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HALOE Science Investigation

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D. Chris Benner  
Research Assistant Professor  
Department of Physics

During this period, the HALOE gas response test simulations were completed using the HALOE spectroscopic instrument model. A new series of programs were written for routine repetitive runs of the spectroscopic model to make it more user friendly for certain studies. Some of the limitations of the model were eased for atmospheric studies and atmospheric signal profiles were calculated for inclusion in the electronic model programs developed by others. The gas response test and calibration wheel test simulations were refined to include some additional subtle effects, but the discrepancies between the observed data and the simulations remains. One of the possible sources of these discrepancies is the spectral response. The spectral response test, however, had a noise level too large to allow for accurate enough data to be inputted to the spectroscopic model. A study was undertaken to understand the source of the noise in this test. A detailed examination of the data revealed that source fluctuations were a significant fraction of the noise (over half at times) and that this portion of the noise could be removed. The resulting gain in signal to noise means that the time required for future repetitions of this test are greatly reduced. Analysis of the completed test was started.

Analysis of additional spectral bands of  $\text{CO}_2$  in the  $3\mu\text{m}$  region was continued. A program of measurement of the air broadened halfwidths of spectral lines in the  $\nu_3$  fundamental band of  $\text{CH}_4$  was started and over 40 lines measured.

Results of the spectroscopic model studies were presented at the HALOE science team meeting at Rutherford Appleton Laboratory in England in April 1986. The carbon dioxide and methane spectroscopic studies were presented at the Forty-first Symposium on Molecular Spectroscopy in June 1986.

Publications appearing during this period:

Absolute line intensities in CO<sub>2</sub> bands near 4.8 μm. C. P. Rinsland, D. Chris Benner and V. Malathy Devi, Applied Optics 25, 1204 (1986).

Published abstracts of papers presented at the Forty-first Molecular Spectroscopy Symposium at the Ohio State University, Columbus, Ohio. June 16-20, 1986.

Molecular Parameters for Carbon Dioxide Absorptions in the 3450 cm<sup>-1</sup> Spectral Region.  
D. Chris Benner, V. Malathy Devi and Curtis P. Rinsland  
Forty-First Symposium on Molecular Spectroscopy, p. 49  
(1986).

Air-Broadened Halfwidths in the ν<sub>3</sub> Band of <sup>12</sup>CH<sub>4</sub>.  
D. Chris Benner, Curtis P. Rinsland and V. Malathy Devi  
Forty-First Symposium on Molecular Spectroscopy, p. 63  
(1986).

Intensities and Self-Broadening of Ozone Near 5 μm.  
M. A. H. Smith, V. Malathy Devi, C. P. Rinsland and D. Chris Benner  
Forty-First Symposium on Molecular Spectroscopy, p. 133  
(1986).