COMPARISON OF CO_2 ABSOLUTE INTENSITIES FOR BANDS NEAR 4000 cm^{-1}

D. CHRIS BENNER, *Department of Physics, College of William and Mary, Williamsburg, VA 23187-8795*; LAWRENCE P. GIVER, CHARLES CHACKERIAN, Jr., *NASA Ames Research Center, Moffett Field, CA 94035-1000*; V. MALATHY DEVI, *Department of Physics, College of William and Mary, Williamsburg, VA 23187-8795*; LINDA R. BROWN, *Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109*; CURTIS P. RINSLAND and MARY ANN H. SMITH, *Atmospheric Sciences Division, NASA Langley Research Center, Mail Stop 401A, Hampton, VA 23681-0001.*

Our two groups have been measuring absolute intensities of CO_2 lines in different spectral regions. One group (William and Mary/NASA Langley) has measured bands from 1830 to 4000 cm^{-1} and the other (NASA Ames/JPL) from 4000 to 8000 cm^{-1}. These two datasets contain three bands in common near the limits of each group's data.

For this comparison both groups used room temperature spectra of pure natural carbon dioxide obtained using the Fourier transform spectrometer at the McMath-Pierce facility of the National Solar Observatory to measure the intensities of the $2\nu_3$-ν_2 and ν_2+$2\nu_3$-$2\nu_2^2$ bands of $^{12}C^{16}O_2$ and the $2\nu_1$+$2\nu_2^0$ band of $^{16}O^{12}C^{18}O$. The two sets of data were analyzed independently. The three William and Mary/NASA Langley spectra (386 meter path, 1 to 10 Torr pressure) were analyzed with a multispectrum nonlinear least squares fitting technique then the derived line intensities fitted by nonlinear least squares to the full equation for line intensity. The six NASA Ames/JPL spectra (49 to 410 meter path length, 45 to 80 Torr pressure) were analyzed with a single spectrum nonlinear least squares fitting technique, the results of the spectra suitably averaged, then the resulting data reduced to a dipole moment. The resulting dipole moments were least squares fitted to a polynomial whose coefficients are the Herman-Wallis factors. The predicted line intensities of the strongest band ($2\nu_3$-ν_2) generally agree within 3%. Linear and cubic Herman-Wallis coefficients were found to be significantly different than zero. The band strengths agree to only 9%. This discrepency is attributed to the high correlation between the linear Herman-Wallis coefficient and the band strength in the solution.

A comparison of these results with values obtained by each group analyzing the data of the other group as well as the results from an analysis of the combined data sets will also be presented.