**MEASUREMENTS OF $CO_2$ SPECTROSCOPIC PARAMETERS IN THE NEAR-INFRARED.** M. A. H. Smith[1], K. Sung[2], L. R. Brown[2] and V. Malathy Devi[3], [1]Science Directorate, NASA Langley Research Center, Hampton, VA, USA (email: mary.ann.h.smith@nasa.gov), [2]Science Division, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA, [3]Dept. of Physics, The College of William and Mary, Williamsburg, VA, USA.

**Abstract:** High-resolution laboratory spectra of carbon dioxide have been recorded using high-resolution Fourier transform spectrometers (FTS) together with specialized temperature-controlled sample cells to determine $CO_2$ near-infrared spectroscopic parameters with high accuracy at room temperature and below. Multispectrum analysis was used to retrieve these highly-accurate spectroscopic parameters (line positions, intensities, air- and self-broadened line widths and pressure-induced shifts, temperature-dependences of line widths and shifts) in the 1.6 µm region [1-5]. However, these highly-accurate retrievals of parameters from the lab spectra have required the use of non-Voigt line shapes to model the effects of speed-dependence and sometimes collisional narrowing observed in the spectra. Line mixing must also be modeled in these retrievals, and line mixing parameters have been determined from the analysis of the laboratory spectra. Results from this work have contributed to recent updates of the parameters in the HITRAN database [6,7]. More recently spectra recorded using a Bruker IFS-125HR FTS together with a temperature-controlled Herriott cell allowing a 20.9 m absorption path [8] have been analyzed to determine spectroscopic parameters (line positions, intensities, and some self-broadening coefficients) for 15 bands of $^{16}O^{12}C^{17}O$ in the 2 µm region [9]. Additional spectra of $^{17}O$-enriched $CO_2$ in the 4.1–4.5 µm region have been analyzed to determine accurate line positions and vibration-rotation constants for several bands of $^{16}O^{12}C^{17}O$, $^{17}O^{12}C^{17}O$ and $^{17}O^{12}C^{18}O$ [10]. These ongoing laboratory spectroscopy efforts support atmospheric remote sensing for the Earth (*e.g.*, GOSAT, OCO-2), Mars and Venus.

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