We have revised the manuscript according to the editor's suggestions and our responses are below.

*** The use of "binned" data in the figures following Fig. 3 requires some clarification in the text. I suggest that the authors consider including revised figures including "unbinned" data in either the main manuscript or as supplementary material.**

Data are no longer presented in 5 K bins. We added a new Figure 3b, which shows the ratio of all of our experimental Keq values to the third law fit. The error shading in this figure now allows for a straightforward comparison with the later figures. For clarity in figure presentation for Figures 4, 5, and 7, we now present our data in 3 K averages, which is the smallest averaging range in which each data point is averaged with at least one other data point. Without averaging our data, the data from the other studies are difficult to see on these later plots. We emphasize that all quantitative analyses in this study were conducted using the full data set of Keq measurements as shown in Figure 3 and Table 1.

*** The residual UV spectra included in Figure 2 should be plotted on an expanded scale to more clearly show the quality of the subtractions and potential systematic deviations, if any.**

The residual UV spectra presented in Figure 2 have now been magnified to more clearly show the quality of the spectral fits. In addition to this change, we have revised the spectral fitting method, motivated by the desire to better quantify OClO concentrations for ruling out secondary chemistry, and this is reflected in the text and the new version of Figure 2. Specifically, to better constrain OClO, we now fit this molecule at longer wavelengths (310– 350 nm), where the cross sections are much greater and have smaller uncertainties. ClO is now fit using the vibrational structure only, which also provides improved results. ClOOCl is fit as before, constraining ClO to the value obtained in the differential absorption method. The *B* parameter from the third law fit changed slightly from 8528 K to 8527 K. The second law fit parameters also changed; however, not beyond the 1σ uncertainty reported previously. As demonstrated in Figure 2, OClO is small for all runs in this study.

*** Table 1: The table should be expanded to include any relevant physical conditions for each measurement but more importantly the concentrations of ClO, Cl2O2, and OClO(if observed) and their uncertainties for each experiment. The precision of the determined Keq should also be provided.**

Table 1 now includes the concentrations of ClO, ClOOCl, and OClO (when it is observed) and uncertainties in these values, as derived from an additional analysis, which is described in the text of the revised manuscript.

*** Table 1: The temperatures quoted in table 1 to 0.01 C is unrealistic considering the accuracy of the temperature measurement in the experiment. Appropriate temperature values should be quoted and possibly used in the data analysis.**

In our original analysis, we retained and propagated an additional decimal place beyond the last significant figure in the analog-to-digital conversion of the temperature reading, choosing to round the final result after all Keq calculations were completed rather than round in the intermediate steps. Accordingly, to exactly reproduce our second law fit results, the temperature had to be reported to two decimals. We now truncate our temperatures to 0.1 C and propagate these values into all calculations of Keq. We find that the third law *B* parameter value is identical between both treatments; however, the second law parameters have adjusted slightly, though not significantly.

*** Conclusions: The text for comparing the JPL recommended uncertainty and the statistical uncertainty obtained in the present work needs to be revised to clearly state that the JPL value was not derived from a statistical analysis.**

We now state unambiguously that the JPL recommended uncertainty is not derived from a statistical analysis of prior works.