Sharma &al.: Photoacoustic and nephelometric spectroscopy of aerosol optical properties with a supercontinuum light source, Atmos. Meas. Tech. Discuss., 6, 6293–6327, 2013.

REVIEW

GENERAL

The application of a supercontinuum laser and photoacoustics for the measurement of light absorption by particles is to my knowledge presented here for the first time. The whole idea is excellent because at least in principle it makes it possible to measure the whole absorption spectrum in the true aerosol phase. And the instrument presented here also measures extinction and scattering so it essentially also has the means to have an independent absorption calibration. The principle of the method is clearly described but it is also shown that it still has fairly high noise levels in order to deploy it to background air measurements, leaving space for technical improvement. But all in all, I consider the paper definitely worth publishing after some fairly small revisions, suggested in the detailed comments below.

DETAILED COMMENTS

P6294L23 “Entrained mineral dust particles ...” Why do you have the word “entrained” there?

P6295 L9 – 10 “... solar radiation depends upon particles characteristics like ...” remove “s”

P6299 L 13 – 15 “The selection of different wavelength bands is achieved by using a series of singlebandpass filters (BrightLine filters by Semrock) mounted on a rotating filterwheel (Edmund Optics)” . What is the rotating speed? In other words, at what frequency do you get data from any selected wavelength? Does the wheel stop for each wavelength filter for a selected time and then take the next wavelength or is it rotating continuously?

P6301 L14 – 16 “The background signal obtained for scattering and absorption were in the order of 10^3 and 10^2 Mm^{-1}, respectively.” Please give averages and standard deviations and the time that was used for collecting the respective data. That would make this info more quantitative and link it to detection limits.

P6302 L13 “Because our instrument operated only at one wavelength-band at a time...” Now this comes back to my question for P6299: for how long does the instrument measure each wavelength and at what frequency?

P6302, L 16 ... Description of the iron lung. I understand that you present the details in the submitted manuscript but please give some more details also here: how big is the lung? How long does it take to fill it? What is the time resolution you achieve with it?

P6302, instrument calibration. I understand you need high concentrations for the extinction calibration because of the short pathlength but why don't you calibrate scattering with CO_2 like any nephelometer? That would be exact and there would not be the inevitable uncertainty that is always associated with aerosol production. And I would trust absorption calibration with NO_2 more than with soot, the absorption spectrum of NO_2 is well known.
Still about the extinction measurement: if so high concentrations are needed for the calibration, what is the detection limit for extinction? In Table 2 you just present the detection limits for scattering and absorption – give also extinction.

P6307, sections 5.1 & 5.2. Why don't you also give results from modeling with a Mie code? You have nice and clear size distributions, they could easily be used for calculating scattering and absorption and the associated SAE and AAE.

P6310 L23 – 24 "... even in environemtns with ...". Typing error.

Figure 8. Why do you have two y axes in both subplots? The ranges and units are the same both on the left and on the right. Confusing.

Figure 9. How come the Allan deviations have so clear minima at around 250 s and then again increase? Is this just due to some mathematical reasons or is this also true in measurement data? I find it hard to believe that by integrating over about 250 s your scattering noise would be about 0.01 Mm^{-1} which is much better than that in the commercial nephelometers, specially dedicated for scattering.