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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Reactive oxygen species associated with water-soluble PM2.5 in the southeastern United States: spatiotemporal trends and source apportionment" *by* V. Verma et al.

Anonymous Referee #2

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This manuscript is a companion paper of Fang et al., "A semi-automated system for quantifying the oxidative potential of ambient particles in aqueous extracts using the dithiothreitol (DTT) assay: results from the Southeastern Center for Air Pollution and Epidemiology (SCAPE)" Atmos.Meas.Tech.Discuss. 7,7245-7279,2014. This paper focus more precisely on the relationship between the composition of water extracts from filters and their redox activity toward DTT. A very large number of filters (23 h integrated samples) have been collected during one year around Atlanta and Birmingham. The water extracts of these filters have been analysed for components like OC,

"brown carbon", metals, inorganic ions as well as for their oxidative potential toward DTT. Seasonal and spatial variability of different aerosols characteristics are described. Identification and apportioning the sources potentially explaining the oxidative activity is reported. The important results are that secondary oxidation processes are the dominant contributor in summer to the DTT activity whereas biomass burning is the most important one in winter.

This paper is worth to be published in ACPD as it integrates a large number of data on DTT activity of ambient PM2.5, which is not common in this field. As the DTT activity may be an integrative PM characteristic related to health effects, the identification of relevant compounds explaining this redox activity is an important scientific and regulatory question. In addition, the paper is well structured and clear.

For discussion purpose, I have the following specific comments/question:

- §2.3: How long where the filter stored at -18° before analysis? Did the author observed any reduction/increase of the DTT activity during this storage process?

- §2.6: The measured DTT activity in this study corresponds to a sub-fraction of the total PM2.5 (water extractable fraction). For consistency reasons, the expression of the DTT reactivity should be based on the amount of the water extracted mass and not based on the total PM2.5 mass. This last calculation could be done only if the insoluble mass fraction is negligible compared to the water soluble fraction. Is it the case in this study?

- §3.2, line 6-8: Regarding the daily variability of the DTTv activity, the authors attribute it to different and general factors. Do the authors have access to meteorological data collected during this sampling period and could they identify variables such as temperature, solar irradiation, wind, ozone level,. . .which may contribute to such variability?

- §3.3.1: As EC and OC have been determined on the total particle (insoluble + soluble part), their correlation with the DTT activity should be done with the total col-

lected particle only and not with the soluble sub-fraction as it is done in this study. It is possible that the insoluble part contribute to some extent to the DTT activity (see for example McWhinney et al., “Filtrable redox cycling activity: A comparison between diesel exhaust particles and secondary organic aerosol constituents”, Environ. Sci. Tecnol.,2013, 47, 3362-3369). Do the authors have some information about the contribution of the insoluble part to the DTT activity?

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 19625, 2014.