

Interactive comment on “Continuous standalone controllable aerosol/cloud droplet dryer for atmospheric sampling” by S. Sjogren et al.

Anonymous Referee #2

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General comments

The authors present a dryer design with low losses for a wide particle size range and a controllable drying performance. The particle losses of the design compare well to theory and the device was successfully tested under field conditions.

Overall, the manuscript provides valuable information, but needs revisions in structure and content.

In terms of a structural overhaul, I recommend combining sections 2-4 into one materials and methods section which for example looks like:

2.1 Design Criteria

2.2 Construction

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2.3 (Laboratory) Benchmark Testing/Evaluation

2.3 Field Testing/Evaluation

The current organization is confusing. There are also sections in the results e.g. equations 5–6 that better fit into the methodology than the results

The writing and content of the paper needs to be more succinct for publication. For example Ln. 8 pg. 5474 states that "cloud droplets are aligned" but there is no explanation how that was achieved. There is unspecific wording/rambling similar to this example, that makes the content difficult for the reader to understand. These issues might be resolved by having a clearer structured methods section, as pointed before.

Specific comments

Ln. 23, pg. 5471, can leakage only be prevented by a closed loop design? (if connections are leaking closed loop wouldn't help).

Pg. 5471–5472, Whole section needs to be structured more clearly e.g. text after Ln. 19 pg. 5472 should be at the beginning of the section.

pg. 5474 Electrostatic losses, similar Gore-Tex membranes have been used widely for humidification. I recommend giving credit to some of the early pioneers e.g. Ogren or Rood, which came up with the stainless mesh support for eliminating static losses etc.

pg. 5476 Generation of dry air, I don't understand why this is a separate section.

Ln. 15 pg. 5479, This is the first time the reader is introduced to "bends". These bends should be discussed earlier in the design and pointed out in Fig. 1.

Ln. 13 pg. 5481, state the average Temperature with the RH measurement.

pg. 5483 Discussion, does the inlet RH affect the transmission efficiency?

Fig. 1, Functionality of parts upstream of dryer not clear. Also, why is this (fairly complicated) design preferred over a traditional annular dryer design?

Fig. 2, point out cross flow which results in the shown decrease in drying flow RH from top to bottom. How was the sample flow point at 0.25 m measured? What are the typical RH uncertainties? Also state roughly temperature range at which the experiment was performed.

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Fig. 3, Confusing, Not enough detail for publication, e.g. was the DMA aerosol flow 4.7 lpm.

Fig. 4, Discuss if RH affects transmission?

Fig. 5, Temperature and upstream RH/T conditions should be provided (maybe as range in text).

Technical corrections

Ln. 6, Abstract, define "highly charged"

Ln. 12, Abstract, missing word before 4.6 x....

Table 1, confusing names "Inner Tube", "Outer Tube", "Sample air space", maybe just "inner drying flow, outer drying flow and sample flow"

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 5469, 2012.