CARBON DIOXIDE ON THE SATELLITES OF SATURN. Dale P. Cruikshank, NASA Ames Research Center, Mail Stop 245-6, Moffett Field, CA, 94035. Dale.P.Cruikshank@nasa.gov

The spectral signature of solid CO_2 (the C-O asymmetric stretching mode at 4.27 μm) is seen in the Cassini VIMS data for several satellites of Saturn [1,2,3,4]. It often appears strongest in geographic regions of low albedo, compared to the higher albedo regions dominated by H_2O ice; this may be an effect of band contrast rather than true spatial association. In all cases, although to varying degrees, the CO_2 band is shifted to shorter wavelengths than is seen in pure CO_2 at 80 K in the laboratory, suggesting that CO_2 is complexed in one or more ways with another molecule or material. Lab spectra and *ab initio* calculations of molecular complexes of CO_2 with 1, 2, and more H_2O molecules [5] show that the wavelength shift seen on some satellites can be explained in this way. The CO_2 band on Hyperion is different from that on the other satellites in that its band is further shifted and has a different profile. Both of these spectral parameters are matched by the type II clathrate of CO_2 in H_2O [6]. Although CO_2 clathrate has been postulated to occur on Mars and Enceladus, its spectroscopic signature has not been seen until this identification on Hyperion. The implications of CO_2 clathrate on Hyperion are far reaching in terms of its propensity to decompose explosively [7], Hyperion's low bulk density, the distribution of low-albedo (organic rich) material on its surface, and other features of this satellite.

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