Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-191

Anonymous Referee #1

Referee comment on "Inter-comparison of online and offline methods for measuring ambient heavy and trace elements and water-soluble inorganic ions (NO_3^-, SO_4^{2-}, NH_4^+, and Cl^-) in $PM_{2.5}$ over a heavily polluted megacity, Delhi" by Himadri Sekhar Bhowmik et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-191-RC1, 2021

The authors compare online and offline methods for the determination of elements and ions at highly polluted sites in Delhi. The topic is important and online methods would be needed for receptor models as they have better time-resolution. However, online instruments have not been very comparable with the traditional methods, there are problems e.g. with calibration and detection limits.

Comments:

- 32 The higher concentrations on the filters were due to the formation of particulate (NH4)2SO4.

This needs clarification (why?).

- 34 Why offline Cl- was higher than that measured by AMS?
- 3, r.82-83… 40 elements, e.g.--- there are more than 40 elements in the list?

p.5 What were the cut-offs of each instrument? How about inlet lengths and materials?

- 6-7. What was number of samples for each measurement period?

p.9 USEPA written here is as US-EPA and Usepa in the reference list.

- 10 D. Zhang should be without D.
- 13 NO3- Why the filter method gave higher NO3- compared to online method in winter? The higher offline NO3- concentrations during winter at IITD can be possibly because of the positive artifact due to the absorption of gas-phase nitric acid (HNO3) on the filter. Why not in summer?
- 13 This part is not very logically written and difficult to follow: first summer results are compared, then winter and back to summer conditions and evaporation problem.
- 323-327 This part should be rewritten: NO3- will not be lost during night, at night filters collect more quantitatively that during warmer daytime…

Schaap et al., 2004: "It is suggested that losses during a 24 h sampling period is not only a function of ambient conditions and sampling apparatus, but also of the sampling strategy. **When filters are changed in the morning, losses may have occurred at the higher temperatures in the afternoon of the previous day whereas at night nitrate is sampled quantitatively. When filters are changed in the afternoon or evening, nitrate sampled during the night might be lost when temperatures rise during the day.** Such seemingly minor details, together with the type of filter material used and **length of sampling lining** in which nitric acid may be lost, should in reality be spelled out when nitrate measurements are being reported."

- 341-342 Why Xact online instrument gave 1.9 times higher than IC?
- 346 What were the cut-offs of online instruments?

Fig 4. Online and offline instrument results could be better marked to separate them. You can't see well the smallest concentration.

Fig 5. The highest shares are easy to separate, but the smallest cannot be seen.

Fig 6. There are far too many slopes in one picture, and they cannot be separated. Why there was so big "inside element" difference between the different measurement period e. g. for Al?

The style of the reference list is varying e. g. the placement of year, use of parentheses, use of capital letters.

I do not comment the used language.