THE WATER VAPOUR SELF- AND FOREIGN CONTINUUM ABSORPTION AT ROOM TEMPERATURE IN THE 1.25 μm window

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The water vapour self- and foreign-continuum are newly measured at room temperature in the high energy edge of the 1.25 cm^{-1} window by using highly stable and sensitive cavity ring-down spectroscopy (CRDS).

Self-continuum cross-sections, C_S, are derived between 8290 and 8620 cm^{-1} at 29 selected spectral points by using pressure ramps (up to 15 Torr) of pure water vapour. Purely quadratic pressure dependence is obtained for the absorption coefficient at each measurement point. Although the spectral measurement points were chosen to minimize the contribution of resonance line absorption, the latter represents between 30 and 70 % of the measured absorption in the studied region.

The self-continuum measurements are found consistent with a previous study of the low-frequency edge of the 1.25 cm^{-1} window (Campargue et al. J Geophys Res Atmos 2016;121:13,180 – 13,203. doi:10.1002/2016JD025531). The frequency dependence of the retrieved C_S values shows an overall good agreement with the MT_CKD values. Nevertheless, an additional broad absorption feature is observed with a centre near 8455 cm^{-1}. It is tentatively interpreted as a possible impact of the uncertainties on the resonance line contribution on the derived C_S values or as possible evidence of a band of the bound dimers, $(H_2O)_2$

Foreign-continuum cross-sections, C_f, are derived for humidified nitrogen, humidified oxygen and humidified air between 8120 and 8500 cm^{-1} by using pressure ramps (up to 750 Torr with 10000 ppm of H_2O) at 5 selected spectral points for each gas mixture. Although data treatment is in progress, the H_2O-air and H_2O-N_2 C_f cross-section values seem to be comparable while the H_2O-O_2 C_f value appears to be significantly smaller. A satisfactory agreement of the retrieved C_f for H_2O-air mixture with the MT_CKD model is demonstrated. To the best of our knowledge, it is the first H_2O-air, H_2O-N_2, H_2O-O_2 foreign-continuum study in this frequency range.