

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-59

Anonymous Referee #1

Referee comment on "Efficacy of a portable, moderate-resolution, fast-scanning differential mobility analyzer for ambient aerosol size distribution measurements" by Stavros Amanatidis et al., Atmos. Meas. Tech. Discuss.,
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The manuscript by Stavros Amanatidis et al. entitled "Efficacy of a portable, moderate-resolution, fast-scanning DMA for ambient aerosol size distribution measurements" reports an intercomparison of a novel SEMS or MPSS system consisting of the "SPIDER" DMA and a "MAGIC" CPC. The main question raised in the paper is whether this system operated a relatively low DMA resolution is able to catch the key characteristics of ambient aerosol size distributions.

The paper comprehensively evaluates the transfer function of the "Spider DMA", and also reports field measurement data showing very good agreement between the novel system and a more traditional scanning DMA system.

From this reviewer's point of view, the paper is very welcome to be published in "Aerosol Measurement Techniques" although it should not be accepted for publications until following remarks have been considered in a revised version of the manuscript:

1) P1/L18ff

The authors state that traditional mobility analyzers are large and most often not suitable for UAV, but that the "Spider DMA" would be appropriate to be used on moving platforms. It would be helpful if the authors could also elaborate on how the sheath air flow supply of the Spider DMA would look like when used on a UAV or other moving platform – especially when compared to "traditional" sheath flow supplies.

2) P3/L74 ff.

The authors report the use of a soft X-ray charge conditioner. It would be beneficial to specify brand / make of the specific instrument. It is not the objective of this paper, but nowadays soft x-ray ionizers are often used for size distribution measurement, without knowing the actual charging probabilities or knowing if the Fuchs charging theory is applicable without any adaptations. Therefore, at least the type of the used instrument should be stated.

3) P5/L107:

It should be named "Fuchs charge distribution"

4) P5/L114 ff

The fact that down-scan peaks have a higher maximum number ratio and are also narrower than the up-scan peaks confuses me. Typically, one would expect the opposite, where the down-scan transfer function also often exhibits a distortion or tail. Therefore, the – as far as this reviewer can say – the most common way would be to use the up-scan data for scanning DMA data rather than the down-scan data.

It would be extremely important for a clear understanding – especially for non-DMA expert readers - to elaborate in more detail on this topic and explain the differences between the down-scan/up-scan transfer functions of the Spider DMA vs. traditional DMAs.