Answer to Anonymous Referee #2

First of all, the authors would like to thank the anonymous referee for this interactive discussion and its constructive comments, corrections and suggestions that ensued. We have carefully replied to all its comments and the paper has been improved following its recommendations.

All technical corrections suggested by the referee have been carefully performed. Answer has also been provided for the minor comment. Please find below the answers for each comment:

Minor Comments

1. The authors have measured the photolytic decay but then assume a quantum yield of unity to allow calculation of photolysis rate coefficients under atmospheric conditions. However, since it appears that the wavelength-dependent light flux in the chamber and the absorption cross-section data are both known, the effective quantum yield can in fact be determined from the ratio J(experimental) to J(maximum), where the latter term is calculated using a quantum yield of unity (Clifford et al., 2011). It is recommend that the authors do this as it will allow for a good estimate of the quantum yield for photolysis of the compounds over the range of their atmospheric absorption.

In fact, the absorption cross sections of the studied compounds are not known and were not measured in this study. They were estimated by assuming the fact that the enhancement factor r_{nk} is the same as the one calculated for 3-nitrooxy-2-propanone. However, this hypothesis could not be confirmed as absorption cross sections are not available. So effective quantum yields cannot be determined from the ratio $J_{experimental}/J_{max}$.

Technical Corrections

1. Lines 20-22: It is probably better to report the measured photolytic rate coefficients as j(carbonyl nitrate)/j(NO2) values, as in Clifford et al (2011). This would allow users of the data to calculate j(carbonyl nitrate) under a range of sunlight conditions.

As proposed by the reviewer, *j(carbonyl nitrate)/j(NO2) values have been provided.*

2. Lines 22-23. The specific atmospheric conditions that the photolytic lifetimes were calculated for should be stated.

The irradiation conditions used to estimate the photolysis frequencies are already given in the abstract. It is not clear for us which additional information the reviewer would like us to provide.

3. Line 35: No need for the abbreviation "ONs" as it does not seem to appear in the rest of the article

The abbreviation has been removed.

4. Line 62: Give full name for PANs

It has been done.

5. Lines 66 and 68: Replace "works" with investigations or studies.

It has been done.

6. Line 83: Replace "photochemical" with atmospheric.

It has been done.

7. Line 90: The term "fairly fast" is not specific. This sentence should be improved.

It has been done.

8. Page 5 and elsewhere: The rate coefficient terms, k and J, should be in italics.

It has been done.

9. Line 209: The first sentence of this paragraph is not needed here.

It has been removed.

10. Line 228: These are not "experimental" photolysis frequencies, but are in fact estimated atmospheric photolysis frequencies under specific light conditions.

In reply to referee #1 and referee #2 comments, photolysis frequencies estimated for typical tropospheric irradiation conditions have been removed from Table 1 and 2. Only experimental values measured in the simulation chamber are presented and compared.

11. Line 258: Define PAN

It has been done.

12. Line 295: Should be Scheme 2.

It has been corrected.

13. Page 15: Captions for the figures, table and schemes should be more detailed to allow the reader to view and understand them without referring to the text too much.

We did our best to improve the captions of the figures, tables and schemes. We hope they are understandable now.

14. Page 17, Scheme 2: Why is decomposition of the nitrooxy radical not considered here, but it is in Scheme 1?

This is an omission and the oxidation scheme has been completed accordingly. However, from the state of the art on the alkoxy chemistry, we expect the decomposition channel to be negligible in comparison to the reaction with O_2.

15. Page 19, Figure 2: What do the different data points represent? More detail should be provided in the caption and/or the figure itself.

The different symbols represent different experiments. This has been added in the figure caption.

16. Page 20, Table 1: The inclusion of the calculated atmospheric photolysis rate coefficient in this table is a bit confusing. It should be removed.

We fully agree with this comment. Photolysis frequencies estimated for typical tropospheric irradiation conditions have therefore been removed from Table 1 and 2.

17. Page 21, Table 2: As explained in point 10 above, the use of the term J(experimental) here is wrong.

See answer to comment 10.

18. Page 23, Table 4: Use the times symbol instead of "x".

It has been done.