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Atmospheric Chemistry and Physics Discussions

Interactive comment on "

Isoprene in poplar emissions: effects on new particle formation and OH concentrations" *by* A. Kiendler-Scharr et al.

Anonymous Referee #2

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General comments:

This manuscript discusses the results of laboratory experiments to study the effect of isoprene on new particle formation from VOCs emitted by a wild type (WT) Grey poplar and a mutant type (MT), in which isoprene emission was suppressed. The authors found that isoprene suppresses particle formation rates and OH concentrations. They also studied the SOA formation potential of isoprene, using deuterated isoprene to be able to separate the isoprene SOA from SOA formed from other VOCs. The authors

used novel methods and present interesting and important results which are relevant to the community and within the scope of ACP. The manuscript is well written, and I recommend its publication in ACP after my comments below have been addressed.

Specific comments

1. p. 22426, lines 3-4: The SOA from deuterated isoprene most likely composes more than the ten ions mentioned by the authors. The isoprene SOA constitutes only a small fraction of the total SOA (1.6%, p. 22430), and other deuterated ions could be in the mass spectrum, located in the "shoulders" of larger peaks corresponding to non-deuterated ions. The mass of deuterium is very close to twice the mass of hydrogen, so deuterated and non-deuterated ions might be very close to each other, and the signal from some of the non-deuterated ions could mask the signal of the deuterated ions. If there are other deuterated ions in the mass spectrum which the authors have not identified, their estimate of isoprene SOA yield would be biased low. One way to check for additional deuterated ions would be to conduct an SOA formation experiment with only the deuterated isoprene as VOC precursor and to analyze what fraction of the isoprene SOA mass is due to the ten ions identified here. The isoprene SOA mass found in the mixture experiments could then be scaled according to this fraction.
In any case, the reported uncertainty in the SOA mass yield (2.3+/- 0.3) seems optimistic considering the uncertainties in trying to quantify the amount of isoprene SOA when it constitutes only such a small fraction of the total SOA.

2. p. 22430, lines 16-23: I recommend that the authors explain in more detail how they deduce the isoprene SOA mass yield from the total SOA mass yield. It appears that their estimate might require the assumption that all VOCs react at the same rate. If this is the case, this assumption should be stated and justified.

3. The authors find that isoprene suppresses new particle formation (nucleation) rates, but it does not affect particle growth rates. The suppression of nucleation will mainly affect climate through the particles' role as cloud condensation nuclei (CCN). Particle

growth rates are an important determinant of whether freshly nucleated particles grow to "CCN size range" (roughly 100 nm and larger). It is therefore important for the implications of this work that the authors comment on the extent to which isoprene suppresses the formation of particles in the CCN size range.

Technical corrections

p. 22429, line 20: "strenght" should be "strength"

Figures 1 and 3: the time-dependence of the monoterpenes (MTs) is not visible using the scale of these figures. I recommend scaling the MTs.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 22417, 2011.