

Interactive comment on “Total Column Water Vapour Retrieval from S-5P/TROPOMI in the Visible Blue Spectral Range” by C. Borger et al.

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We have a couple of comments on the way different editions of the HITRAN database are represented in this paper.

1. Regarding statement in Line 75. "The molecular absorption by water vapour within our fit window is relatively weak and hence the modelled line lists vary strongly from HITRAN 2008 to HITRAN 2012 (Rothman et al., 2013) and to HITRAN 2016 (Gordon et al., 2017)."

Please see attached figure, which shows the absolute absorption cross-sections of HITRAN2008 and HITRAN2012 plotted on a linear scale, all isotopologues included. The cross-sections were all calculated using the HITRAN API with a temperature of

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288K, 1 atm, 0.001 cm⁻¹ resolution and a 50 cm⁻¹ wing. The data sets appear similar and do not seem to "vary strongly". The residuals at 446.2 nm, 444.2 nm and 444.5 nm are due to improvements in calculated line positions in HITRAN2012. The line centers are slightly shifted, but they are present in each set. The HITRAN2012 line list is also more complete than HITRAN2008, note the extra HITRAN2012 weak absorption around 440 nm. Can the authors provide any evidence that suggest the data sets "vary strongly" in 430-450 nm?

2. Regarding statement in Line 77. "Lampel et al. (2015) found out that HITRAN2012 underestimates the water vapour concentration derived from Long Path DOAS observations by approximately 10% and that the previous version HITRAN2008 agrees better to the reference measurements."

Within the discussion section in Lampel et al. (2015b), they found residuals in all their windows to be reduced by going from HITRAN2009 to HITEMP2010/HITRAN2012 cross-sections. (HITRAN2008 is HITRAN2009: the article was online in 2009 but the edition of the database is HITRAN2008.) Lampel et al. (2015b) also say "development of water vapour absorption compilations from HITRAN 2009 to HITEMP/HITRAN 2012 results in a better fit of the measurement data". This is not in line with what is claimed here? Can the authors please verify?

3. Appendix B. The authors state that Lampel et al. (2015b) found the HITRAN2012 cross-sections to underestimate water vapor mixing ratios by 8% in 430-450 nm, while for HITRAN2008, the results are in excellent agreement with the meteorological station. The meteorological station is quoted by Lampel et al. (2015b) to have a 5% uncertainty on their value of humidity and a 2% error on the temperature. Lampel et al. (2015b) then proceeds to state "absolute differences of the cross-sections shown in Table 3 cannot be absolutely validated with sufficient precision". It therefore may not be true that HITRAN2008 is 'superior' to HITRAN2012 and 8% deviation is very close to the uncertainty of the measurement. Does this provide sufficient evidence to support the use of HITRAN2008 over HITRAN2012?

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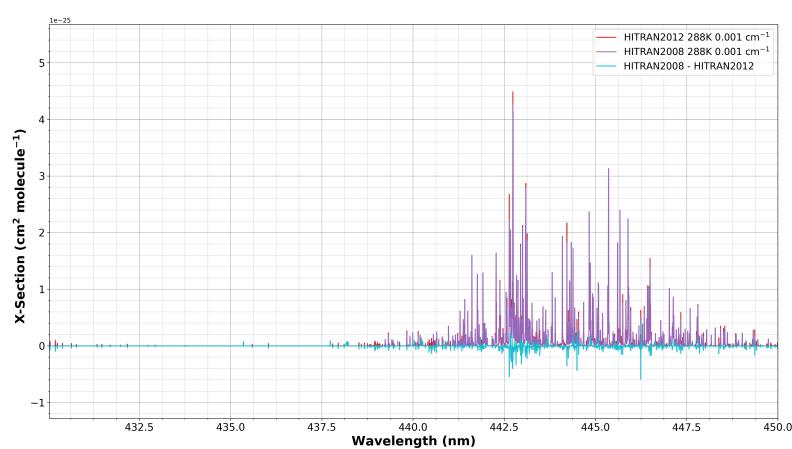


Fig. 1. Absorption cross sections for the HITRAN2008 and HITRAN2012 water vapor line lists computed at 288K, 1 atm, 0.001 cm⁻¹ resolution and 50 cm⁻¹ wing.

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