Calculation of Refraction Indices of Planetary Atmospheres Using the HITRAN and GEISA spectroscopic databases

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Calculations of the refractive indices from the visible to far-infrared for Earth and other planetary atmospheres are presented. The calculations have been performed using a recently developed fortran code that computes the real part of the refractive indices using as input the oscillator strengths (location on a wavenumber (wavelength) axis plus the strengths related to Einstein coefficients, transition moments, etc) from the HITRAN and GEISA spectroscopic databases. The absorption spectrum is the imaginary part of the refractive index, which essentially is a Kramers-Kronig transform of the real part. These are plugged into the numerator and denominator of the standard oscillator formula, corrected for the Claussius-Mossotti terms. The formulation used in this work is based on the work by Mathar (Ref. 1) and developed in support of astronomical observations.

In this paper the effect of the variation of the refraction indices with wavelength and atmospheric conditions and comparisons with a previously developed model by Collavita et al. (Ref. 2) will be be discussed.

References:

1. R. Mathar, Applied Optics 43(4), 928-932, 2004.

2. Collavita et al., Publications of the Astronomical Society of the Pacific 116, 876-885, 2004.