ACCURATE LASER MEASUREMENTS OF THE WATER VAPOR SELF-CONTINUUM ABSORPTION IN FOUR NEAR INFRARED ATMOSPHERIC WINDOWS. A TEST OF THE MT_CKD MODEL.

ALAIN CAMPARGUE, SAMIR KASSI, DIDIER MONDELAIN, DANIELE ROMANINI, *UMR5588 LIPhy, Université Grenoble Alpes/CNRS, Saint Martin d'Hères, France*; LOÏC LECHEVALLIER, *Institut des Géosciences de l'Environnement, Université Grenoble Alpes, Saint Martin d'Hères, France*; SEMYON VASILCHENKO, *UMR5588 LIPhy, Université Grenoble Alpes/CNRS, Saint Martin d'Hères, France*.

The semi empirical MT_CKD model of the absorption continuum of water vapor is widely used in atmospheric radiative transfer codes of the atmosphere of Earth and exoplanets but lacks of experimental validation in the atmospheric windows. Recent laboratory measurements by Fourier transform Spectroscopy have led to self-continuum cross-sections much larger than the MT_CKD values in the near infrared transparency windows. In the present work, we report on accurate water vapor absorption continuum measurements by Cavity Ring Down Spectroscopy (CRDS) and Optical-Feedback-Cavity Enhanced Laser Spectroscopy (OF-CEAS) at selected spectral points of the transparency windows centered around 4.0, 2.1 and 1.25 μm. The temperature dependence of the absorption continuum at 4.38 μm and 3.32 μm is measured in the 23-39 °C range. The self-continuum water vapor absorption is derived either from the baseline variation of spectra recorded for a series of pressure values over a small spectral interval or from baseline monitoring at fixed laser frequency, during pressure ramps. In order to avoid possible bias approaching the water saturation pressure, the maximum pressure value was limited to about 16 Torr, corresponding to a 75% humidity rate. After subtraction of the local water monomer lines contribution, self-continuum cross-sections, C_S, were determined with a few % accuracy from the pressure squared dependence of the spectra base line level. Together with our previous CRDS and OF-CEAS measurements in the 2.1 and 1.6 μm windows, the derived water vapor self-continuum provides a unique set of water vapor self-continuum cross-sections for a test of the MT_CKD model in four transparency windows. Although showing some important deviations of the absolute values (up to a factor of 4 at the center of the 2.1 μm window), our accurate measurements validate the overall frequency dependence of the MT_CKD2.8 model.