, R. J. (2003). Refinements to the particle-into-liquid sampler (PILS) for ground and airborne measurements of water soluble aerosol composition. Atmospheric Environment, 37(9), 1243-1259. King, L. E., & Weber, R. J. (2013). Development and testing of an online method to measure ambient fine particulate reactive oxygen species (ROS) based on the 2', 7'-dichlorofluorescin (DCFH) assay. Atmospheric Measurement Techniques, 6(7), 1647.

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