

Atmos. Meas. Tech. Discuss., referee comment RC3
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Comment on amt-2021-362

Anonymous Referee #3

Referee comment on "LED-based solar simulator to study photochemistry over a wide temperature range in the large simulation chamber AIDA" by Magdalena Vallon et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2021-362-RC3>, 2022

The authors present an LED based lightning system for the simulation chamber AIDA. The lightning within the chamber is very well characterized in terms of gradients, photolysis of relevant species like NO₂, effects of chamber temperatures and perturbation of chamber conditions while the lights are on. The methodology, figures and discussion are well done. However, the presentation while good, suffers from an introduction that is not written in a fluent and precise way. Improving the introduction would help the manuscript but it stands as a great piece of work regardless. I would accept the manuscript baring some minor comments below.

Line 35-36: Odd way of saying that light enables photochemical pathways that are not available by merely increasing the temperature. Rephrase.

Line 39-40: This sentence is vague in the way it is written. The authors provide examples in the next paragraph but I would rephrase this sentence to be more specific.

Line 43: Should read "In principle"

Line 125: Did the experiments after using NO₂ differ in any way?

Figure 4: jNO₂ seems fairly constant even though the emissions profiles are quite different in Figure 3. For figure 3 electrical settings were adjusted, is that the same case for Figure 4? If so it should be stated.

Line 305 and Figure 5: How consistent are kW values? Did they change with temperature? Also, did the authors perform exclusively wall loss experiments?

Figure 6 formaldehyde and acetaldehyde yields increase with temperature, is this the result of faster wall losses artificially reducing the yields? Or increased adsorption leading to different product distributions? The suggested changes to alkoxy radical chemistry are a plausible reason but there could be other reasons.

Figure 9, Figure S7 and lines 435-440: The authors mention that product formation for the DTDP photolysis experiments is slower at lower temperatures but the photolysis rate is the same. Any explanation for this? Figure S7 only shows one temperature.

Line 460: Should read pinene

Line 463: Numbers should be subscript