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Interactive comment on “Oxidant production from source-oriented particulate matter – Part 1: Oxidative potential using the dithiothreitol (DTT) assay” by J. G. Charrier et al.

Anonymous Referee #1

Received and published: 6 October 2014

This manuscript by Charrier et al. provides information regarding the oxidative potential of source-segregated ultrafine and submicron particles in Fresno, CA, using a well-established and widely used acellular assay (DTT consumption rate). The authors estimated the contribution of individual soluble metals to the overall DTT activity based on a previous publication by the same group (Charrier and Anastasio, 2012) and their results indicate significant contribution of water soluble transition metals (notably Cu and Mn) to the overall DTT activity of the PM samples.

The manuscript is well-written and provides important information regarding the role of metals on the overall oxidative potential and DTT assay in particular. Publication in

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ACPD is recommended after considering the revisions noted below:

1) Section 2.1., P: 24153: method description is not sufficiently detailed. It is not clarified in the text why summer daytime samples were collected over one time period but winter daytime samples are segregated into three different periods (i.e. Table 1). Also, although the authors mention in page 24154 (first paragraph) that the seasonal periods defined as “winter” and “summer” do not correspond to the typical definitions these of seasons, it is nowhere mentioned what months are clustered as “summer” and what months as “winter” ? This should be clarified in the text and a brief description of meteorological conditions should also be added to the Supplements, as this information can be useful in interpreting some of the seasonal trends and results (see the next comment).

2) In Figure 1, a distinct seasonal trend is evident with higher summer-time metal concentrations compared to winter. There is, however, no explanation regarding this trend and possible reasons in the text. In typical winter vs. summer conditions an elevated metal concentration in winter is often more expectable (due to the lower atmospheric mixing height). Is there any explanation why summer-time metal content of PM is found to be considerably higher than winter? Again, meteorological information about these two seasonal periods would simplify the interpretation of these results.

3) It is important (and intriguing) that water soluble metals are found to have a major contribution to the DTT assay. The extent of this effect is, however, somewhat overestimated in the manuscript. In Figure 3, the authors calculated DTT activity based on DTT rate associated with individual water soluble metals (method described in Charrier and Anastasio, 2012), and the results imply that Copper and Manganese are the sole chemical species responsible for DTT activity in 36 out of 38 samples (Page 24161, last paragraph). It is difficult to make this direct conclusion without quantifying the DTT activity of the organic fraction as well. The authors explain higher summer-time DTT levels by higher corresponding summer-time metal concentrations. While metals abundance can indeed be one of the main factors, presence of other species (specifically

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secondary organics, not measured in this study), may also have significant contributions.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 24149, 2014.

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14, C7726–C7728, 2014

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