C72:

This paper presents an analysis on the characteristics and associated chemistry of a series of new-particle formation event observed in Beijing, China. The paper is very well written and easy to follow. The analysis is scientifically sound and sufficiently original to warrant publication. The authors have already addressed the major technical flaws when revising the paper for ACPD. I have only a couple of further suggestions for improvements. After considering these minor points, I highly favor the publication of this paper in ACP.

Response: Thank you very much for your comments.

First, the authors quantitatively estimate how much coagulation between particles decreases particle formation rates during their measurements. This is a very important point when considering, for example, the efficacy by which atmospheric new-particle formation events produce cloud condensation nuclei. Besides a couple of theoretical analyses (Pierce and Adams, 2007,ACP 7, p. 1367-1379; Kerminen et al., 2004, Tellus 56B, p. 135-146), the quantitative role of coagulation scavenging in CCN production has been investigated in only one field study (Kuang et al., 2009, GRL 36, doi:10.1029/2009GL037584). By explicitly bringing up the tight connection between the nucleation rate, coagulation scavenging and CCN formation, the value of the result obtained by the authors would be very much enhanced.

Response: Thank you very much for your advice.

It has been reported that during a NPF event in the summer in Beijing the nucleation mode particles grew very quickly into the size range of CCN, and the CCN size distribution was dominated by the growing nucleation mode (up to 80% of the total CCN number concentration) and not as usual by the accumulation mode (Wiedensohler et al., 2009). Coagulation decreases the net formation rate of the nucleation mode particles and their number concentrations, so it reduces the enhancement of CCN number concentration caused by NPF events. Coagulation would roughly decrease the contribution of NPF to CCN formation by about 40% in

the summer in Beijing, as it reduces the nucleation mode particle number concentration by about 40%.

Hence, corresponding description will be added into the revised manuscript as follows:

Page 2719 before line 11:

Moreover, it affects the contribution of NPF to CCN formation. Besides a couple of theoretical analyses (Pierce and Adams, 2007; Kerminen et al., 2004), the quantitative role of coagulation scavenging in CCN production has been investigated in only one field study (Kuang et al., 2009). The ratio of coagulation loss to the formation rate here also suggests that coagulation will decrease the contribution of NPF to CCN formation by about 40%.

Second, the authors provide quantitative information about the relative contribution of sulfuric acid and organics to the condensation growth of nucleation particles. Especially, they can distinguish between so-called sulfur-rich days when the contribution by sulfuric acid is more than a half and sulfur-poor days when it is less than a half (typically a quarter). I would be valuable for the readers if the authors contrasted their finding with the few earlier studies on this subject (e.g. Weber et al., 1997, JGR 102, p. 4375- 4385; Birmili et al., 2003, ACP 3, p. 361-376; Boy et al., 2005, ACP 5, p. 863-878; Smith et al., 2008). To me, it seems that large contribution by sulfuric acid to the nuclei growth can be seen in a few locations only, such as Eastern US and China, whereas in most locations sulfuric acid typically explains less than 20 per cent of the condensation growth. The authors should add a brief discussion (one paragraph) on this topic with suitable references.

Response: Thank you very much for your suggestion.

A paragraph about such comparison will be added in the revised version as you suggested:

Page 2721 before line 17:

Few earlier studies on NPF events at some suburban, remote, or forest sites (e.g. Weber et al., 1997; Birmili et al., 2003; Boy et al., 2005; Smith et al., 2008)

show that the contribution of sulfuric acid to the apparent growth of the new particles is typically below 30%. But such contribution is found to be larger in Beijing especially for the sulfur-rich cases as investigated in this paper and in Atlanta, US, about 60% on average (Stozenberg et al., 2005). Possible reasons are: (1) The concentration of SO_2 is lower in the non-urban area than in the urban area, leading to lower concentration of H_2SO_4 and suppressing the contribution of H_2SO_4 to new particle growth. (2) It was shown in Kiendler-Scharr et al. (2009) that isoprene suppresses the formation but enhances the growth of the nucleation mode particles. So abundant isoprene in the non-urban area will contribute more to the growth of the new particles and reduce the fraction of the contribution of H_2SO_4. As the environments are so complex and different at diverse sites, other factors, such as concentration of OH radical, can be also very important and deserve further investigation.

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