HIGH PRESSURE OXYGEN A-BAND SPECTRA

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Composition measurements from remote sensing platforms require knowledge of air mass to better than the desired precision of the composition. Oxygen spectra allow determination of air mass since the mixing ratio of oxygen is fixed. The OCO-2 mission is currently retrieving carbon dioxide concentration using the oxygen A-band for air mass normalization. The 0.25% accuracy desired for the carbon dioxide concentration has pushed the state-of-the-art for oxygen spectroscopy. To produce atmospheric pressure A-band cross-sections with this accuracy requires a sophisticated line-shape model (Galatry or Speed-Dependent) with line mixing (LM) and collision induced absorption (CIA). Models of each of these phenomena exist, but an integrated self-consistent model must be developed to ensure accuracy.

This presentation will describe the ongoing effort to parameterize these phenomena on a representative data set created from complementary experimental techniques. The techniques include Fourier transform spectroscopy (FTS), photo-acoustic spectroscopy (PAS) and cavity ring-down spectroscopy (CRDS). CRDS data allow long-pathlength measurements with absolute intensities, providing lineshape information as well as LM and CIA, however the subtleties of the lineshape are diminished in the saturated line-centers. Conversely, the short paths and large dynamic range of the PAS data allow the full lineshape to be discerned, but with an arbitrary intensity axis. Finally, the FTS data provides intermediate paths and consistency across a broad pressure range. These spectra are all modeled with the Labfit software using first the spectral line database HITRAN, and then model values are adjusted and fitted for better agreement with the data.