ROOM TEMPERATURE WATER CONTINUUM MEASUREMENTS IN THE 1.25 μm ATMOSPHERIC WINDOWS

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Water vapour self- and foreign-continuum are newly measured at a room temperature in the high energy edge of the 1.25 μm window. The measurements are carried out in pure water vapour at pressure up to 15 Torr and in humidified air, humidified nitrogen and humidified oxygen at total pressure up to 750 Torr with 1% of H_2O by using cavity ring-down spectroscopy technique (CRDS) [1]. Self- and foreign-continuum absorption cross-sections are retrieved from recorded pressure ramps at fixed frequencies in microwindows of transparency between strong H_2O lines. These microwindows are selected to minimise water monomer spectrum contribution to the total absorption spectrum.

The spread of previous continuum measurements at lower frequencies (reaching several orders of magnitude in some atmospheric windows [2]), requires a checking of possible systematic errors in data acquisition and analysis. Minimisation of such errors in the presented work is confirmed by (1) acurate checking of the expected pressure dependences both for self- and for foreign-continuum and (2) the consistency of continuum measurements in humidified nitrogen and oxygen with measurements in humidified air.

Presented results agree with previous self-continuum measurements at lower frequencies [2] and with high-temperature measurements of foreign continuum in air [3].

The frequency dependence of retrieved self- and foreign continuum cross-sections validates in general MT_CKD model [4]. However, an additional broad absorption feature is observed with a centre near 8455 cm^{-1}. It can be tentatively interpreted as possible spectral signature of bound dimers, $(H_2O)_2$. Similar peaks in the continuum spectrum were previously observed near 1600, 3610 and 3750 cm^{-1} and attributed to water dimer [2]. Thus, the detection of the peak at 8455 cm^{-1} may confirm that dimer features are manifested in the entire range of the vibrational-rotational spectrum of water vapor.

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