Atmos. Chem. Phys. Discuss., 15, C4851–C4853, 2015
www.atmos-chem-phys-discuss.net/15/C4851/2015/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Challenges of parameterizing CCN due to changes in particle physicochemical properties: implications from observations at a suburban site in China" *by* F. Zhang et al.

Anonymous Referee #1

Received and published: 13 July 2015

General comments:

The paper "Challenges of parameterizing CCN due to changes in particle physicochemical properties: implications from observations at a suburban site in China" by F. Zhang, et al. 2015 provide more surface measurement dataset in China. The authors present useful observations on CCN activation properties and the results are consistent with the previous studies. However, the paper is lack of the discussion on what affects CCN properties, such as distinguishing the effect of chemical composition from

size distribution or mixing state of aerosol. Thus, the results and conclusion are not new and expected from previous studies.

Authors may consider providing more analysis/discussion which separates aerosol size effect with its chemical composition effect.

In addition, the figure 1 shows the maximum activation fraction is around 0.9 for both sites, but in the paper by Zhang et al. 2014, the table 1 shows that MAF is larger than 0.94%. Please explain the inconsistency.

Specific comments:

P16143, Line 10-15, P16154, section 4.3.2: When author mentioned PSD effect was examined, how does author exclude the chemical effect/mixing state effects? If you cannot separate those effects, it is impossible to exam the influence of the PSD on Nccn estimation.

P16146, section 2, line 14: what do you mean “relatively little”? Is it occasionally local interference? If so, was the data screened? What percentage of the data is screened? Do they happen in the same pattern? Such as all in the morning?

P16148, line 7: what the mass concentration from ACSM? Is the BC concentration significant comparing the rest of chemical compositions?

P16148, line 16-20, What is the percentage of valid data? Is there a time pattern for the invalid data appearance?

P16149-150, section 3, it is almost identical with the paper published in Zhang et al. 2014. Please consider remove it and refer to the paper.

P16151, line 7, because the maximum activation fraction is around 90%, should the cut-off diameter at AR=50% represent the critical activation size?

P16151, line 10-15, To discuss the heterogeneous of hygroscopicity of aerosol, it is better to analyze data using supersaturation vs activation fraction. Here is an ex-

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ample of such discussion: http://www.atmos-chem-phys.net/13/12155/2013/acp-13-12155-2013-supplement.pdf

P16152, line 4-5, what is the height of the back-trajectory running at? P16154, section 4.3.2, it is well know that the size effect of aerosol on CCN concentration. If author wants to discuss that, please add more qualitative analysis.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 16141, 2015.