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Atmospheric Measurement Techniques
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Discussions

Interactive comment on "Quantitative measurement of PM_{10} by means of X-ray fluorescence spectra" *by* E. Busetto et al.

Anonymous Referee #1

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General comments: The authors describe an automatic device they have developed to sample and analyze in situ and in real time airborne particulate matter (PM) using the X-ray fluorescence, which determines the concentrations of elements between 19 (Potassium) and 82 (Lead). They also describes a new calibration technique which gives the parameters for real time automatic determination of the absolute mass of the chemical species present on the sample. The subject is of interest, however the authors miss to give very relevant information about their system and the relevance of the new calibration procedure is not clearly explained; often, only a qualitative description is given, which is not appropriate for a scientific publication. Therefore, in my opinion, the article cannot be published as it is now but major revisions are necessary.

Specific comments:

1.pag. 4314, line 4: elements like Al, Si, S, Cl which are relevant for aerosol studies are missed; the authors should give a comment about this

2.the authors use quartz filters: why did they make this choice? quartz filters often present worse blank levels respect to other kind of filters

3.§2: most of the relevant technical parameters are not given in the article, only a qualitative description is given, which is not appropriate for a scientific publication. pag 4317, lines 14-22: which kind of inlet is used (PM10, PM2.5..)? is it possible to change it? which is the air flux? Which are the dimension of the filter? Since the areal density of the deposit is an important parameter to obtain a good sensitivity this is a relevant information. Was any comparison made with a certified sampler at least to compare the total aerosol mass? Which is the typical sampling time to obtain sufficient statistics for the most relevant elements? Which is the minimum analysis time to obtain sufficient statistics for the most relevant elements? Which are the dimensions of the detector and which is the distance from the sample? Why a Mo target was chosen?

4.Fig. 1 could be removed

5.Fig. 2: at which concentrations in air correspond the Ca and Cu contaminations due to the filter holder?

6.pag 4318: A basic information are the minimum detection limits (in micrograms/cubic meter) which are obtained by the system. Without these information the performances of the system may be not evaluated.

7.§3: pag. 4319, lines 12-14: Which is the advantage respect to the use of certified standards produced by some companies for XRF calibration?

8.pag. 4319, line 17: the particulates penetrate into the quartz fiber filter, therefore the standard does not represent the real particulate deposited on the filter. The authors should make a comment.

9.I do not understand the advantage of the use of the new calibration method described by the authors. More comments should be given (see also comment to pag. 4319, lines 12-14)

10.pag 4320 lines 1-5: I do not understand what the authors say; if the spot of the beam is the same both for the standard and the sample analysis, the determination of the area illuminated by the X-ray source is not critical at all, if it is smaller than the deposit size, like is done in all the XRF commercial devices.

11.pag. 4320 line 17: if such an alteration is not observed, simple certified standards could be used without any problem.

12.§4: pag. 4320, line 19: What does it mean "standard operating conditions"? Some numbers are necessary.

13.pag. 4320, line 22: why 48 hours if the standard sampling period is 24 hours?

14.No discussion on the procedure which has been used to calculate the experimental error is presented. Which are the uncertainties considered to determine the values reported in the table? Without such a discussion, what the authors say at pag 4321 has no sense.

15.pag 4320,line 11-13: Why did the authors not analyze one of the aerosol standards produced by NIST which are typical for testing the accuracy of the analytical systems? Furthermore, only results for two elements (Fe and Ca) are reported; no comments about other relevant elements like K, Ni, Cu, Zn, Pb .... are done

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Interactive comment on Atmos. Meas. Tech. Discuss., 6, 4313, 2013.