

## ***Interactive comment on “Modelling studies of HOM and its contributions to growth of new particles: comparison of boreal forest in Finland and polluted environment in China” by Ximeng Qi et al.***

**Anonymous Referee #1**

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This is a very interesting Manuscript since it measures HOM within urban China and to investigate new particle formation mechanism at this polluted location. An important aspect is NPF is observed even at a polluted site with high condensation sink of vapors.

The manuscript is important for our understanding of NPF in polluted locations. Following are some questions which need to be addressed: 1. On page 8, the authors mention heterogeneous uptake of amines. Is it included in their model?

2. Why is SOA underpredicted at polluted locations? Is it because their model only

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treats monoterpene SOA?

3. Can the authors comment on what other SOA types are likely to be important at SORPES? For example, anthropogenic SOA, isoprene SOA, IEPOX SOA etc.? What is isoprene concentration at SORPES (measured or predicted by WRF-Chem)?

4. Given the much higher 'k' value needed at SORPES compared to SMEAR II it is quite plausible that other NPF mechanisms are at play. Do the authors expect these NPF mechanisms to be dominated by anthropogenic processes?

5. Why does high Nox suppress new particle formation? Is it due to suppression of HOM dimers?

6. Can HOM organonitrates contribute to NPF/growth?

7. In addition to the formation of gas-phase HOM from aromatics oxidation, could aromatics oxidation contribute to HOM through heterogeneous uptake processes?

8. Can the authors comment on what measurements could be used to understand the relative roles of gas-phase and heterogeneous HOM processes on NPF/growth in polluted urban environments?

9. Seems a detailed modeling study that treats various SOA precursors and processes e.g. WRF-Chem at SORPES may be valuable for providing further insights into expected processes. Could the authors comment on how such a study could be used to augment their measurements and box model?

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