

Interactive comment on “How to reliably detect molecular clusters and nucleation mode particles with Neutral cluster and Air Ion Spectrometer (NAIS)” by Hanna E. Manninen et al.

Anonymous Referee #1

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The NAIS is an important instrument as it provides an insight into the physical processes occurring at the very sizes where atmospheric particles are formed. Unfortunately, since its development, there has been very little information on its operation and trouble-shooting procedures available in the literature. In that respect, I feel that this paper will prove to be invaluable. I have been using a NAIS for the last 4 years and I find that the answers to many of the questions that have arisen during this time are contained in this paper. The description of its operation and the many troubleshooting hints will be extremely useful to its many users. The authors also provide many useful tips on the interpretation of the data which I find to be extremely useful.

Furthermore, it is written by a group of authors who are best qualified to do so.

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Therefore, I consider it to be a very important paper which fills a void that has been present for quite some time.

There are several typo's and grammatical errors that should be corrected. There are other possible minor improvements that could be made. Some obvious ones are listed below:

P 1, line 23: replace “happen” with “occur”. P 2, lines 21-24 should be improved or replaced. I would suggest text similar to that used by Manninen et al (2009). P 3, line 11: Replace “descripted” by “described”. And, perhaps delete “in a Nature protocols article”. P 5, line 19: “It is recommended that ion spectrometers take part in the calibration and intercomparison workshops...”. Not clear. Do you mean that “ion spectrometer users take part” or that “ion spectrometers should be brought and calibrated ... at ... “ ? P 9, lines 15-16: “The instrument is operational both in vertical and horizontal position” – Do you mean the instrument or the inlet line? Can the instrument be placed horizontally? It continues as “However, the vertical orientation for inlet line is not recommended”. Does this mean that the inlet line should not be placed vertically? Could you provide your reasons for this? Is it the electrode effect? “Recommended inlet height is 2 metres above the ground level”. To my knowledge, several NAIS instruments are being used with the sampling tube out of upper floor windows and on the roofs of buildings. Is this not recommended? P 14, line 30: Replace “notice to” by “ensure that you”. P 15, line 7: Replace “place” with “position”. P 20, line 22 is very unclear. I would recommend, replacing “stay” with “remain” and delete either “no” or “not” from later in this sentence.

Table 2 P 34 Top Row: “inlet is too long”. I think you mean that the “inlet tube is too long” ? Bottom Row: “Whole particle spectra is continuously red..” Do you mean “total particle” or “Both particle” ? Suggest “appears continuously red in colour” P 36 Airflow Issues: “Blower stops soon working”. Do you mean “Blower soon stops working” ? But, I am not sure how this could be the “Possible Reason” for the issue. Is it not a consequence of the issue?

A comment on P 22, line 26: “The only exception where no cluster ions were observed is when measured inside cloud (Lihavainen et al., 2007)”. While this is so, another clear example is shown in Jayaratne et al: Suppression of cluster ions during rapidly increasing particle number concentration events in the environment. Aerosol and Air Quality Research. 15, 28-37, 2015. They used a NAIS to monitor ions and particles during a local fireworks display and observed that, owing to the very high concentration of particles, the cluster ion concentration was suppressed to zero for a short time.

Some references are missing from the reference list. E.g. Alguacil and Alonso (2006), Alonso et al (2006), Huang and Alonso (2011),

Both Supplementary Sections are written in great detail and will, I am sure, be of great help to all present and future users of the NAIS. Just a minor suggestion – the Supplement giving the cleaning instructions could benefit with some improvement of the grammar.

The manuscript falls into the scope of AMT and the content is scientifically sound.

Following the minor revisions above, I recommend it for publication in AMT.

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