

Interactive comment on “Aerosol size distributions during the Atmospheric Tomography (ATom) mission: methods, uncertainties, and data products” by Charles A. Brock et al.

Anonymous Referee #1

Received and published: 23 April 2019

This manuscript describes in detail the aerosol particle measurements carried out during the ATom missions onboard the NASA DC8. It describes the measurement systems and the generated data products which will be freely available to the scientific community. This data set is of high relevance for atmospheric research and will certainly be widely used. The manuscript is very well-written and should be published in AMT after the following minor points have been considered:

page 4 line 6-7: how many size classes can the POPS determine?

page 4 lines 8-15: in which format will PALMS data be made public on the data base?

page 4, line 25: HIMIL and UH/LARGE acronyms are not explained (appear here for
C1

the first time).

page 5, line 35: Please give the equation used for the efficiency factor. I assume it is Equ. 9 in Belyaev and Levin?

page 6 line 12: replace by "...and the LAS instrument were calculated after Brockmann (2001) on a second-by-second..."

page 7, line 30ff / Fig 6: What was the averaging time for the size distributions? It's hard to see from the graphs a1, b1, c1. These are not the reported 1-second data products but rather 30 second averages.

page 8, line 20: please refer to section 4.3.1 when mentioning that the time resolution is variable.

Section 4.3.1: looking at Fig 6, b2 and c2, the first channels of NMASS (< 15 nm) may also suffer from poor counting statistics. Why is the averaging not applied to the first NMASS channels as well?

page 9 line 18: Any literature references for typical Atkinson mode size range definitions?

page 9 line 32: The AMS measures only the accumulation mode. The density of the nucleation mode may be different (higher, if assuming that H₂SO₄ plays an important role for nucleation).

page 11 line 32: remove line break.

page 12 line 14: this is channel NMASS-1 CPC5 in Figure 2, right?

page 12, line 35-36: That would mean that the inlet transmission is unity up to 3 μm and drops immediately to zero. On page 5 it was said that at 12 km the transmission at 3 μm is still 50%. Would it be possible to average the >7 km distribution over a longer time? What does "> 7 km" mean exactly? Can you give the altitude range that is averaged here?

page 13, lines 3-6 and Figure 10: wouldn't it make sense to average the high altitude values over more than 1 minute to improve counting statistics?

Figures

Figure 1: What about ATom-4?

Figure 7: Y-axis "LAS number" is missing. In general, shouldn't the axes be called "number concentration" and "volume concentration"? (same for Fig. 10)

Figure 8: Fig 7, Figs 10, and 11 show the regression slope and r^2 , while Fig. 8 shows the 1:1 line. Wouldn't it be better to make the Figures consistent?

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-44, 2019.