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# The ceilometer inter-comparison campaign CeiLinEx2015

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Ceilometers are well established instruments for the detection of cloud base heights. Since about 2000, modern ceilometer types (mainly CHM15k, CL51, and CL31) are used also for investigations of the top height of the planetary boundary layer and for quantitative retrievals of vertical profiles of backscatter coefficients. In the framework of the European projects E-PROFILE and TOPROF, tools for the exchange of ceilometer data among European meteorological services, as well as calibration and visualization procedures are developed and established. Unfortunately, the national networks are equipped with instruments of different generations and different manufacturers. In order to quantify and reduce those inhomogeneities, the ceilometer inter-comparison experiment CeiLinEx2015 was performed between June and September 2015 at the Meteorological Observatory Lindenberg, Germany.

We tested six different instrument types: LD40, CL31, CL51, CHM15k, CHM15kx, and CS135. Each instrument type was represented by two instruments to estimate the instrument-to-instrument variability and the influence of different firmware versions. Two Raman lidars (RAMSES and RALPH), operated by German Meteorological Service (DWD) are used as reference instruments. Further ancillary data are available, e.g., hourly eye observations, four radio soundings per day, and AERONET sun photometer observations. Beside the typical vertically pointing measurement scheme, we performed special measurements with horizontal pointing direction or blocked receiver telescope.

During the experiment, we could collect measurements under very different meteorological situations: Several clear nights allow for Rayleigh-Calibration (see Hervo and CeiLinEx2015 team [EGU2016-4785]), a strong event of Sahara dust intrusion can be used to study the behaviour of the instruments in presence of large, non-spherical particles (like volcanic ash). Further investigations focus, e.g., on the detection of very low cloud base heights, on the retrieval of boundary layer heights, on the performance of the individual instruments in the overlap region, on the characterization of signal artefacts in the clean free troposphere, on daytime performance, and on the estimation of measurement range. All those investigations need calibrated ceilometer profiles as input data. Therefore, quantitative calibration of all instruments is a very important first step of data analysis. [Hervo and CeiLinEx2015 team EGU2016-4785] present the procedure and results of calibration of all individual instruments in a companion contribution.

In this contribution, we will provide a general overview on the CeiLinEx2015 experiment together with first results. We present preliminary results concerning signal artefacts in the free troposphere and correlation studies in more detail.