



Stability classes from operational ceilometers

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Dispersion models usually need atmospheric stability information as a meteorological input parameter. Stability classes according to the Klug-Manier scheme are used here which are necessary to define time-series of wind and dispersion-parameters in the German AKTerm-format. Deriving the stability class from cloud coverage data is one of the most often used schemes for the parameterization. The number of fully automatic meteorological stations (without human observations) is increasing. Therefore the usability of methods other than human observations to quantify cloud coverage – based on instruments such as ceilometers – will come into use, despite the different approaches of how to define cloud coverage. While a human observer will take into account the whole visible sky, a ceilometer can only detect clouds directly above the instrument. The topic of the presented research was to investigate whether the mean value of ceilometer-soundings over a defined period of time (i.e. hour) can be used as a substitute for observed cloud coverage data in order to determine stability classes.

At 4 sites in Austria Klug-Manier-classes derived from observed cloud data (for the year 2014) were compared with Klug-Manier-classes from ceilometer-data. At one site (ZAMG at Vienna), a single ceilometer CL51 is in use, at the airports (AustroControl) several (up to five instruments) ceilometers CL31 can be combined to improve the cloud cover information.

Although there are distinct differences between observed and measured cloud cover, the Klug-Manier-classes show a very good correlation: During more than 84 % of the time, ceilometer-based stability classes were exactly the same as observation-based stability classes. Allowing for a deviation of one class, the agreement rises up to 99 %. As the number of ceilometers within the Austrian ceilometer-network is increasing, the use of this data will improve the local representativity of AKTerm-series in the future.