

Potential of Ceilometer Networks for Validation of models

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There exist various models which can treat aerosol particles within the model. Due to the limited availability of high quality profiles of particle properties most models are only validated with ground based particle measurements and/or with columnar particle amounts, e.g. aerosol optical depth, derived from satellites. Modern ceilometers are capable of providing aerosol vertical profiles and they are not too expensive and hence several national weather services operate a network of ceilometers.

The Deutscher Wetterdienst operates currently a ceilometer network of about 75 devices providing aerosol profiles. Within the next few years the number of instruments will double. Each station has always several neighboring stations within 100km distance. Recently automated routines for quality checks and calibration of the devices were developed and implemented. Such automated tools together with the good spatial coverage make the DWD ceilometer network an excellent tool for model validation with respect to aerosol particle properties.

The Copernicus Atmosphere service provides operational forecast of five aerosol species (sea-salt, dust, sulphate as well as organic and black carbon which are summarized as biomass burning aerosol) and the boundary layer height. These parameters can be compared with the outcome of ceilometer measurements and consequently the model can be validated. Especially long-range transported aerosol particles above the boundary layer can be investigated.

At the conference the network will be presented, the validation strategy of the CAMS models by using ceilometer measurements will be explained and results will be shown. An outlook to international measuring networks will be given.