

***Interactive comment on* “Evaluation on the role of sulfuric acid in the mechanisms of new particle formation for Beijing case” by Z. B. Wang et al.**

Z. B. Wang et al.

minhu@pku.edu.cn

Received and published: 27 October 2011

We thank the reviewer for helpful comments and suggestions. Below we provide point to point response to each comment. The page number refer to the version published in ACPD.

1) Comment: P. 24172, lines 24-25. The authors conclude from examining Fig. 2 that "the existing aerosol concentration is more likely the key limiting factor to determine the observation of NPF events in Beijing rather than the concentration of gaseous sulfuric acid." This is not at all clear from Figure 2, which does not show a hard boundary of condensation sink term beyond which NPF does not occur. Rather, at lower CS term values, NPF can proceed readily, and at higher CS term values NPF can proceed if sulfuric acid concentrations are sufficiently high. Thus the CS term and the sulfuric acid

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concentration each play determining roles in whether NPF proceeds or not. It would be interesting to see if there is a combination of terms, perhaps $[H_2SO_4]/CS$ term, that could be plotted against the NPF rate, J . For example, Lee et al. (Science, 301, 1886–1889, 2003) found a relationship between the concentration of nano-particles and the ratio of sun exposure to aerosol surface area. Perhaps a similar parameterization, using sulfuric acid rather than sun exposure fraction, could be useful.

Response: This point is very important. Actually, the NPF event is the product of competition between source (here represented as H_2SO_4 concentration) and sink (CS). We included one figure which showed the relationship between the concentration of newly formed particles and the ratio of sulfuric acid concentration to condensation sink in Figure 2 as you recommended. In the revised manuscript, we sharpened the conclusion as below: “The higher number concentration of newly formed particles was observed when the ratio of sulfuric acid concentration to condensation sink was larger, which is shown in Figure 2(b) in the manuscript. The NPF event is the product of the competition between source (here represented as sulfuric acid concentration) and sink (CS). In the case of both higher source and sink values, the result of the competition between source and sink is more likely the key limiting factor to determine the observation of NPF events in the urban of Beijing.

2) Comment: There are several recurring problems with English usage, especially indefinite vs. definite articles and prepositional choices. English issues occasionally obscure the meaning of the text, such as (p. 24172, lines 5–8), “the N3-6 and H_2SO_4 concentration showed similar variation trend on the NPF event days (gray background).” In addition, there are several typographical errors as well. I recommend a thorough edit by a skilled English speaker on the author list.

Response: Thanks for your comment. We checked the entire manuscript and corrected several errors. Please find the details in the revised version. 3) Comment: The figures are clearly presented, although Fig. 1 is rather dense and should be larger. Where possible, please apply different symbols in addition to different colors (e.g., Figs. 2–5),

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as ~10% of males suffer some level of color blindness.

Response: Thank you for reminding. We modified the Figure 1 in the manuscript using different symbols.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 24165, 2011.

ACPD

11, C10903–C10907,
2011

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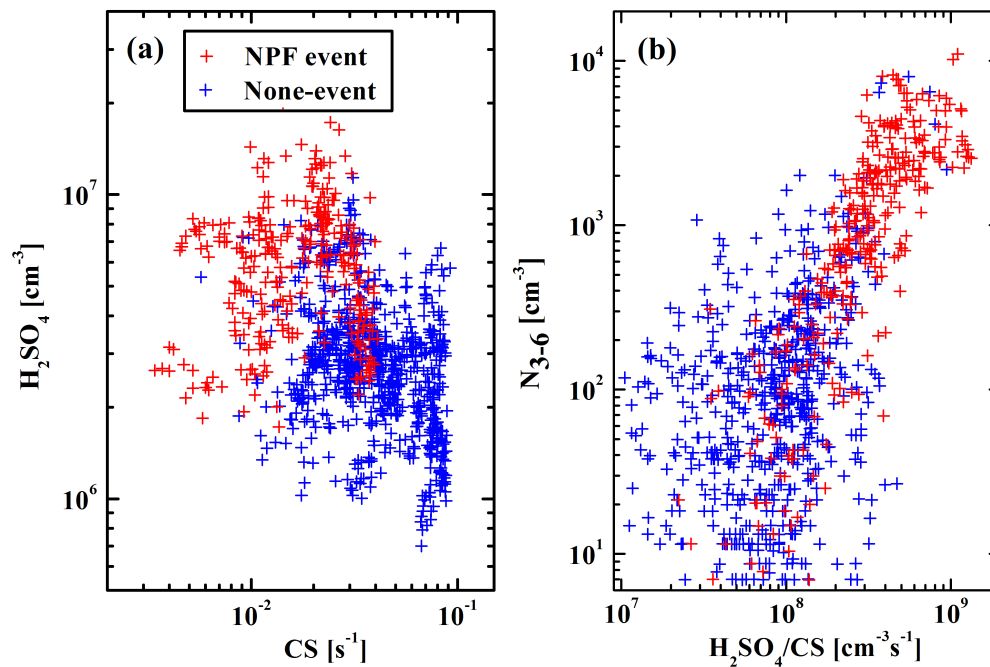
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Fig. 1. The comparisons between the NPF event days and None-event days (Figure 2 in the manuscript)

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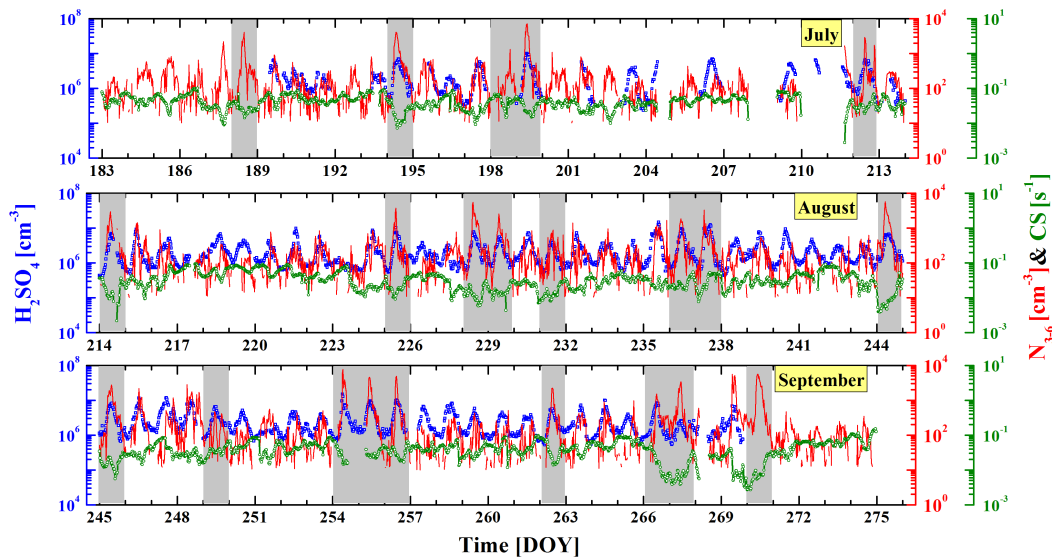
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Fig. 2. Time series of the different parameters for the whole measurement period (Figure 1 in the manuscript)

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