



A scale break in high-resolution liquid water path measurements

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We have found a scale break in the power spectrum of Liquid Water Path (LWP) measurements. These measurements were made with the microwave radiometer MICCY, which has an integration time of one second and a unique beam width of less than 1 degree. The measurements were made during the BBC campaign which was held in 2001 in Cabauw, The Netherlands.

For this study, we used 36 quality-controlled time series of half an hour. Radar and lidar measurements were used to guarantee that no rain or mixed clouds were present and cloud free cases were not used. After scaling the time series from time to space by the wind speed from radiosondes, the power spectra were averaged.

This averaged power spectrum clearly shows a scale break. Were the power law exponent of the larger scales is around -1.2 and the exponent at smaller scales is -1.9. However, the exponent varies strongly from case to case.

The scale break warns against using 2D cloud fields for radiative transfer studies, where the horizontal resolution is higher than the cloud depth. In this case the structure of such a field should follow that of LWP and not of LWC.