

Interactive comment on “Field and laboratory evaluation of a high time resolution x-ray fluorescence instrument for determining the elemental composition of ambient aerosols” by Anja H. Tremper et al.

Anonymous Referee #3

Received and published: 10 January 2018

The paper “Field and laboratory evaluation of a high time resolution x-ray fluorescence instrument for determining the elemental composition of ambient aerosols” by Tremper et al. is a comprehensive study aiming at providing laboratory and in-field information on the performance of the X-ACT 625 instrument. The paper is well structured, data presentation is adequate and well commented. X-ACT is an innovative instrument and improving its characterization is important for the scientific community. Thus, in my opinion the paper is of interest for publication in AMT and publication can occur after few revisions are performed.

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Major concerns:

P10L18: why is Cd not mentioned? Cd is the element providing the strongest differences in all cases, but its discussion is completely missed in the text. Please add comments about it, or give explanation why it should be rejected. In this case, please remove it throughout the manuscript.

P11L30-35: Parallel sampling of PM₁₀ and PM_{2.5} is needed to determine PM_{2.5}/PM₁₀ element ratios. Sampling different aerosol size fractions in different seasons and using ratios to separate fine and coarse contributions by elements is misleading. Please remove.

X-ACT is an on-line device providing elemental composition of atmospheric aerosol. Other instruments (e.g. streaker sampler, rotating drum impactors) can provide high time-resolved measurements by off-line analyses performed at accelerator facilities (e.g. by Particle-Induced X-Ray Fluorescence or Synchrotron Radiation XRF). I think a comparison with such measurements should be mentioned as a perspective.

Minor concerns: P2L2: please evidence that modelling approaches (and not only measurements of aerosol chemical composition) are needed to gain information on aerosol sources

P3L2: please add ion chromatography for inorganic ions (as it is cited in the following and applied in the paper)

P3L23: “sample a narrower range of components”. Please change “sample” with “measure” (instruments sample what is in air but are not always able to quantify)

P5L3: wrong formula for Ammonium sulphate (cfr. P5L13 where it is correct)

P6L6: “where source contributions may be assumed based on one of these measurement techniques”. I guess the authors refer to receptor modelling approaches for source apportionment. Please change into “where source contributions may be estimated by receptor modelling using measurements of chemical components as input”

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(the measurement techniques do not provide source contributions, but quantify chemical components)

P7L3-5: obscure. Please add some explanation

P8L7: 3 or sqrt(3)?

P8L12&15: what is k?

P8L27: Are the authors referring to statistical significance?

P9L1: “dominated by fireworks activity (Oct-Dec 2014)”. Do the authors mean that fireworks were the main source impacting the area in those 3 months? If not, please rephrase.

P9L7-19: First of all, suitable references to fireworks tracers in aerosol are missing. Secondly, high time resolved measurements of elemental composition during fireworks has already been presented in the literature. In one case, they were also exploited for source apportionment by receptor models (Vecchi et al., 2008. DOI: 10.1016/j.atmosenv.2007.10.047)

P9L22&34: “mean concentrations”. Please change into “mean elemental concentrations”

P10L1&P11L2: how was non-sea sulphate calculated? Please describe or add suitable references. Furthermore, provide references for this choice in the comparison.

P10L28: “filter artefacts”? What do the authors refer to? Sampling artefacts or something else? Please, clarify.

Typos

P2L31: “implementing” instead of “implement”

P7L1 vs P7L2: Middlebook or Middlebrook?

P10L30: change “extends” into “extents”

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P11L7: ".." Change into "."

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2017-363, 2017.

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