Responses to Reviewers' Comments on Manuscript amt-2018-35

(Data inversion methods to determine sub-3 nm aerosol size distributions using the Particle Size Magnifier)

We thank the reviewers for their help in improving this manuscript. We have addressed the comments in the following paragraphs and made corresponding changes in the revised manuscript. Comments are shown as *blue italic text* followed by our responses. Changes are ==highlighted== in the revised manuscript and shown as <u>underlined text</u> in the responses. Line numbers and equation numbers quoted in the following responses correspond to those in the revised manuscript.

Reviewer #2:

The Reviewer is wondering how the different studied inversion algorithm will perform when the particle number concentration of the observed aerosol is strongly decreased like it is under atmospheric conditions? Have any considerations been made concerning the application onto atmospheric conditions?

<u>Response:</u> Theoretically, none of the studied inversion methods will report sub-3 nm particles when the measured particle concentration decreases monotonically with the increasing saturator flow rate. When measuring particles around 7.3 nm, a gradually decreasing particle concentration was observed due to the instability of the wire generator. The sub-3 nm particle concentrations inverted using the studied methods were zero/negligible.

The uncertainties/errors of the observed raw particle concentration in atmosphere are usually larger than in the laboratory. Thus, it is more complicated to test the performance of the inversion methods under various atmospheric conditions. An ongoing study is focusing on the comparisons of the inversion methods using atmospheric observation data and the results obtained using different instruments.

Technical Corrections:
p.1, l.14 using diethylene glycol as "the" working fluid – remove "the"
p.15, l.13 sable – stable

<u>Response:</u> Done.

p.6, l.22 eq. 6 - the uppercase subscriptions are not fully visible
p.7, l.4 eq. 8 J ? I – please check equation
p.7, l.10 eq. 9 - the uppercase subscriptions are not fully visible
p.7, l.11 the uppercase subscriptions are not fully visible
p.7, l.16 eq. 10 - the uppercase subscriptions are not fully visible

Response: We replaced those symbols that may lead to format issues.

p.23, l.1 Figure 4 is full of information – Consider to increase the figure size or add a table with the stated concentrations.

Response: We moved the particle concentrations to Table 1 and removed the legends in Fig. 4(b), 4(c), and 4(d).