

Interactive comment on “Quantitative sampling and analysis of trace elements in ambient air: impactor characterization and Synchrotron-XRF mass calibration” by A. Richard et al.

Anonymous Referee #1

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1. Does the paper address relevant scientific questions within the scope of AMT? YES
2. Does the paper present novel concepts, ideas, tools, or data? YES
3. Are substantial conclusions reached? YES
4. Are the scientific methods and assumptions valid and clearly outlined? YES, I have some doubts on section 4, see below
5. Are the results sufficient to support the interpretations and conclusions? YES, in the sense described below
6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? YES
7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? YES
8. Does the title clearly reflect the contents of the paper? YES, but it can be improved
9. Does the abstract provide a concise and complete

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summary? YES 10. Is the overall presentation well structured and clear? YES 11. Is the language fluent and precise? YES 12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? YES 13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? May be some changes in sect. 4, see below 14. Are the number and quality of references appropriate? YES 15. Is the amount and quality of supplementary material appropriate? No supplementary material, some suggestions below

General Comment:

This manuscript faces a crucial problem in aerosol studies and source apportionment i.e. the combination of size and time resolved aerosol speciation. There are very little examples of techniques/methods which provide all these information and any further work is highly welcome. The core of the manuscript is the characterization of the RDI impactor and of the SXRF analysis of the samples collected with this equipment. Two points are discussed: the cut-offs of the rotating impactor and the sensitivity curve for SXRF elemental analysis. Both the topics are of course very important and the Authors present a long and detailed discussion which seems to be clear and convincing. My only remark/question is on the homogeneity of the aerosol deposition inside each "bar" (see fig. 1) of the impaction stages: this is particularly important since I understand that just a very small portion of each "bar" is actually analyzed and this could create problems. In other similar cases (such as the IBA analysis of streaker samples described in one of the referenced papers: D'Alessandro et al. 2003) this problem was acknowledged and faced scanning the whole deposit with the incident beam. The Authors should comment this point which, in my view, is also related to the discussion in section 4 where the quality of the paper decreases a little bit. In fact, while in the previous sections many details are provided, in sect. 4 the discussion is very short and rough. Actually, in the present form this part does not add so much to information. The agreement between HVS and RDI data is not completely satisfying and the few reported data present significative discrepancies (in some cases, see fig. 11) which

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could alter significantly the output of the upcoming PMF analysis quoted in the last statement of the text. May be the origin of such discrepancies related to inhomogeneity of the RDI samples? The last statement of sec. 4 (the overall comparison of 24 h...etc) is very qualitative and, to me, is not completely supported by the data shown in fig. 11). I would suggest to include as supplementary material the time series of the elemental concentration values measured in the three stages during the Zurich experiment: this could help in understanding possible artifacts due to samples inhomogeneity. I think that this issue should be considered before accepting the manuscript for publication. I would also suggest to change the title a little bit since the focus of the manuscript is on the performance of the sampler+analytical techniques. I would prefer: Quantitative sampling and analysis of trace elements in atmospheric aerosols: impactor characterization and Synchrotron-XRF mass calibration

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 2477, 2010.

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