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Title: Different characteristics of new particle formation between urban and deciduous forest sites in northern Japan during the summers of 2010–2011

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Responses to the reviewer's specific comments and questions:

**Reviewer #2 (Comments):**

The manuscript "Different Characteristics of New Particle Formation between Urban and Deciduous forest sites in Northern Japan during the summers of 2010-2011" presents measurements of new particle formation at two sites in Japan. The authors present the case that at the urban site, particles are formed with low pre-existing aerosol present in sunny conditions, and that the particles grow when the air comes from parks and residential areas and contains elevated NMHC concentrations when compared to other air mass source areas. At the forest site, the pre-existing aerosol does not have the same limiting effect, and the initiation of new particle formation is caused by the inflow of anthropogenic emissions from urban areas. The manuscript is very well written, the case is well made and the conclusions in the paper are drawn logically from the presented evidence. The result is scientifically of interest and furthers understanding of tropospheric aerosol sources in areas affected by both anthropogenic and biogenic sources

Specific comments

*I could find little fault in the analysis and reasoning. The only doubts I have is in the explanation for the urban emission impact on NPF enhancement: the authors explain it by the presence of an acid catalyst (page 14061-14062) and mix in the inhibiting effect of isoprene which would be counteracted by sulphur from the city which would then act as this acid catalyst. In my opinion, the effect could also be simply caused by more available sulphuric acid to increase the nucleation rate. As the isoprene inhibiting effect may well be an effect caused by isoprene acting as an OH scavenger, the increased amount of SO<sub>2</sub> would counteract this to produce more sulphuric acid and boost particle formation. I would be interested on the authors' take on this.*

**Response:** Paragraphs in Section 3.4 has been rearranged.

A paragraph in lines 17-23 in page 14062 in the original MS has been moved to line 24 in page 14061.

A sentence in lines 24-27 in page 14061 removed.

Following sentence has been added. Please see lines 528-529 in page 23 in the revised MS.

“The periods with non-NPF events at the forest site can be explained by the inhibiting effect of isoprene on NPF acting as an OH scavenger.”

*Other than this, my only comment is related to fig. 7. The CS unit on the y-axis should probably be a CS-density in log-space (eg  $dCS/\log D_p$ ) so that the integral over the whole distribution in log-space gives the total sink.*

**Response:** The unit of CS in Fig. 7b,d and Fig. 12a has been changed to  $dCS/d\log D_p$ . Please see the revised Figs. 7 and 12.

Fig. 7

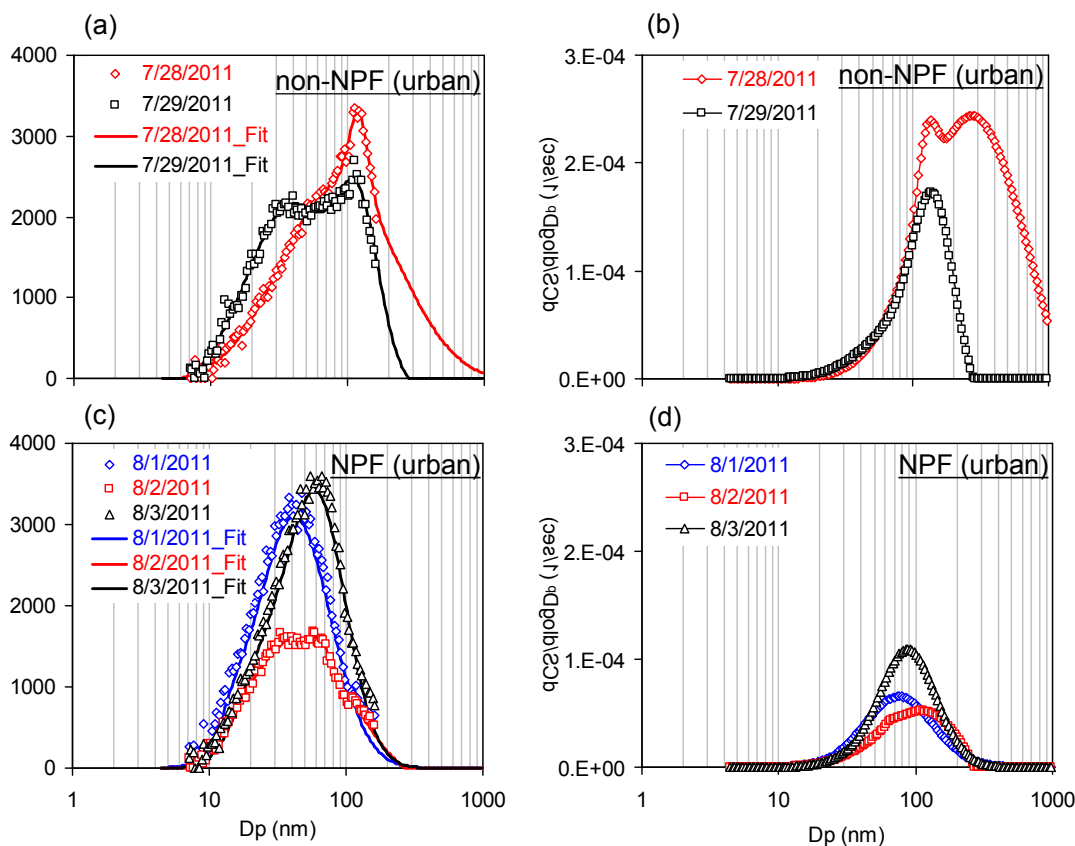


Fig. 12

