CAVITY RING-DOWN SPECTROSCOPY OF WATER VAPOR IN THE NEAR-UV REGION

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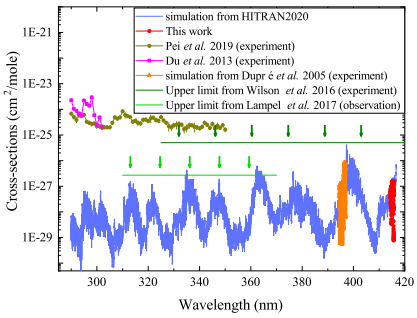

Figure: The overview of cross-sections for water vapor obtained in this work and those reported in previous works, as well as the simulation from HITRAN2020 .

Water vapor absorption in the near-ultraviolet region is essential to describing the energy budget of Earth, but little spectroscopic information is currently available since it is a challenging spectral region for both experimental and theoretical studies. A continuous-wave cavity ring-down spectroscopic experiment was built to record the weak absorption of water vapor in the *near*-UV region around 415 nm. This is a region that is still missing in laboratory measurements. A minimum absorption coefficient detection of around $4 \times 10^{-10}\ cm^{-1}$ was reached and over 40 ro-vibrational transitions of $H_2^{16}O$ determined in this work. A comparison of line positions and intensities determined in this work to the most recent HITRAN2020 database will be presented. We calculate water vapor absorption cross-sections from our measurements and compare them with recent observations (Pei et al., 2019[a]; Du et al., 2013[b]; Dupré et al., 2005[c]; Wilson et al., 2016[d]; Lampel et al., 2017[e]) and simulations (Gordon et al., 2022[f]).

[a] Pei, et al., Journal of Geophysical Research: Atmospheres; 124(24):14310-14324.

[b] Du et al., Geophysical Research Letters; 40(17):4788-4792.

[c] Dupré et al., The Journal of Chemical Physics; 123(15): 154307

[d] Wilson et al., Journal of Quantitative Spectroscopy and Radiative Transfer; 295(170): 194-199.

[e] Lampel et al., Atmospheric Chemistry and Physics; 17(2): 1271–1295.

[f] Gordon et al., Journal of Quantitative Spectroscopy and Radiative Transfer; 277.