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Spectroscopic characterization for high CO_2 concentration atmospheres

C. Miller, L. Brown, R. Toth, D. Crisp

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109-8099 USA [charles.e.miller@jpl.nasa.gov]

Carbon dioxide (CO_2) exists in high concentrations in the atmospheres of the terrestrial planets, eg Venus, Mars, and the young Earth. Quantitative modeling of the radiative transfer in such environments requires accurate characterization not only of the strong $^{16}O^{12}C^{16}O$ absorptions, but also of the weak absorption features due to forbidden or collisionally induced transitions, hot band transitions, and absorptions from minor isotopomers. We present laboratory measurements of such weak absorptions an examine their use in understanding the evolution of planetary atmospheres, as potential biosignatures, and in helping to define optimal strategies detecting extrasolar terrestrial planets.