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Atmospheric Measurement Techniques Discussions

Interactive comment on "Characterization of trace metals with the SP-AMS: detection and quantification" *by* S. Carbone et al.

Anonymous Referee #2

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The manuscript evaluates a detection and quantification of metals by deploying an SP-AMS instrument. Relative ionization efficiency was found for several trace metals by performing laboratory experiments and compared to the RIE derived from theoretical calculations. Appropriate detection limits of specific metals were also derived, which, along with RIE, enabled the quantification of metal concentrations in ambient aerosol. Since a presence of the trace metals can affect human health, but their levels and effects are still purely understood, this study fills the gap and enhances the quasi real time SP-AMS potential in evaluating and quantifying pollution episodes in urban environment and assessing the risks to human population. Therefore, I recommend this study for publishing in AMT after revisions listed below are made:

My major concern is with the quantification of metals in ambient samples, which is

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the main outcome of this paper, so merits more detailed evaluation and discussion. As for now, Figure 8 gives an impression that LD/quantification of metals depends on rBC, while LD calculations described in paragraph 3.2.4 did not account for this fact. I would strongly recommend evaluating the influence of rBC concentration on LD's of the metals and their quantification. Say, by identifying a threshold value for rBC in order to quantify metals in ambient samples or give more comprehensive discussion on conditions required. Lines 27-28 page 5751 and 1-4 page 5752 raise a doubt on proper quantification in ambient samples, however, conclusions state opposite 'A method for the detection and quantification of the trace elements with the SP-AMS was presented'. You either present the method for quantification with all explanations and evaluated uncertainties or this is just another study towards the quantification, but it cannot be both.

Specific comments:

Use consistent abbreviation for Regal black, it is RB in the abstract and rBC in the rest of the manuscript. BTW explanation for rBC abbreviation is absent from the text, so I just assumed that it is Regal black.

Lines 23-25, page 5736: The first sentence of Introduction combines the real metal sources (combustion and industrial sources) with the metal carriers (sea salt, dust), it should be separated.

Was RH of aerosol flow measured? as 25 cm diffusion dryer might not be enough to dry nebulised particles.

Lines 11-13, page 5740: This sentence is not clear

Lines 22-25, page 5740: Add some discussion on how relevant rBC is to the ambient measurements in addition to its suitability for SP-AMS.

Line 15 page 5741: acid as well?

Line 22 and 24 page 5741, correct ''species"

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Lines 17-19 page 5743: it requires more information – vaporiser and filaments are off, so what is causing the TSI? Laser? It should be written.

Figure 3. Figure caption is not clear, what is rBC fraction relative to the rBC, and why Rb fraction relative to rBC is equal 1, which would mean no rBC in the particle and, I assume it was not the case here, therefore, caption needs clarification.

Figure S2: word 'vaporiser' is missing after 'Tungsten' as filaments can also be made of tungsten.

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 5735, 2015.