

Interactive comment on “A new optical-based technique for real-time measurements of mineral dust concentration in PM10 using a virtual impactor” by Luka Drinovec et al.

Anonymous Referee #2

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This work presents a novel on-line detection technique of dust absorption (named VI-PM1) by comparing a coupled high flow virtual impactor sampler with an Aethalometer (model AE33) with the absorption of the submicron aerosol fraction measured with the same absorption photometer. This method was applied for detecting desert dust and was tested in the field for a period of two months at a regional background site in the Eastern Mediterranean. Such new techniques are most valuable to the field and VI-PM1 is expected to provide valuable information about dust particles and their properties. The authors however need to emphasize more the limitations of the method especially under conditions that the mineral dust is contaminated with black carbon.

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Specific Comments

AMTD

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L 195: The effect of water uptake in the sampling line, as could occur in Cyprus in spring time due to high ambient temperatures and RH, would require a drying step prior to the aethalometers which is however not described here. On the other hand, the APS and the nephelometer were connected to a nafion providing measurements in dry conditions. How were data handled since different conditions were applied? What limitations may be introduced due to water uptake by the particles?

L 341: In Fig. 3 there are some periods when PM1 measurements seem to be higher than TSP (e.g. 19 April). Can this be attributed to the unit to unit variability?

L. 350: Since the laboratory tests for the enhancement factor were originally performed with flows 75 and 1.5 lpm and 95 and 5 lpm, why did the flows were finally chosen to be 100 and 2 lpm?

L. 357: It would be better the axis to be in μm rather than nm.

L 410: To my opinion babs, mineral dust is not appropriate to describe the right term of this equation. This would require that there is no BC in the coarse mode, it would fail to describe the possibility of internally mixed BC and dust particles. Once internally mixed, the particles would have different optical properties than those of pure dust (e.g. Scarnato et al., 2015). In the Eastern Mediterranean such a mixture is possible. I recommend to change the left term to bcoarse or similar. This applies to Equation 7 and the subscript of MAC as well. Overall, a short discussion should be dedicated to this issue, expanding the sentence in Line 510 and on.

References

Scarnato, B. V., China, S., Nielsen, K., and Mazzoleni, C.: Perturbations of the optical properties of mineral dust particles by mixing with black carbon: a numerical simulation study, *Atmos. Chem. Phys.*, 15, 6913–6928, <https://doi.org/10.5194/acp-15-6913-2015>, 2015.

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