

Interactive comment on “Absolute rate constant and O(³P) yield for the O(¹D)+N₂O reaction in the temperature range 227 K to 719 K” by S. Vranckx et al.

Anonymous Referee #1

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This paper describes careful lab studies that help reduce the uncertainties in $k(T)$ and the O(³P) yield for the important stratospheric reaction $O(^1D) + N_2O \rightarrow$ products. The paper warrants publication in ACP once the authors have addressed the relatively minor issues raised below.

1. The authors comment that a ± 5 K uncertainty in temperature at 220 K will not impact the overall uncertainty of reported rate constants because the rate constants are essentially temperature-independent. The temperature uncertainty does, however, add a non-negligible, temperature-dependent uncertainty component to the N₂O concentration determination that should be taken into account.

2. I think that equation (9) is incorrect as written. The term 0.005 accounts for O(3P) production from N₂O photolysis; this O(3P) is present immediately after the photolysis laser fires, i.e., it does not appear tracking the O(1D) decay as equation (9) implies. The data need to be re-analyzed using the correct equation, although I think the effect on the authors' results will be minor.

3. The term 0.005 that appears in equation (9) is taken from a single study reported in the literature, not determined in this study. I think the authors should be skeptical enough about this result to explore the potential impact on their reported kinetic and yield parameters of a significant systematic error in this photolysis yield. I would recommend considering 0 and 0.01 as reasonable lower and upper limits, and analyzing the impact on their reported parameters. Also, does the data reported in this study provide any (independent) new information about the O(3P) yield from N₂O photolysis?

Minor Corrections:

p. 8892, line 4: "0.045" should be " 0.045×10^{-10} " p. 8894, line 6: I think the last word on the line should be "products" rather than "reactants" p. 8896, line 15: "Fig. 6" should be "Fig. 7" p. 8896, line 22: "Fig. 7" should be "Fig. 8" p. 8897, line 12: "Fig. 7" should be "Fig. 8" and "Fig. 8" should be "Fig. 9"

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