ANALYSIS OF FTS ATMOSPHERIC MEASUREMENTS AT MAUNA KEA AND IMPLICATIONS ON ATMOSPHERIC RADIATIVE TRANSFER MODELING

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Atmospheric transmission spectra have been obtained during the last 3 years with a Fourier-transform spectrometer at the Caltech Submillimeter Observatory on Mauna Kea, Hawaii. This instrument can reach a best frequency resolution of ∼200 MHz and in its actual configuration can cover the frequency range ∼250-1200 GHz. A wide range of atmospheric conditions has been covered (water vapor columns from ∼ 0.2 mm to 2 mm). The compiled data base, completed with simultaneous radiosoundings from Hilo airport when available, has been analyzed with the aim of defining the atmospheric transmission curve for applications to ground-based submillimeter astronomy. From the modeling point of view one of the main interests of this analysis is whether or not the true H2O and dry continuum opacities (both included as empirical terms in current models) can be quantified and separated from the far wing opacity associated to far infrared H2O lines. If they can be accurately determined then we may have some progress in identifying their nature.

In one of our recent observing runs at Mauna Kea a supra-THz atmospheric window has been reported under excellent atmospheric conditions (∼200 microns of precipitable water vapor). The access to a partially transparent atmosphere at such high frequencies, where the relative importance of the continuum opacity is much larger than at millimeter waves, has provided us with precious data to make a step forward in the problem of characterizing the water vapor continuum.

The data have been fitted using a multilayer atmospheric radiative transfer model with different line shapes and continuum descriptions. The results and implications of these fits will be discussed at the conference.

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