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Interactive comment on "Variation of CCN activity during new particle formation events in the North China Plain" *by* N. Ma et al.

Anonymous Referee #2

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Reference No.: acp-2016-23 Authors: N. Ma et al. Title: Variation of CCN activity during new particle formation events in the North China Plain

This paper investigated the ability of aerosols acting as CCN during the new particle formation (NPF) events over North China Plain. The authors focused on two different NPF events and suggested that the possible deviation of simplified NCCN estimation might be significant for the NPF periods.

Overall comment: The authors differentiated two cased based on the sulfate fraction in PM10 to conclude the sulfate dominant and OM dominated cases. However, the sulfate fraction in PM10 cannot be representative for sub-micron sized particles and that was also stated by the authors. If sulfate fraction in PM10 can represents for the sulfate fraction in sub-micrometer sized particles, the authors should also expect the

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Discussion paper

high sulfate fraction should correspond to higher kappa for all periods and this is not always true. For example, the kappa of 7/20 in the early morning showed a much lower value even though the sulfate fraction is similar to the daytime of 7/20. This analytical method might be suspicious without further validation. The composition variation might be due to the parcel source since the provided two cases has the source difference; i.e. west-southwest wind for 7/22 and northwest wind for 7/24. Could the radiation also play a role affecting the hygroscopicity because 7/22 is a hazy day while 7/24 is a sunny day? Overall, it is difficult to conclude the exact factor with only two cases.

Other comments: 1. Lines 4-11 of Page 4: How many sizes did the authors scan for a given SS?

2. There were two methods applied to determine the hygroscopicity. How is the comparison?

3. Line 20 of Page 20: the authors stated there are 10 out of 28 days associated with NPF events but only 5 days with particle growing. What parameter controls the growing process? Does the hygroscopicity of aerosols at these two cases different?

4. Because the authors focused on the NPF events, the date of Figure 4 should be the same as Figure 2.

5. Line 10 of Page 9: What is the average activation ratio profile the authors applied?

6. The label of y axis for all SMPS figures should be Diameter (nm) not the number concentration.

7. The color bar for SMPS and k in Figure 2 should be provided.

8. There are two ticks for the right y axes of Figure 6B, 6C and 6D which should be modified.

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