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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Influence of relative humidity and temperature on the production of pinonaldehyde and OH radicals from the ozonolysis of $\vec{\alpha}$-pinene" *by* R. Tillmann et al.

Anonymous Referee #2

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The manuscript describes the results and their detailed interpretation of alpha-pinene ozonolysis experiments in the AIDA chamber under different humidity and temperature conditions. The scientific focus lies on the interpretation of the formation of pinonaldehyde. Based on the differences of the PA yield at different humidities and the gas/particle partitioning of PA at the different temperatures, the authors conclude that the higher SOA yields at higher humidities (especially at low temperatures) is essentially caused by the higher chemical yield of PA at higher humidities and not (or just insignificant) the physical uptake of water. They also describe the formation of OH radicals under these reaction conditions and discuss potential explanations for the observed differences. The data interpretation is certainly based on high quality experi-

mental work and the conclusions drawn are generally sound. In my opinion the results of the work are very useful for the scientific community, since despite the fact that the importance of natural SOA formation is more and more acknowledged, high quality experimental work that also is aiming on a better process understanding on the molecular level is scarce. The manuscript is generally well written and the topic certainly appropriate for the readers of ACP. Therefore, I recommend to publish the paper in ACP after considering the following comments.

The authors discus the results presented in Figure 7 and conclude that the relatively large K value (derived from Fig. 7) of 0.005 of PA might be explained by reactions with SCIs (a gas phase reaction). I cannot follow this line of argumentation, since the plot shows the measured PA gas phase concentrations (more precisely its inverse) vs. Mo – hence such an explanation could just be valid if the hypothetic reaction product (the C20-SOZ) also gives the same signal in the PTRMS (with the same intensities). If the SCI reaction just diminishes the PA concentration in the gas phase this would be independent from Mo (and it certainly makes no sense to assume that with increasing Mo the PA-SCI reaction gains importance). Therefore, I think this discussion has to be reexamined. Furthermore, the whole discussion is based on the experiments under humid conditions and under these conditions it can be expected that the SCIs predominantly react with water. Alternatively, a condensed phase reaction of PA could perhaps explain the observations, however, this might be unlikely. Indeed an aerosol mass dependent activity coefficient might be the most likely explanation, since clearly the organic aerosol composition in these experiments depends from the organic aerosol mass (i.e. uptake of more and more PA-like compounds with increasing Mo).

Figure 6 can easily be misunderstood – I suggest to plot [(delta) a_pinene] vs. [PA] (and not just [a_pinene] vs. [PA]).

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 3129, 2010.