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Atmospheric Chemistry and Physics Discussions

# *Interactive comment on* "Size-resolved cloud condensation nuclei concentration measurements in the Arctic: two case studies from the summer of 2008" *by* J. Zábori et al.

**J. Zábori et al.**

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Dear reviewer 2

Thank you very much for your review. Please find our responses in the supplement. Figure captions are written below, as they do not fit in the "caption window".

Kind regards,

Julia Zábori

Figure 1. Scheme of the two different measurement modes for the cloud condensa-



tion nuclei counter (CCNC). When CCN size-resolved number concentration measurements took place, the CCNC was connected behind the Differential Mobility Analyzer and the supersaturation was set to 0.4%. During normal operation, the CCNC was connected parallel to the DMA and SS alternated between 0.2% and 1.0%.

Figure 2. a) Particle number size concentration measured before, during, and after the size-resolved CCN concentration measurements were conducted in June 2008. Purple vertical lines indicate the start and end time of the CCN size-resolved concentration measurements. b) Time series of the 8-min medians from CPC measurements for the same period in June 2008. Horizontal dashed lines represent the 25th and 75th percentile of the CN number concentration for June during the years 2001 to 2010. Trajectory plots show 5-day backward trajectories, calculated for every hour. Trajectory plots on top of panel a) show air masses arriving between the 27 and midday of the 28 June at Zeppelin Research Station. Trajectory plots below panel b) show air masses arriving between midday of the 28 June to midnight of the 29 June at Zeppelin Research Station.

Figure 3. Normalized relative backscatter (Level 1.0 data) based on Lidar measurements at Ny-Ålesund recorded during the period 27–29 June 2008 (modified from http://mplnet.gsfc.nasa.gov/).

Figure 4. a) Particle number size concentration measured before, during, and after the size-resolved CCN concentration measurements were conducted in August 2008. Purple vertical lines indicate the start and end time of the CCN size-resolved concentration measurements. b) Time series of the 8-min medians from CPC measurements for the same period in August 2008. Horizontal dashed lines represent the 25th and 75th percentile of the CN number concentration for August during the years 2001 to 2010. Trajectory plots show 5-day backward trajectories, calculated for every hour. Trajectory plots on top of panel a) show air masses arriving between the 21 and 23 August 2008 at Zeppelin Research Station. Trajectory plots below panel b) show air masses arriving between midnight of the 23 August to midnight of the 24 August at Zeppelin Research

Station.

Figure 5. Normalized relative backscatter (Level 1.0 data) based on Lidar measurements at Ny-Ålesund recorded during the period 21–24 August 2008 (modified from http://mplnet.gsfc.nasa.gov/).

Figure 6. a) Ratios of the medians for each SS scan between CCN and particles with diameters > 3nm (CN>3nm) for June 2008 as a function of SS. b) Medians for each SS scan of the total numbers of CCN as a function of SS for June 2008. c) Ratios of the medians for each SS scan between CCN and particles with diameters > 3nm (CN>3nm) for 21 and 24 August 2008 as a function of SS. d) Medians for each SS scan of the total numbers of CCN as a function of SS for 21 and 24 August 2008. The red curves represent power-law function fits to the data with the coefficients C and k.

Figure 7. Geometric means of size-resolved particle density measurements and resulting CCN concentrations for the measurement period in a) June 2008 and b) August 2008. Measurements were conducted at 0.4% SS. Error bars indicate the geometric standard deviation.

Figure 8. Activation ratio as a function of dry particle diameter (Dp) for the measurement period in June 2008 and August 2008. Obtained from measurements at a SS of 0.4%. Error bars indicate SD. The grey area indicates the for further analysis omitted data.

Please also note the supplement to this comment:
http://www.atmos-chem-phys-discuss.net/15/C8575/2015/acpd-15-C8575-2015-supplement.pdf

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 5079, 2015.



