General comments:

This manuscript, AMT-2020-94, reports the evaluation of new O3 xsec data sets (labeled as 'BW') measured in the Hartly and Huggins bands for the use of O3 profile retrieval from OMI observations. The BW data sets were modeled by using a polynomial in a function of temperature in order to facilitate direct comparison with the current reference data set ('BDM') and their application to the O3 profile retrieval. They have found that the new data set, BW, shows a better performance in the retrieval of O3 profile in terms of less oscillatory features in the retrieved profile and better agreement with the ozonesonde data. We found the manuscript written in a nice and compact manner; the presentation looks consistent. However, we're not convinced that we can agree with the authors' interpretation of what is described in Sec. 2, which will be detailed below.

This manuscript has shown well that the new dataset, BW, is better than the BDM in the O3 profile retrievals primarily because of their wider temperature coverage, esp. going down to 194 K critical to the retrievals in the transition layers (UTLS), which was not covered by the BDM data set in temperature. Therefore, the conclusion of this work has bee supported by the results presented in the manuscript. The topics of this paper highly relevant to the scope of AMT, so that we recommend a publication of this manuscript to AMT with a revision or a further clarification Sec. 2. Specific comments and suggestions follow.

The authors wrote, "*Offset corrections were made for each of the 6 temperatures by fitting to the SER dataset since it was measured at higher ozone column density and thus considered more reliable regarding offset.*"

→ Does this mean that the BW xsec was 'normalized' to that of SER? Clarify what the corrections factors were and how (and what wavelengths) they were determined. Was this offset considered in the error budgets?

Authors wrote, "*After offset correction polynomials of 1st order (<270.27 nm) > and 2nd order (>270.27 nm) in temperature were fitted for each spectral point to improve the statistical uncertainty*." and followed by "*Measured cross-sections are typically parameterized quadratically to be applied conveniently at any atmospheric temperatures using the following equation:* $C = C_0 + C_1(T - 273.15) + C_2(T - 273.15)^2$ *(Eq.1)*"

→ (1) The agreement between the original data and the fitted data should be inspected or discussed for each of the two data sets, BW and BDM, and discussed. Besides, direct comparison of their original data sets between BW and BDM (prior to having them fitted to the polynomial), which may be done at T = 273 and 295 K provided that their temperature differences, ΔT = 0.5 and 0.7K, respectively, is insignificant, which seems true because the authors argued the dominant coefficient C0 is almost independent of temperature.

→ (2) We're not sure how well the Eq. (1) could have captured the temperature dependence of the xsec. The xsec can be represented by integrated (line) intensities for the given frequency (wavelength) grid, and the temperature dependence of the line intensities can be modeled by two parameters, i.e., partition function (which we know well for O3) and the lower state energies (which we do not know for the features of this work). Thus, one can simulate the intensity ratio to that at 296 K at various temperature for a few representative cases of the lower state energies, as shown in Fig. X below.

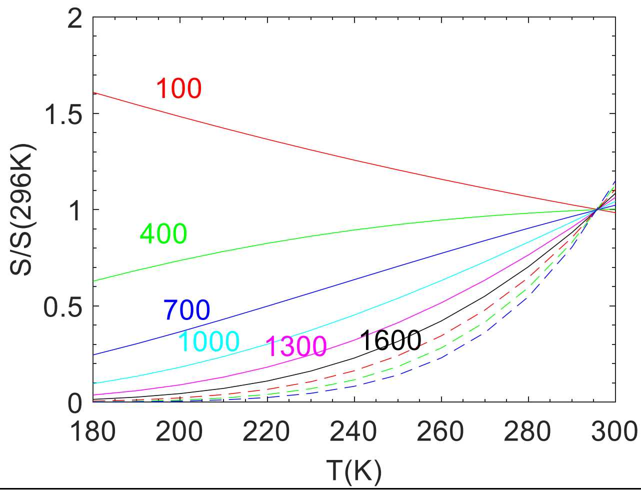

Fig. X S/S(296K) vs. T at a given E"(cm^{-1}) =[100,400,700,1000, 1300, etc.]

As we see, Fig. X is similar to the right panel of Fig. 1, except for one thing that each curve in Fig. X represents different values of the lower state energies, not the wavelength presented in Fig. 1. There is a possibility of having the sampled wavelengths (such as 280, 290,..., in nm) possessing progressively higher value of their (effective) lower state energies. However, it'd be more appropriate to assume that each curve in Fig. 1 corresponds to a different value of 'effective value of the lower state energy' of multiple transitions falling into the particular wavelength data point grid (for instance, 280nm±resolution element). This point should be addressed properly to keep naive readers from being misled to think the temperature dependences in Fig. 1 is attributed to the wavelengths.

→ (3) For the same reason, Fig. 2 is hard to interpret. The respective comparison of the C1 and C2 for two different data set as a function of nm could be legitimate only when the two data sets are measured at the same resolution because the effective lower state energies mentioned above would be the same. Therefore, the non-wavy feature of C2 for the BW data set would have more to do with the outcome of the resolution choice in the representation by Eq.(1), rather than it is telling the BW data set is superior to the BDM dataset in the temperature consistency. In other words, Fig. 2 shows which data set is better represented by Eq. 1 rather than which data is closer to the truth.

This section may stay, but with a specific statement being provided for the readers on the point made above. The bottom line is that the BW data set is better than the BDM set because of the broader coverage of the measurement temperature, especially covering the temperature critical to UTLS layers, as was properly concluded by the authors in the manuscript.

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