

First groundbased FTIR observations of HDO to H₂O ratio in atmospheric water vapour over Ural

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Abstract

Ural Atmospheric Fourier Station (UAFS) is arranged in Kourovka Astronomical Observatory of the Ural State University. The UAFS is equipped with groundbased FTIR including modern commercial spectrometer Bruker IFS125M and solar tracker A547N. Maximum spectral resolution of the Bruker IFS125M installed in Kourovka is 0.0035 cm⁻¹, entire spectral range is 450-25000 cm⁻¹. The UAFS situated at 57.038N and 59.545E in forest area about 80 km to north-west from Ekaterinburg and operated since July of 2009. UAFS is intended for teledetection of trace gases in the atmosphere to validate satellite data (in particular TANSO-FTS/GOSAT data) and to accumulate the time series data on concentration of trace gases in the atmosphere for climate research. The groundbased FTIR technique and main features of the methodology of teledetection of water vapour isotopomers and retrieval of their concentration in the atmosphere are discussed. Set of passed through the atmosphere solar spectra from the range of 4000-11000 cm⁻¹ with resolution of 0.05 - 0.0035cm⁻¹ was recorded during clear sky conditions using the FTIR from July 2009. Based on independent data of AERONET spectrometer in Kourovka, the spectra corresponding to weak aerosol atmosphere have been selected for further analysis with GFIT. The GFIT outputs for HDO/H₂O in the atmosphere over Ural are obtained. Original method for determination of HDO to H₂O ratio in the atmosphere from the high resolution FTIR spectra is suggested and applied. The suggested method and obtained results are discussed.

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