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Comparison of microwave satellite humidity data and radiosonde profiles: A survey of European stations

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Abstract. A method to compare upper tropospheric humidity (UTH) from satellite and radiosonde data has been applied to the European radiosonde stations. The method uses microwave data as a benchmark for monitoring the performance of the stations. The present study utilizes three years (2001-2003) of data from channel 18 (183.31 ± 1.00 GHz) of the Advanced Microwave Sounding Unit-B (AMSU-B) aboard the satellites NOAA-15 and NOAA-16. The comparison is done in the radiance space, the radiosonde data were transformed to the channel radiances using a radiative transfer model. The comparison results confirm that there is a dry bias in the UTH measured by the radiosondes. This bias is highly variable among the stations and the years. This variability is attributed mainly to the differences in the radiosonde humidity measurements. The analysis also shows a difference between daytime and nighttime soundings which is attributed to radiation error in the radiosonde data. The dry bias due to this error alone correspond to approximately 11% relative error in the UTH measurements.

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