EMS Annual Meeting Abstracts
Vol. 14, EMS2017-527, 2017


# The international ceilometer inter-comparison campaign CeiLinEx2015 - uncertainties and artefacts of aerosol profiles -

Ina Mattis (1), Margit Pattantyús-Ábrahám (1), Robert Begbie (2), Juan Antonio Bravo-Aranda (3), Mike Brettle (4), Jan Cermak (5), Marc-Antoine Drouin (3), Alexander Geiss (6), Ulrich Görsdorf (2), Alexander Haefele (7), Martial Haeffelin (3), Maxime Hervo (7), Kateřina Komínková (8), Ronny Leinweber (2), Gerhard Müller (1), Christoph Münkel (9), Kornelia Pönitz (10), Frank Wagner (11), and Matthias Wiegner (6)

(1) Deutscher Wetterdienst, Observatorium Hohenpeißenberg, Hohenpeißenberg, Germany, (2) Deutscher Wetterdienst, Observatorium Lindenberg, Germany, (3) SIRTA Palaiseau, France, (4) Campbell Scientific Ltd., Shepshed, Loughborough, UK, (5) Department of Geography, Ruhr-Universität Bochum, Germany; now at KIT Karlsruhe, Germany, (6) Ludwig-Maximilians-Universität München, Germany, (7) MeteoSwiss, Payerne, Switzerland, (8) Global Change Research Institute (CAS), Brno, Czech Republic, (9) Vaisala GmbH, Hamburg, Germany, (10) G. Lufft Mess- und Regeltechnik GmbH, Fellbach, Germany, (11) Deutscher Wetterdienst, Observatorium Hohenpeißenberg, Hohenpeißenberg, Germany; now at KIT Karlsruhe, Germany

Ceilometers are well established instruments for the detection of cloud base heights. Additionally, modern ceilometer types have been used for investigations on the quantitative retrievals of vertical aerosol distributions trough backscatter coefficient profiles, since about 2010.

In the framework of the European projects E-PROFILE and TOPROF, tools for the exchange of ceilometer data among national networks, as well as calibration and visualization procedures are being developed and established. Unfortunately, the meteorological services are equipped with instruments of different generations and different manufacturers. In order to quantify and reduce the instrumental biases, the ceilometer inter-comparison experiment CeiLinEx2015 was performed between June and September 2015 at the Meteorological Observatory Lindenberg, Germany.

Six different instrument types were tested: LD40, CL31, CL51, CHM15k, CHM15kx, and CS135. Each type was represented by two instruments to estimate the instrument-to-instrument variability and the influence of different firmware versions. The Raman lidar RALPH was used as reference instrument. Further ancillary data are hourly eye observations, four radio soundings per day, and AERONET sun photometer observations.

During the experiment, measurements under very different meteorological situations were collected, including clear nights allowed for Rayleigh-calibration, and strong events of Saharan dust intrusion enabling the study of instrumental behaviour in the presence of large, non-spherical particles, similar to volcanic ash. Further investigations focus, e.g., on the detection of cloud base heights, on the retrieval of boundary layer heights, on the performance of the instruments in the overlap region, on the characterization of signal artefacts in the clean free troposphere, and on the estimation of measurement range.

In this contribution, we provide a general overview on the CeiLinEx2015 experiment. Results which are relevant for aerosol profiling like signal artefacts and instrument-to-instrument variability of attenuated backscatter profiles are presented in more detail. Finally, we present an overview on the relevant individual error sources and an estimation of the overall uncertainty of attenuated backscatter profiles from CL31, CL51, and CHM15k instruments.