We thank reviewer 1 for the thorough work and the positive and helpful feedback. We adjusted our manuscript accordingly.

> Page 1, line 19: processes instead of mechanisms.
> Page 5, line 1: Correct the sentence.
> Page 10, line 12/13: The compound is missing.… "the main degradation product of the OH
> initiated oxidation of" ? (2-oxo-3-hydroxy-succinaldehyde)
> Page 10, line 15: Figure 11c/d shows…(not show)
> Page 11, lines 29-41: Please, rewrite this section to make it clearer.
> Page 19, line 30: Check the unit for Henry's law coefficient.
> Page 20, line 1:…carboxyl functional groups and not "functions".
> Page 20, line 67/68: Correct the whole sentence: "Furthermore, uptake processes…"
> Page 22, line 27: …has been developed and tested.
> Page 23, line 12: Check the unit for Henry's law coefficient.
> Table 4: (c)…by switching of the UV-C
> Figure 9: ..5-dicarbonlys
> ESM:
> Page 19: First two lines?
> Page 20: line 10: …plotted as box model in ? (Where?)
> Page 24, line 6: Dashed lines in subfigure d (not c).

In particular we corrected all typos, rephrased unclear or misleading sentences, corrected wrong cross-references and units as pointed out in the specific comments listed above.

> Page 2, line 38: Use "auto-generation" throughout the manuscript. "Auto-construction" is not a good choice.
> In Table3 "automated mechanism self-generation" is used; in line 17 (page 15) "automated aqueous-phase mechanism generation", but mostly "auto-generation" is used. I would suggest using the same through the whole article.

Mechanism self-construction was consistently renamed to mechanism auto-generation in the main article and the ESM.

> The manuscript is very extensive with a lot of material including also ESM; I would suggest to shorten a bit if possible (especially the text/sentences, which are repeated can be deleted).
> I suggest also checking the English language.
> Page 3, lines 12-15 (Overall, a database…) can be deleted; the same is written below (lines 30-32).

To shorten the paper, the introductory part of section 2 was removed and partly moved to subsections 2.1 and 2.2. The article was carefully revised for the use of the English language. The analysis of the simple correlations in section 2.2 was shortened. This addresses the following comments:

> Page 3, lines 9-11: If aromatics are excluded here, then this sentence can be deleted.

However, we kept the sentence on p. 3, ll. 9-11 to make the reader aware of the additional aromatics data of the kinetics database, even though the data wasn't used for the CAPRAM/GECKO-A protocol at this stage.

> Further, I strongly suggest a separate list of abbreviation, which would be very helpful. The
> full name should be used at the beginning, and after abbreviation can be used throughout the manuscript.
> Page 1, line 33: Instead of mesitylene I would use 1,3,5-timethylbenzene or TMB later in the manuscript.

> The meaning of UPT, RNX, etc. sensitivity runs should be involved in the list of abbreviations.

Furthermore, we have introduced a list of abbreviations in a new appendix A, which is split into different topics/sections. In this context, we have removed Table 2 and moved the contents to appendix A.2. The appendix includes species abbreviations with 1,3,5-trimethylbenzene as TMB as suggest to address the following comments:

> Page 19, line 10: How OH radicals are formed from the photolysis of O_3 in the gas phase?
>
> During photolysis, O atom is formed, which with H_2O forms OH (RH 75%)?

We introduced two new reactions of

> O3 + hv -> O(^{1}D) + O2
>
> O(^{1}D) + H_2O -> 2 OH

to clarify the formation of hydroxyl radicals from ozone photolysis in section 5.

> Page 13: Why do you use HLC abbreviation for the Henry's Law coefficient and not as it is usually used?

We have used HLC as abbreviation for Henry's law coefficient in the text of the article rather than the K_H or H as this is a it can be easily associated with Henry's Law coefficient and is a more spoken abbreviation and, hence, fits better with the text flow.

> Figure 19 & 20: TMB cannot not be seen.
>
> Page 20, line 41: From Fig. 19, the particle growth (red color) in the model run TMB cannot be seen.

In Figures 19 and 20, the concentrations in the model runs TMB and UPT were almost identical and graphs were on top of each other. Therefore, the concentrations in the run TMB were not visible. To overcome this issue, we introduced new dash-dotted line types for the scenarios UPT and RXN.

> Page 24, line 76: The grey dashed-dotted line is not visible.

As the overall carbonyl correlation is identical to the ketone correlation, both graphs are on top of each other. With the previous colour scheme, the grey dash-dotted line was hard to detect. Therefore, we have changed the colour to black and adjusted the figure caption accordingly.

> Page 30: Figure S9: Give the reference for the standard SAR.

In Fig. S9 in the ESM, reference to the construction method of the main SAR has been given citing all papers and cross-referencing Table 2 of the main article with the explanation of the construction method.

> Page 31: Correct the title for Figure S10.

As Figure 10 has no title, we are not quite sure, what the following comment meant.
However, we detected a mistake in the unit of the organic mass and corrected the y axis label. Furthermore, we spelled out "organic" in the legend.

> Page 32: Figure S12: It is good to shortly explain alpha, beta and gamma scenarios also here.

The caption of Fig. S12 has been expanded to shortly explain the different subversions of the CAPRAM/GECKO-A protocol.

> Figure 13: Add conditions or at least mark cloud and non-cloud periods. This should be done also for other figures.

We have expanded on the conditions in all figures of the sensitivity runs and explained the shading of cloud and night-time periods in the plots in the figure captions.

> Page22, line 5: Do you have an idea how malic acid is formed?

As stated on page 21, ll. 18-21, the formation of malic acid from TMB cannot be explained with the current knowledge. Therefore, we attributed the formation to background chemistry,

most likely from reactions with the chamber walls and possible residue of previous experiments.