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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A upper limit for water dimer absorption in the 750 nm spectral region and a revised water line list" *by* A. J. L. Shillings et al.

Anonymous Referee #2

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The paper presents new broad band cavity ring down experiments at rather low resolution (approx 2 cm-1) in an attempt to detect water dimer in the spectral region around 750nm. The third OH stretching overtone of the hydrogen bound OH in water dimer is expected in this region. The authors use puts an upper limit on the combined intensity and width of the band.

The paper is well written.

Points the authors should consider.

It seems to me that the water dimer upper limit and the new line list are two different topics and could be presented in separate papers. Fig 4 is not in the 750 nm region

and could be left out.

I think the results are nice and can stand alone without the need for section 4.2. The results of Pfeilsticker have been shown to be in error and the authors have reported this in Lotters thesis, which is also referenced in this paper. I would delete section 4.2 and fig 6 and would rewrite without repeated reference to Pfeilsticker 2003. The reference to Pfeilsticker could be done in the introduction in a sentence.

The width of the OHb stretching transition is likely wide, based on the present work and also the Garden calculation. Overtone spectra recorded of diols with increasing carbon chain length also suggest that these transitions become wider as the Hydrogen bond becomes stronger. JPCA, 110, 10245-10250 (2006).

In the figures, make the x-axis point in the same direction, e.g. from low to high wavenumbers.

Introduction: 23347, As far as I remember the Hill&Jones and Daniel papers, they were in different regions and not regions where one would expect the OHb water dimer signal.

23348, line 3, add ref to Lotter that says Pfeilsticker's results are not correct.

23348, Line 18, why is M necessary?

23350, line 26, delete Pfeilsticker reference

23351, line 20. The 20cm-1 is similar to widths observed in OH-stretching overtone spectra of other molecules e.g. phenol, methanol, and seems like a reasonable minimum.

23353, what is the possible range of the spectrometer. I.e. could spectra have been recorded at lower or higher wavelengths than the ones presented?

23360, the high temp that gives the most dimer also gives more water for interference, ie possible error in simulation. Is the self-broadening of lines an issue?

23360, a width of 2cm-1 is not realistic. Why was this used in simulation?

23364, line 2, I would mention here that Kjaergaard et al, J. Phys. Chem. A. 112, 4324-4335 (2008) shows that even with different vibrational models similar overtone intensities (only done for v=2 in the paper) are obtained, thus further supporting the range of intensity values used in the present study.

23366, line 13, the OHb stretching transition has not been measured in these first overtone region, like due to its low intensity.

23366, the width of the water dimer bands are important for its absorption of sunlight.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 23345, 2010.