

## ***Interactive comment on “An automatic collector to monitor insoluble atmospheric deposition: an application for mineral dust deposition” by B. Laurent et al.***

### **Anonymous Referee #1**

Received and published: 28 March 2015

Peer review, and interactive public discussion

Does the paper address relevant scientific questions within the scope of AMT? Yes

1. Does the paper present novel concepts, ideas, tools, or data? Yes, the paper presents a practical design and tool for sampling insoluble deposition.
2. Are substantial conclusions reached? Yes.
3. Are the scientific methods and assumptions valid and clearly outlined? Yes, the methods are clearly outlined. Some clarifications on the filter efficiency need to be clarified.

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4. Are the results sufficient to support the interpretations and conclusions? Yes

5. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)?

Yes, as far as I can see.

6. Do the authors give proper credit to related work and clearly indicate their own new/original contribution

Yes.

7. Does the title clearly reflect the contents of the paper?

Yes

8. Does the abstract provide a concise and complete summary?

The last sentence of abstract is descriptive of what has been done but showed no results. It would good to describe the results of the field work.

9. Is the overall presentation well structured and clear?

Yes

10. Is the language fluent and precise?

Mostly. It would be good if a native English speaker could have a look before submission.

11. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used

Yes.

12. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated?

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The authors should consider moving some of the figures to supplementary materials. For example, Figure 2 and 3 do not really contribute to the science case and only provide supporting evidence and therefore they are not absolutely necessary in the main text.

13. Are the number and quality of references appropriate?

Yes

Detailed comments

This paper reports an automatic sampler for collecting insoluble deposition. It will prove useful to quantify the aerosol deposition fluxes at various sites, which will be of great value to constrain global aerosol models. The sampler will provide new and exciting opportunities for the aerosol community. The paper is of value to scientific community. My recommendation is to accept the paper after a full consideration of the comments below and those by the other reviewer.

The chosen pore size is 0.8  $\mu\text{m}$ . This is very large. I am sure there are smaller particles passing the filters. It is recommended that a test is carried out to see how much  $<0.8\mu\text{m}$  particles will go through the filter. This can be done by a successive filtering: 0.8  $\mu\text{m}$  pore size filtering of original sample followed by 0.02 $\mu\text{m}$  pore size or 0.1  $\mu\text{m}$  pore size filtering of the filtrates. By comparing the mass of the particles on the first and second filter, it should be possible to estimate the uncertainty associated with the loss of some of the finer particles.

It may be that this fine fraction is not a major source uncertainty. But if it is, then it would be necessary that the authors consider using smaller pore size filter (slightly longer time does not seem to be a big issue?) or adding a pump although this does add a complexity requiring electricity. Since the pump will only be needed in a short while, it should be able to be powered by car batteries. The study has carefully considered the removal of organic material. However, the black carbon and other anthropogenic

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particles may still be collected. If the particles are collected onto quartz filter, then it is possible to use a thermal optical carbon analyser to measure both insoluble organic and elemental carbon. The reviewer understand that the purpose of the sampler is for dust deposition evaluation but there is no reason why the sampler could not be used for evaluation of deposition of other types of particles including OC/EC. This may be mentioned in the paper so that a wider impact of the paper could be recognized.

This study assumes that all the insoluble material is from Sahara. This is wrong. When the air masses are coming from the European continent, the deposition can be dust or anthropogenic particles from the Europe. Practically, the method proposed may still be useful if the dust events dominated the total insoluble material deposition. However, the study here and any further studies should discuss in detail the uncertainties associated with the proposed study in estimating Saharan dust deposition. This should include both anthropogenic particles and biomass burning aerosol, both of which will add to uncertainty in estimating dust deposition fluxes.

It is recommended that the authors conduct chemical analyses (including metals, crustal elements, and OC/EC) on the collected samples, which will provide important information on the sources of aerosol as well as the deposition flux of insoluble materials other than dust. The authors should be very careful when deciding where to deploy the samplers. Dust deposition fluxes estimated at sites that are subject to intensive anthropogenic or biomass burning emissions could be largely uncertain.

The authors should clarify what the white dots on some of the filters and what is the dark dot on the filter of fourth row and 2nd column.

Table 2: clarify what filter; further tests are needed to check how the mass of different particles will change without filter: we know that dust do contain some water and volatile components which may be lost during heating; clarify what is "finest mineral"? Have you checked the blank filter mass change at different temperature? This can be done but putting a blank filter on Al foil.

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I would like to echo the points by the first reviewer that it is necessary to consider insect contamination. Also new measures should be in place to prevent the bird standing on the funnel causing all sorts of contamination.

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Interactive comment on Atmos. Meas. Tech. Discuss., 8, 2299, 2015.

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