NEW MEASUREMENTS OF H_2O BROADENED BY CO_2 LINE SHAPE PARAMETERS USING QUADRATIC SPEED-DEPENDENT VOIGT PROFILE

E. DUCREUX[1,2,4]**, B. GROUIEZ**[1]**, L. RÉGALIA**[1], (1)*Université de Reims Champagne-Ardenne, CNRS, GSMA, Reims, France*; **S. ROBERT**[2], (2)*Planetary Atmospheres, Royal Belgian Institute for Space Aeronomy, 3 Avenue Circulaire, 1180 Brussels, Belgium*; **R.R. GAMACHE**[3], (3)*Department of Environmental, Earth, and Atmospheric Sciences, University of Massachusetts Lowell, 1 University Avenue, Lowell, MA 01854, USA*; **M. LEPÈRE**[4]**, B. VISPOEL**[4], (4)*Research Unit Lasers and Spectroscopies (LLS), Institute of Life, Earth and Environment (ILEE), University of Namur (UNamur), 61 rue de Bruxelles, Namur, B-5000, Belgium*

The main gas in the atmosphere of our closest planetary neighbors, Venus and Mars is CO_2. Since decades both planets have been regularly investigated by different probes and spacecrafts which carry a large amount of scientific instruments in constant improvement. Their accuracy is expected to be such that it is nowadays important to use the best line shape parameters to study their atmospheric spectra.

A previous study was published in 2019[1] using a Voigt profile to measure the line parameters of water vapor in a CO_2-rich environment. In this work, we studied the influence of the line profile in the determination of the line parameters. Hence, we recorded new spectra in Reims with our Bruker IFS125HR spectrometer combined with a 2-meters White cell at 2.7 μm. We analysed them using a multi-spectrum fitting procedure[2] with Voigt and quadratic speed-dependent Voigt (qSDV)[3,4] profiles. The first gives us a characteristic w-shape residual, while the second profile can greatly reduce the residuals allowing more accurate line shape parameters, especially the CO_2 broadening and shift coefficients. The Voigt profile limits seem reached in our experiment as the speed dependence effects need to be taken into account.

Note that other spectral domains of atmospheric interest are being studied.

Acknowledgments: This work was supported by the Programme National de Planétologie (PNP) of CNRS-INSU co-funded by CNES.

[1] doi:10.1016/j.jqsrt.2019.04.012, L. Régalia, E. Cousin, R.R. Gamache, B. Vispoel, S. Robert and X. Thomas, *J. Quant. Spectrosc. Radiat. Transfer*, **231**, 126-135 (2019)

[2] doi:10.1134/S102485601506010X, O.M. Lyulin, *Atmos Ocean Opt*, **28**, 487-495 (2015)

[3] doi:10.1016/j.jqsrt.2013.05.034, N.H. Ngo, D. Lisak, H. Tran and J.-M. Hartmann, *J. Quant. Spectrosc. Radiat. Transfer*, **129**, 89-100 (2013)

[4] doi:10.1016/j.jqsrt.2013.06.015, H. Tran, N.H. Ngo and J.-M. Hartmann, *J. Quant. Spectrosc. Radiat. Transfer*, **129**, 199-203 (2013)