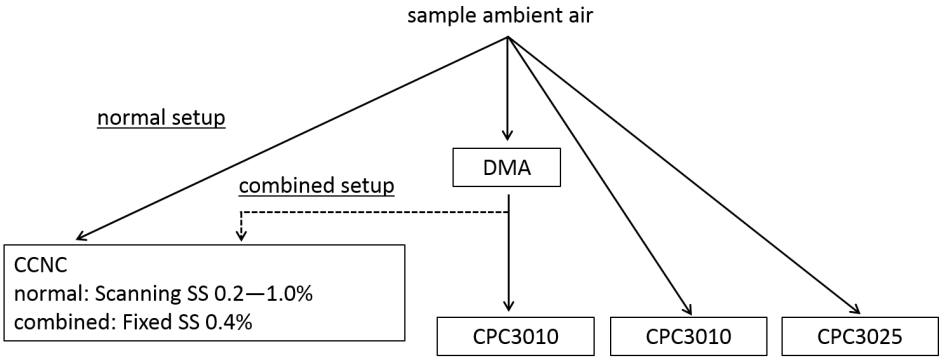


**Fig. 1.**

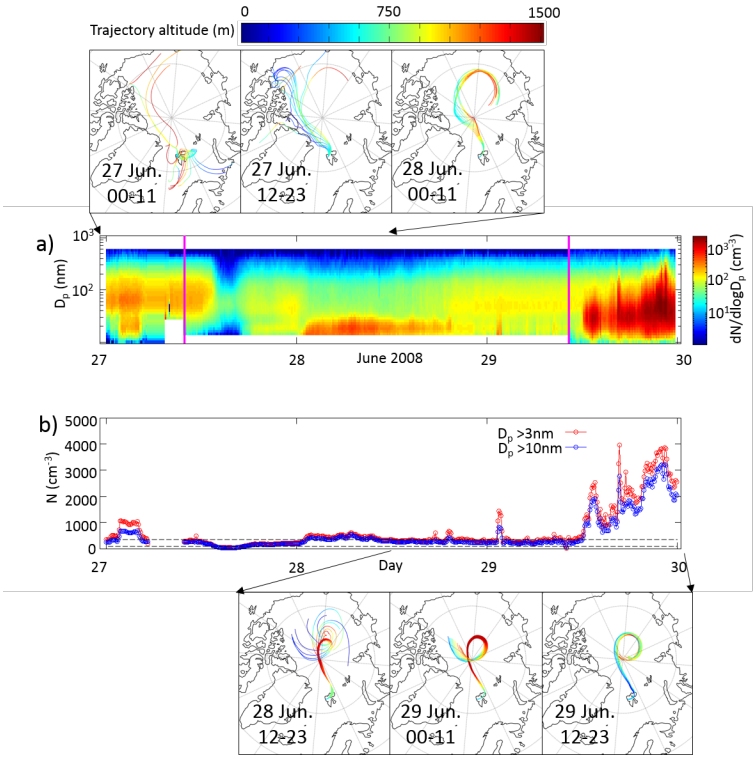
Trajectory altitude (m)
0
750
1500
27 Jun. 00-11
27 Jun. 12-23
28 Jun. 00-11
a)
$D_p$ (nm)
$10^3$
$10^2$
$10^3$
$10^2$
$10^1$
$dN/dlogD_p$ ($cm^{-3}$)
27
28
June 2008
29
30
b)
N ($cm^{-3}$)
5000
4000
3000
2000
1000
0
$D_p$ >3nm
$D_p$ >10nm
27
28
Day
29
30
28 Jun. 12-23
29 Jun. 00-11
29 Jun. 12-23

**Fig. 2.**



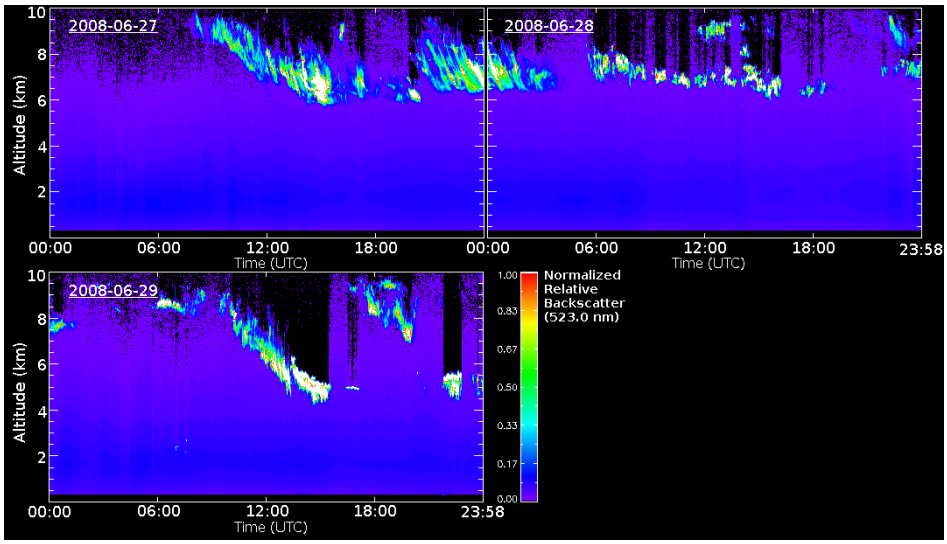
2008-06-27
2008-06-28
2008-06-29
Altitude (km)
10
8
6
4
2
00:00
06:00
12:00
18:00
23:58
Time (UTC)
Normalized Relative Backscatter (523.0 nm)
1.00
0.83
0.67
0.50
0.33
0.17
0.00

