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# Investigating the overlap function of a ceilometer with different methods

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The DWD ceilometer network was created in 2008. In the following years more and more ceilometers of type CHM15k (manufacturer Jenoptik) were installed with the aim of observing atmospheric aerosol particles. Now, 58 ceilometers are in continuous operation.

The overlap function of a ceilometer is important for the correction of the measurements in the near field of the instrument. In this work the overlap function for a ceilometer CHM15k Nimbus was determined with different methods and the results are compared taking into accounts the respective errors and error propagation.

The first method is based on the comparison of measurements with another CHM15k Nimbus device which has a known overlap function. For this type of instrument the overlap is complete at about 1.5km distance. Co-located measurements of the 2 devices were done at Hohenpeissenberg Meteorological Observatory during several months in summer 2013. The second method resembles the first one but the comparison is done with a CHM15k near field instrument. For this type of instrument the overlap is complete at about 500m distance. Co-located measurements of the 2 devices were done at the Meteorological Institute of the University of Munich during one week in July 2013.The third method is based on horizontal measurements under the assumption that the aerosol particles are horizontally homogenously spread. This is assured by measurements in different (horizontal) directions, i.e. different azimuth angles, under suitable meteorological conditions. The measurements were acquired during one night at Hohenpeissenberg Meteorological Observatory.

All three methods were used to determine the overlap function of a CHM15k ceilometer. The results were similar although the final error of the obtained overlap function differs due to different assumptions and measurement errors.