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Retrieval of upper tropospheric water vapor and upper tropospheric humidity from AMSU radiances

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Abstract. A regression method was developed to retrieve upper tropospheric water vapor (UTWV in kg/m^2) and upper tropospheric humidity (UTH in % *RH*) from radiances measured by the Advanced Microwave Sounding Unit (AMSU). In contrast to other UTH retrieval methods, UTH is defined as the average relative humidity between 500 and 200hPa, not as a Jacobian weighted average, which has the advantage that the UTH altitude does not depend on the atmospheric conditions. The method uses AMSU channels 6-10, 18, and 19, and should achieve an accuracy of 0.48 kg/m^2 for UTWV and 6.3% *RH* for UTH, according to a test against an independent synthetic data set. This performance was confirmed for northern mid-latitudes by a comparison against radiosonde data from station Lindenberg in Germany, which yielded errors of 0.23 kg/m^2 for UTWV and 6.1% *RH* for UTH.

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