

## AN ACCURATE AND COMPLETE EMPIRICAL LINE LIST FOR WATER VAPOR BETWEEN 5850 AND 7920 $\text{cm}^{-1}$

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An empirical line list has been constructed for “natural” water vapor at 296 K in the 5850 – 7920  $\text{cm}^{-1}$  region. It was obtained by gathering separate line lists recently published on the basis of spectra recorded by high sensitivity Continuous Wave Cavity Ring Down Spectroscopy (CW-CRDS) of natural water, complemented with literature data for the strongest lines. The list includes 38318 transitions of four major water isotopologues ( $\text{H}_2^{16}\text{O}$ ,  $\text{H}_2^{18}\text{O}$ ,  $\text{H}_2^{17}\text{O}$  and  $\text{HD}^{16}\text{O}$ ) with an intensity cut-off of  $1 \times 10^{-29}$  cm/molecule at 296 K. The list is made mostly complete over the whole spectral region by including a large number of weak lines with positions calculated using experimentally determined energy levels and intensities obtained from variational calculations. In addition, we provide  $\text{HD}^{18}\text{O}$  and  $\text{HD}^{17}\text{O}$  lists in the same region for transitions with intensities larger than  $1 \times 10^{-29}$  cm/molecule. The  $\text{HD}^{18}\text{O}$  and  $\text{HD}^{17}\text{O}$  lists (1972 lines in total) were obtained using empirical energy levels available in the literature and variational intensities. The global list (40290 transitions) for water including the contribution of the six major isotopologues will be adopted for the next edition of the GEISA database in the region. The advantages and drawbacks of our list are discussed in comparison with the list provided for the same region in the 2012 edition of the HITRAN database. The direct comparison of the CRDS spectra to simulations based on the HITRAN list has revealed some insufficiencies which could easily be corrected: missing HDO lines, duplicated lines, inaccurate line positions or line intensities from variational calculations.