**Fig. 3.**

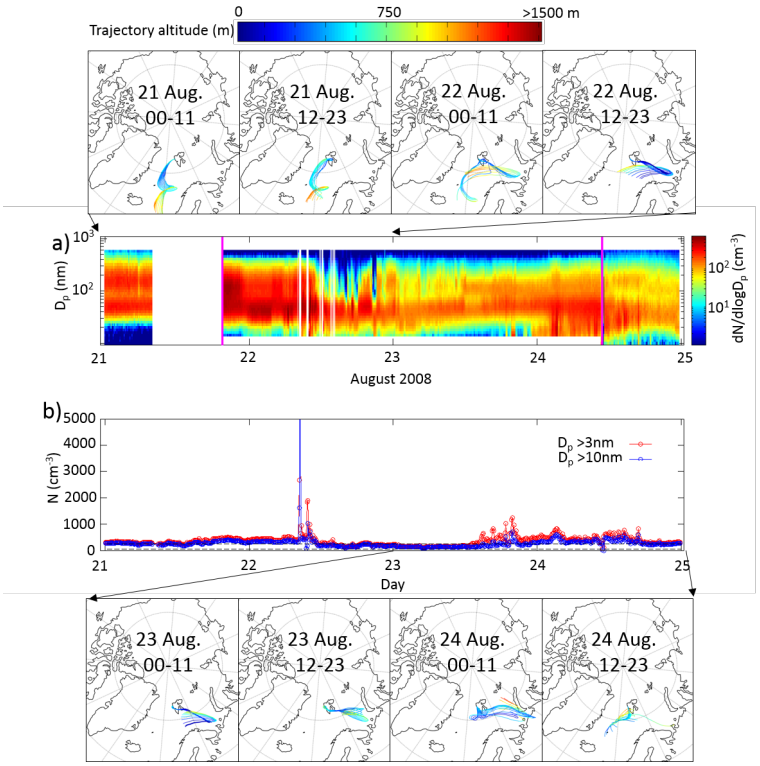
0
750
>1500 m
Trajectory altitude (m)
21 Aug. 00-11
21 Aug. 12-23
22 Aug. 00-11
22 Aug. 12-23
a)
$D_p$ (nm)
$10^3$
$10^2$
$10^2$
$10^1$
$dN/dlogD_p$ ($cm^{-3}$)
21
22
23
24
25
August 2008
b)
N ($cm^{-3}$)
5000
4000
3000
2000
1000
0
$D_p$ >3nm
$D_p$ >10nm
21
22
23
24
25
Day
23 Aug. 00-11
23 Aug. 12-23
24 Aug. 00-11
24 Aug. 12-23

**Fig. 4.**



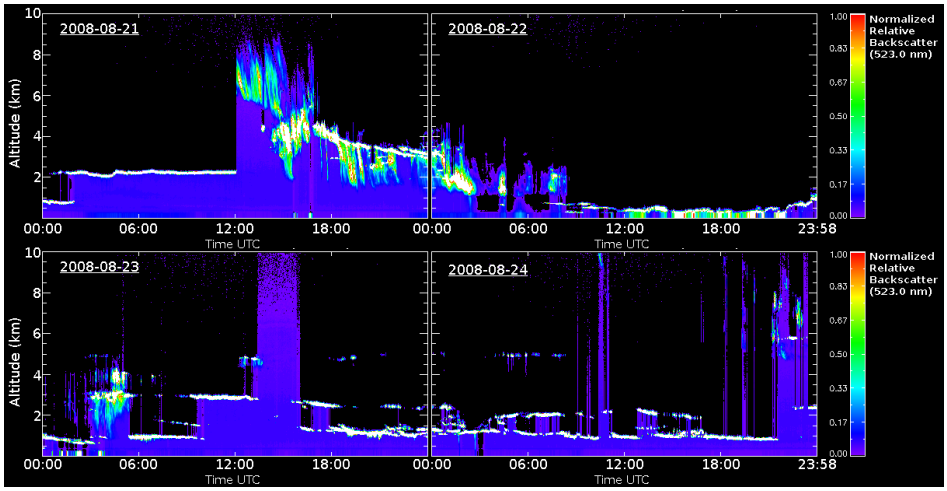
2008-08-21
2008-08-22
2008-08-23
2008-08-24
Altitude (km)
10
8
6
4
2
00:00
06:00
12:00
18:00
23:58
Time UTC
Normalized Relative Backscatter (523.0 nm)
1.00
0.83
0.67
0.50
0.33
0.17
0.00

