



Inhomogeneity of water vapour in the boundary layer from ground based microwave measurements

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Passive microwave radiometers (MWR) can be used to infer temperature and humidity profiles in the boundary layer. The principle is based on the different emissivities at the edges of emission lines in the microwave range. Elevation scans are used to increase the accuracy and resolution of derived temperature and humidity profiles. To derive profiles from elevation scans it is assumed that the humidity distribution is horizontally homogeneous. But this is usually not the case.

To investigate the possibilities for the derivation of three dimensional humidity fields the HATPRO MWR of the Institute of Geophysics and Meteorology Cologne was redesigned to scan the sky in all directions. The instrument was installed during the COPS campaign in the german black forest at the site of the ARM mobile facility to have maximum synergy from the instruments there. To get a reference for our ground based measurements the METAIR DIMONA research aircraft flew patterns synchronized with our ground based measurements.

The results show that it is in principle possible to detect the differences in the microwave radiation due to the variability of water vapour. But the derivation of the three dimensional water vapour field still remains a challenge.