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Interactive comment on “PM_{2.5} water-soluble elements in the southeastern United States: automated analytical method development, spatiotemporal distributions, source apportionment, and implications for health studies” by T. Fang et al.

Anonymous Referee #1

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This paper describes extensive measurements of water soluble elements in PM_{2.5} aerosol in the southeastern US. This work is a tour-de-force in terms of the numbers of measurements (500), which permit analysis of spatial homogeneity and seasonal dependencies. For the most part, the measurements were made by a commercial x-ray fluorescence system, along with some measurements of WSOC using a TOC analyzer. In particular, samples were collected on filters and then solubilized and atomized, be-

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fore being directed to the analyzers. The authors do an extensive characterization of the efficiency of detection of elements from solutions of known concentrations from which they extract a correction factor applied to their data. They also compare sulfur analyzed by ion chromatography to that measured by XRF. All-in-all, the analytical measurements are first-class, made by a group known for its experimental rigor. The data are analyzed largely by PMF (along with some COD work) and a good justification of a four-factor solution is given in the Supplementary Information, including illustration of the size of the residuals for each element.

I think this is an excellent study and I highly recommend publication.

My comments are all relatively minor:

Are there any analytical matrix effects associated with the XRF detection, i.e. presence of one element affecting the signal from another? With this being XRF, I would not expect so but just wondering if the authors examined this?

I am puzzled why some elements were given a value of 0.5 of LOD when they were not detected, for the PMF analysis. Why not give them a value of zero? Does this affect the PMF solutions?

Can the WSOC data also be presented, for example in Figures 5 and 6?

Lastly, is there a way to substantiate the suggestion that some elements (e.g. those in dust) are higher in summer periods because the weather is drier? In particular, is there a way to summarize or incorporate the meteorological conditions into the analyses? e.g. lower dust or break/tire wear after precipitation? Higher sulfur after high pressure times, etc?

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 17189, 2015.