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HDO mapping in the atmosphere over Western Siberia from satellite data with validation using ground based FTIR measurements

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HDO is long existing tool in climate sciences, and retrieved concentration of this molecule in the atmosphere can be used for adjusting general circulation models with embedded isotopomers. Retrieval of total columnar value of HDO in the atmosphere is possible using the TCCON FTIR spectrometers. However, satellite data can give better coverage of HDO mapping together with vertical distribution in the scale of whole planet. This study represents the method of HDO vertical profile retrieval from satellite spectral measurements with high spectral resolution with conservation of total columnar value of HDO retrieved from simultaneous and collocated ground based FTIR measurements. The method is based on approximation of vertical H_2O and HDO profiles using parametrized probability distribution functions (PDF), so that retrieval is performed in the domain of PDF's parameters. This method is then expanded for all selected satellite data which are not simultaneous and not collocated with ground based measurements. In the last case total column amount of HDO is also varied by the method and retrieved. TANSO-FTS/GOSAT spectral measurements were used for mapping of HDO. Ground based measurements were performed at Ural Atmospheric Fourier Station (Kourovka, 57.036N, 59.546E). HDO mapping for the region of Western Siberia is represented.