*13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced,combined, or eliminated?*

*(a) Explain Table 1in more detail. (Table 1 shows . . . . . ..the slopes (k) and correlation coefficients (R2) between fitted lines of calculated and measured concentrations. . . . . ...)*

**We have added following sentences in the first paragraph of "Summary and Discussion".**

**"Table 1 showed the slopes of the linear regression (with intercept of 0) and the correlation coefficients ($R^2$) between calculated and measured CCN number concentrations. The numbers in brackets showed the ranges of slopes and $R^2$ at different supersaturations, while the ones outside brackets were computed with data at all supersaturations."**

*(b) Describe text in more detail.*

**More details have been added in the text following the suggestion of the referee.**

*(c) Correct Nccn,m(S)Ncn>10nm to Nccn,m(S)/Ncn>10nm in caption of Fig.3.*

**Thank you for the careful reading. We have corrected the caption of Fig. 3.**

*Questions:*

*1. Is aerosol activation property in the North China Plain quite similar with mixed particles containing hygroscopic substances?*

**Yes, we can tell from the critical diameters and hygroscopicity parameter $\kappa$ that the hygroscopicity of aerosols in the NCP is lower than ammonium sulfate (see Table R1 below). The aerosol activation property is highly related to hygroscopic components of particles, such as sulfates, nitrates, and WSOCs. One manuscript in preparation will discuss the relationship between the hygroscopic property (activation property) and the chemical substances measured during HaChi campaign using 10-stage Berner Low Pressure Impactor.**

*2. It is estimated that most of aerosol particles larger than 10nm in diameter in the North China Plain are activated as CCN at higher super-saturation than about 0.20% for example from Fig.3 and 9. Are critical size of the aerosol particles as CCN activation quite close to those of hygroscopic materials such as ammonium sulfate?*

**Table R1 shows the critical sizes for ammonium sulfate particles, as well as the measured $D_{50}$ and $D_{inf}$, and their hygroscopicity parameter $\kappa$ in this study. The critical diameters of ambient particles, both $D_{50}$ and $D_{inf}$, are larger than that of ammonium sulfate, and the hygroscopicity parameter $\kappa$ is smaller, suggesting that the hygroscopicity of ambient particles is lower than that of ammonium sulfate.**

**Table R1 Critical sizes for ammonium sulfate particles, as well as the measured $D_{50}$ and $D_{inf}$ and corresponding hygroscopicity parameter $\kappa$**

| *SS* | $D_{c,AS}$ (nm) | $D_{50}$ (nm) Mean+s Range | $\kappa$ from $D_{50}$ Mean+s Range | $D_{inf}$ (nm) Mean+s Range | $\kappa$ from $D_{Inf}$ Mean+s Range |
|---|---|---|---|---|---|
| 0.061 | 175 | 215 ±12<br>189~254 | 0.35 ±0.06<br>0.20~0.53 | 238 ±17<br>193~275 | 0.26 ±0.06<br>0.16~0.48 |
| 0.083 | 143 | 175 ±12<br>148~212 | 0.35 ±0.07<br>0.19~0.56 | 194 ±13<br>157~220 | 0.26 ±0.06<br>0.17~0.48 |
| 0.200 | 81 | 93 ±5<br>81~110 | 0.39 ±0.07<br>0.22~0.59 | 106 ±7<br>90~125 | 0.26 ±0.06<br>0.16~0.46 |
| 0.414 | 49 | 61 ±4<br>53~74 | 0.31 ±0.06<br>0.18~0.49 | 76 ±7<br>60~133 | 0.17 ±0.05<br>0.03~0.34 |
| 0.812 | 31 | 45 ±4<br>37~59 | 0.19 ±0.05<br>0.08~0.33 | 60 ±7<br>41~85 | 0.08 ±0.03<br>0.03~0.24 |

3. *Are $D_{50}$ and $D_{inf}$ almost constant regardless of time or place in the North China Plain ?*

   **The statistics of $D_{50}$ and $D_{inf}$ at different supersaturations during the campaign is given in Table R1. Since critical diameters depend on the chemical composition of aerosol particles, $D_{50}$ and $D_{inf}$ would remain constant if there is little variation in aerosol chemical composition.**

4. *You recommended that CCN number concentrations are predicted using particle number size distribution with inferred critical diameters or size resolved activation ratios. Size distribution and material composition of aerosol particles in the world vary greatly in time and place. Can you recommend the prediction in general for these particles?*

   **In this study, we recommended two methods for accurate calculation of CCN number concentration, i.e., the inferred critical diameter and the size-resolved activation ratios. Either of methods is general. There is little variation in inferred critical diameter or size-resolved activation ratio according to the measurements at Wuqing site within the HaChi Project. However, different inputs of inferred critical diameters or size-resolved activation ratios would be required for studies in different regions because of the spatial variation of aerosol chemical compositions.**