



Infrared laser detection and quantification of water vapor isotopologues in the atmosphere

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A quantum-cascade spectrometer was used in the laboratory to produce accurate concentration measurements for three water vapor isotopologues, H_2^{16}O , H_2^{18}O and HDO near $6.7\text{-}\mu\text{m}$. The spectral region ranging from 1483 to 1487 cm^{-1} , which is suitable for the *in situ* laser sensing of major water-vapor isotopologues in the middle atmosphere from airborne or balloonborne platforms, was investigated by use of a continuous-wave distributed feedback quantum-cascade laser.

The linestrengths of HDO and H_2^{18}O lines were measured and thoroughly compared to relevant molecular databases and other experimental results. These spectroscopic data have been used to measure HDO and H_2^{18}O mixing ratio in the ambient air. Ground level measurements are presented.

The capability of the QCL to perform proper determinations of H_2O isotopic ratios was demonstrated. We are currently preparing the implementation of the laser source onboard the SDLA balloonborne tunable diode laser spectrometer to investigate, in 2007 and 2008, the mechanisms that controls H_2O in the tropical tropopause layer.