Reviewer #2:

We thank the reviewer for extensive, constructive and positive comments regarding our paper.

1. Page 1987, lines 11-14: I propose to mention that the cross sections included in the PNNL database are "composite" data. They result from many experiments. Furthermore, infrared signatures due to impurities were removed numerically from the experimental cross sections. A good example is given in the text with hydrogen peroxide (H2O2) which exist in a laboratory cell in equilibrium with water, oxygen as impurities. This is the same for nitrogen dioxide (NO2) which exist in equilibrium conditions with its dimer (N_2O_4).

We added some more information in the introduction. The corresponding paragraph now says

The PNNL set is a strictly experimental database recorded at moderate resolution (0.1 cm^{-1}) with all species pressure-broadened to 760 Torr during measurement using pure N_2 gas. By definition, it includes all experimental effects in its results such as hot bands, combination bands, pressure broadening, and the effects of (potential) trace contaminants (Sharpe et al., 2004) (Johnson et al., 2010). Great care is taken to identify these experimental effects by analyzing multiple aliquots (~10) of sample at various partial pressures. For example, a composite spectrum might be derived from aliquots containing 0.1, 0.25, 0.5, 5, 10, 50,… Torr of sample, which are then pressure broadened to 760 Torr using UHP nitrogen. Any discrepancies introduced by contaminants, partial pressure errors, baseline drift, etc. will manifest in the residuals of the composite or fitted spectrum.

2. Page 1992, paragraph 3.1:
The identification of the main infrared bands of N_2O_4 are given in the following references [Hurtmans et al, 1993; Hepp et al. 2000]. I propose to add these references to the text.

The dimer is not a subject of the original paper and was just a wrong gas the BG authors picked from PNNL database. We do not think that details of the spectroscopy of the dimer would be of interest to the readers of this comment.

3. Table 1, page 2001:
I do not understand the column "PNNL classes" (the letters I, II and III). Please add a comment to the Table caption.

We agree that this information was not well described and not particularly relevant to the discussion in our paper. We removed that column.

4. ¤ Page 1992, paragraph 3.1 line 15 :
Please correct:
…parametrization and hot bands in HITRAN, as well as aforementioned differences between

We believe the word “aforementioned’ is correct in this context. We are not sure what the reviewer had in mind exactly.

5. ¤ The reference “Rothman 2005” is missing.

Reviewer #1 also noticed this omission. We have added it now.