

Atmos. Meas. Tech. Discuss., referee comment RC1
<https://doi.org/10.5194/amt-2021-362-RC1>, 2021
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Comment on amt-2021-362

Anonymous Referee #1

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-RC1>, 2021

Vallon et al. described the implementation of a newly designed light source for the AIDA chamber. The illumination conditions were well characterized. In particular, with this newly designed light source, the photolysis of 2,3-pentanedione and a brown carbon proxy was investigated over a wide range of temperatures. It was demonstrated that this type of light source allows reproducible experiments for a wide range of atmospheric conditions.

This paper has significant implications for the design of a smog chamber so is well within the scope for AMT. The experimental part is solid. It can be recommended for publication after the following comments are addressed.

Specific comments:

Line 28: Please specify the location and seasonal conditions that the light source is compared with. Is it the Karlsruhe summer at noontime?

Lines 60-79: The advantages and disadvantages of LEDs and xenon arc lamps are discussed in detail. How about black lights? Why are they excluded from the solutions?

Section 4.3 Integral light intensity: Are the wall losses of NO₂, NO, and O₃ accounted for when determining the light intensity? Also, it seems that the wall loss rates of gas-phase species at different temperatures were different. Will this impact the determination of the light intensity at different temperatures?

Line 302: Why are the slopes different before and after illumination? Any explanations?

Line 317: Is it a summer day of Karlsruhe? Please clarify.

Line 337: What are the uncertainties of wall losses? Why are the uncertainties higher at higher temperatures?

Lines 431-432: The photolysis of nitrate aerosols can produce OH radicals. Will this perturb the photolysis of DTDP?

Lines 432-433: What are the phase states of DTDP at different temperatures? Were the slower production rates of products at lower temperatures caused by the reduced photolysis rate or the increased viscosity of particles?

Lines 437-439: Are these components characterized by CIMS?

Technical comments:

Line 100: Please remove the comma after "note".

Figure 3: Please add the labels "a" "b" to the figures.

Figure 4: The labels "a" and "b" in the figures and captions are missing. Please check throughout the manuscript.

Line 296: Wrong figure number.

Figure 7: The caption of the x-axis should be "Time relative to start of the first illumination".

Line 460: "pinen" should be "pinene".

Line 501: "an" should be "and".