**Fig. 5.**

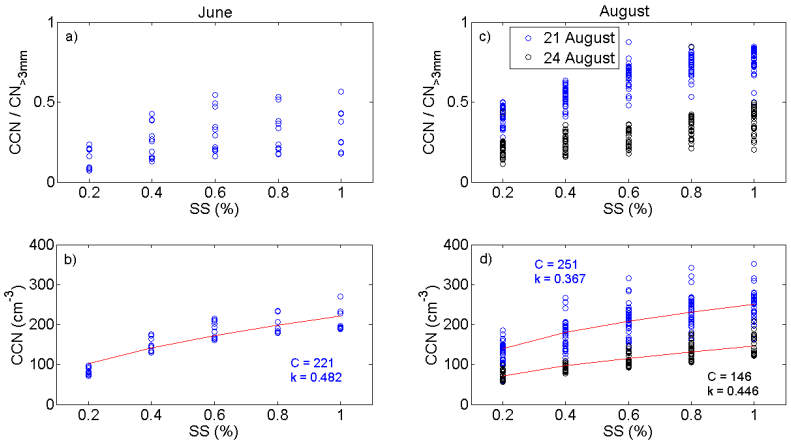
June
August
a)
b)
c)
d)
21 August
24 August
CCN / CN>3nm
CCN (cm-3)
SS (%)
C = 221
k = 0.482
C = 251
k = 0.367
C = 146
k = 0.446

**Fig. 6.**



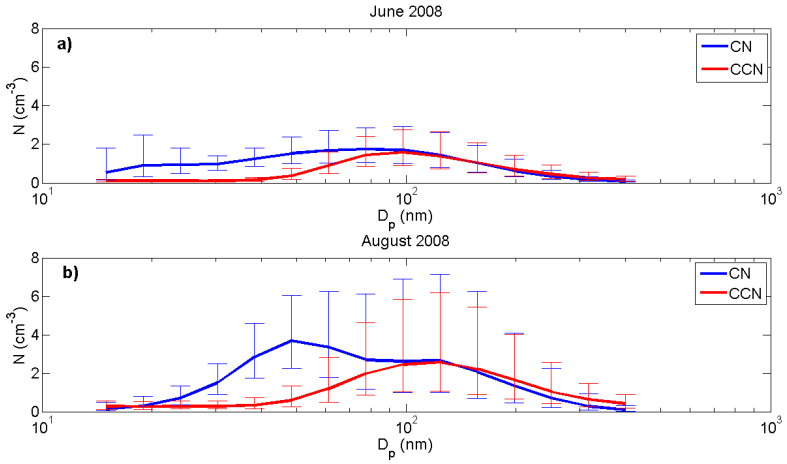
June 2008
August 2008
a)
b)
CN
CCN
N (cm-3)
Dp (nm)

**Fig. 7.**

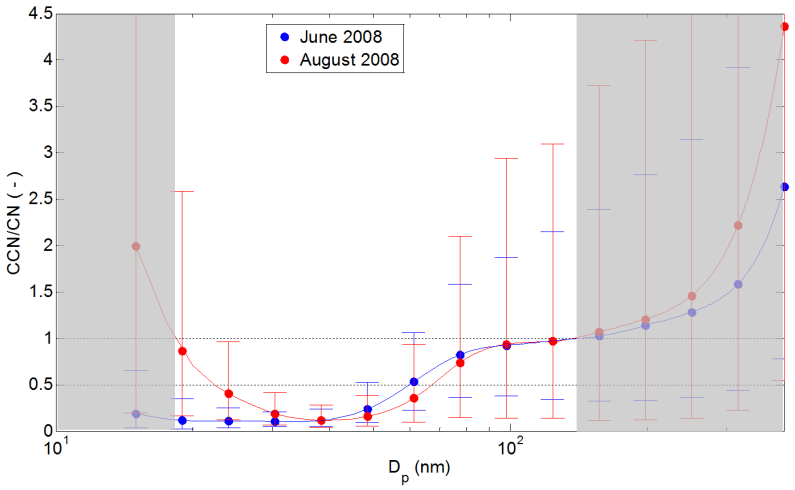


**Fig. 8.**