

Atmos. Meas. Tech. Discuss., 4, C1892–C1896, 2011

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AMTD

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Interactive
Comment

Interactive comment on “Characterisation of corona-generated ions used in a Neutral cluster and Air Ion Spectrometer (NAIS)” by H. E. Manninen et al.

H. E. Manninen et al.

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We would like to thank Referee #2 for the constructive comments to help us to improve the manuscript. Below is our answer to the comments.

Answer to interactive comments by Referee #2 on our manuscript “Characterisation of corona-generated ions used in a Neutral cluster and Air Ion Spectrometer (NAIS)” by H. E. Manninen et al.

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Specific comments:

Refere #2: From my point of view, the only major improvement that has to be carried out is a revision of the reference list: At the moment, numerous references that are mentioned in the manuscript are missing.

Answer: - We apologize for this error. We have now added missing references to the reference list.

Refere #2: My other comments are related to the measurement of the ionic molecules: *) On page 2108, line 4 it says that the negative ions, presented in Fig. 5, are shifted towards smaller sizes with increasing relative humidity. I cannot see that from the graph in Fig. 5. and would also be contradictory to my experience in this field up to now. They are rather shifted to larger sizes, indicating an accumulation of water molecules on the clusters.

Answer: - True. We modified the sentence: "The negative ions, upper panel in Fig. 5, shifted towards smaller larger sizes as the RH increased indicating an accumulation of water molecules on the clusters. Concurrently, tThe positive charger ions, lower panel in Fig. 5, had an opposite similar behaviour. The positive charger ion size distribution had a peak at 1.1 nm, and as the RH increased, the maximum shifted to 1.25 nm. In addition, the number of peaks both in the positive and negative ions size distribution changes as a function of RH."

Refere #2: *) Also on page 2108, in line 21 it is stated, that the red line in Fig. 6 represents ion spectra that were recorded during a humidification of the carrier gas. This is somehow confusing with the labels given in Fig. 6, as there it says that the red line represents measurements including a silica-gel dryer. Reading this I would assume rather dry conditions. It is absolutely necessary to clarify these points. Otherwise, the change of the properties of the ions by different operating conditions is obscured.

Answer: - We're sorry about this ambiguous expression. We will add following sen-

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tences to p. 2108, line 23, to clear the matter:

“It should be noted that the data points represented by red line was measured when carrier gas was additionally ‘dried’ with a silica gel. The compressed air used in this study has a dew point of $-36\text{ }^{\circ}\text{C}$, which in room temperature ($25\text{ }^{\circ}\text{C}$) correspond to very low RH of $\sim 0.6\%$. When the silica gel was added to the set-up, it actually increased the RH as the extremely dry compressed air was drying the silica gel – quite the contrary to what was supposed to.”

We also will modify legend of the figure (please, see the modified figure attached):

(‘Dry compressed air’, ‘Comp.+Filt.+Silicagel’, ‘Nitrogen’) → (‘Dry compressed air’, ‘Humidified compressed air’, ‘Nitrogen’)

Refere #2: *) on page 2109, line 14, it says that there may occur some fragmentation inside APi-TOF, but for this application (the measurement of charger generated ions), these effects are considered small. My simple question is: why? Of course, the APi-TOF itself is not matter of discussion in this paper, but for example, there is no sign of water in the mass spectra shown in Fig. 7. The complete absenceg of water seems to me as a huge effect of fragmentation, especially as there were experiments carried out with a controlled humidification of the carrier gas. I would suggest addressing this topic in the manuscript as well.

Answer: - Fragmentation is believed to be small, which we always assume. The water loss might be caused by evaporation. Therefore, we will add to chater 3.3 (where the "considered small" comment was) that some evaporation, especially of water, likely takes place, but that the loss of water will not change the size of the ions so dramatically that it would be visible with the low-resolution AIS.

We add modify following sentence to p. 2109, line 14:

For this application, however, these effects are considered small. → For this application, however, these effects are considered small. some evaporation, especially of

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water, occurs and fragmentation is a minor issue for this.

Please also note the supplement to this comment:

<http://www.atmos-meas-tech-discuss.net/4/C1892/2011/amtd-4-C1892-2011-supplement.pdf>

Interactive comment on Atmos. Meas. Tech. Discuss., 4, 2009, 2011.

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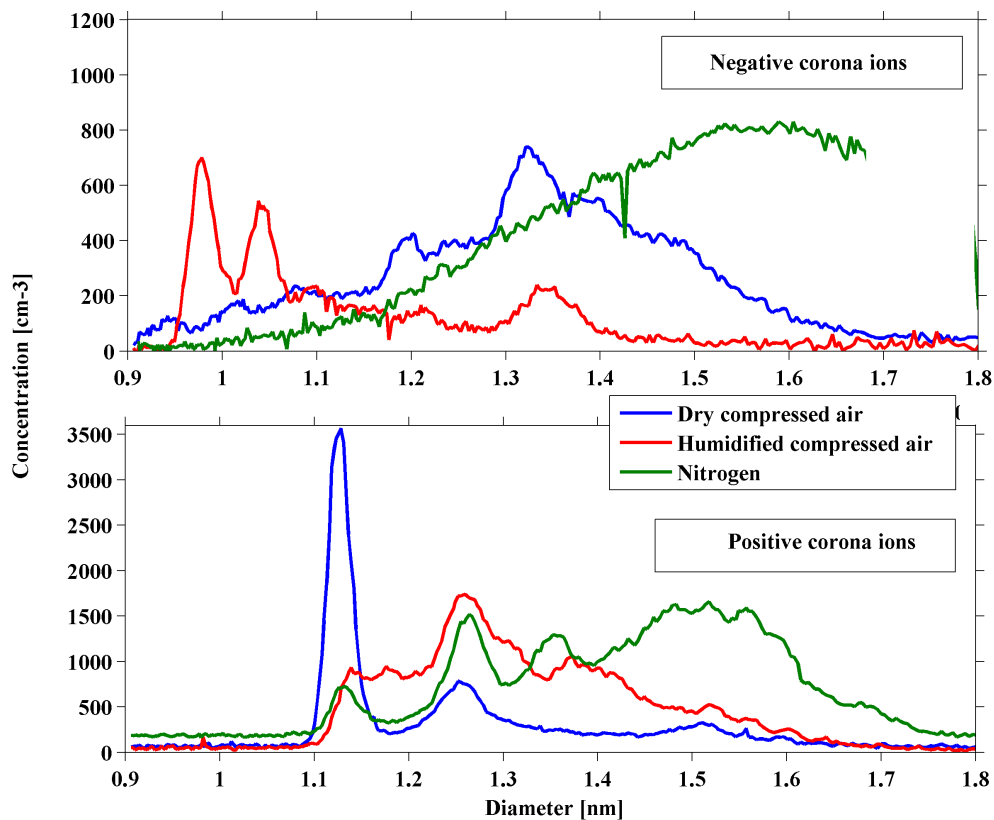


Fig. 1.

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