**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Updated aerosol module and its application to simulate secondary organic aerosols during IMPACT campaign May 2008" *by* Y. P. Li et al.

Anonymous Referee #2

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This study describes the improvements the authors made for the simulation of secondary organic aerosols (SOA) using the updated SORGAM module, SORGAM-TIN. In the new module, the authors have successfully modified three parameters: the temperature dependence functions of SOA yields for aromatics and biogenic VOCs, OH-initiated isoprene SOA, and isoprene and monoterpene SOA formation channels from NO3 oxidation. The ambient SOA concentrations observed during the IMPACT field campaign in the Netherlands were used to evaluate the performance of SOEGAM-TIN. The updated model can reproduce the observed SOA much better than the original one, especially for those during nighttime. Possibilities of the daytime measurement-model discrepancies for the SORGAM-TIN model results were also discussed, al-

though more discussion is needed. In general, the paper is written and organized clearly and concisely and is easy to follow. I recommend the acceptance of this paper for publication in ACP after some minor revisions shown below.

1. Page 5973, Lines 13-15: do you have any idea about the uncertainty raised from such an assumption? There should be significant differences among the spectra of the oxidation products of aromatics and biogenic VOCs with OH, NO3 and O3.

2. Page 5974, Section 3.2: this section should be briefly mentioned in the abstract. In addition, it would be better to provide more information on the chamber experiment conditions such as the levels of biogenic VOCs, acidity and relative humidity, which may help understand the discrepancies among the chamber, model and ambient results discussed in the following section.

3. Page 5978, Lines 4-7. The overestimations of SOA on May 9 and May 16 (Figure 7a) seem to be largely from the failure of SORGAM-N. Is this true? Wet scavenging occurred on 16-17 May could strongly influence the atmospheric level of SOA.

4. Page 6005, in Figure 8a, SORGAM-TIN still strongly underestimates the observed SOA concentrations in the afternoon. The authors have discussed about some possible reasons in Section 3.3.3. However, special attention should be paid for isoprene derived SOA. The model result of the low level of SOA_ISO in the afternoon as shown Figure 8b seems to be one of the main reasons for such an underestimation. Isoprene is known to be emitted during daytime and can be rapidly oxidized into semi-volatile organic species. Field campaigns have also shown that isoprene oxidation products such as 2-methyltetrols peaked during late afternoon to early evening due to a time lag of photooxidation and gas/particle partitioning. More discussions/explanations on such a point are needed in the text.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 5961, 2013.