



Retrieval of cloud droplet concentration of liquid water clouds from ground based remote sensing observations

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The environment in which clouds develop is crucial for the cloud microphysics and therefore the cloud radiative properties. The impact of aerosols on climate via modification of cloud radiative properties is called the aerosol indirect effect.

In order to assess the aerosol indirect effect a constant monitoring of cloud properties is needed. Presently this can be realised only by remote sensing observations.

A retrieval method is being developed to obtain the droplet concentration for boundary layer, nonprecipitating, water clouds using collocated ground-based remote sensing observations from radar, ceilometer and microwave radiometer. The input parameters for the algorithm are: cloud base height (ceilometer), cloud top height (radar), reflectivity factor profile (radar), liquid water path (microwave radiometer) and temperature and pressure at the cloud base (radiosounding). From these observations the cloud droplet concentration is calculated assuming that the droplet concentration is constant with height and the liquid water content profile has a certain shape constrained by remote sensing data. The retrieved values of droplet number concentration are compared with in-situ data for a small sample of data from the BBC campaign in 2001 at Cabauw. The algorithm works properly only in some situations. Data from a Large Eddie Simulation - (LES) of Stratocumulus has been used to test the method and to make a selection of cases when algorithm gives reasonably results.