TOPROF, E-PROFILE and ACTRIS
Sustained automatic lidar and ceilometer networking

1IPSL, 2DWD, 3Meteoswiss, 4U. of Reading, 5RIMB, 6LMU

ALC, TOPROF, E-PROFILE and ACTRIS in 2017

• ALC: Automatic Lidars and Ceilometers, low-cost instruments for cloud and aerosol profiling
• TOPROF: a EU COST action; a group of Lidar experts working on ALC performance
• E-PROFILE: EUMETNET programme to coordinate operational wind, cloud and aerosol measurements using radar and lidar
• ACTRIS-2: European H2020 infrastructure in support of aerosol, clouds and trace gas research

FUTURE ORGANISATION

• COST Action: Development of sustained Cloud Profiling Centre of Expertise (CE)
• ACTRIS-RI: Long-term implementation of Cloud Profiling CE
• E-PROFILE: Heavy end-user of the Cloud Profiling CE

ALC MEASUREMENT NETWORK

Worldwide ALC-location database http://www.dwd.de/ Search „Ceilomap“

TOPROF Ceilometer Lidar Intercomparison Experiment http://ceilinex2015.de/ 3 months – 12 ALCs

E-PROFILE ALC data
2017: central processing of 80 ALC
Future: 700 ALC
http://eumetnet.eu/
Search „alc-network“

ALC MEASUREMENT PROCESSING

Signal correction
(Kotthaus et al. 2016)

Water vapor absorption correction (Wiegner and Gasteiger 2015)

Overlap function
(Hervo et al. 2016)

Harmonized format using RAW2L1 software
(Drouin et al. 2015)

Calibrated attenuated backscatter based on Rayleigh and Cloud calibrations methods

ALC measurement uncertainties
(Mattis et al. 2017)

ALC MEASUREMENT APPLICATIONS

Model Evaluation

Lidar forward models used to simulate attenuated backscatter
Direct comparisons of observed – simulated
Evaluation of sources of discrepancies.

Atmospheric boundary layer detection

New methods are proposed to improve gradient
attribution allowing improved boundary layer
depth estimation & boundary layer classification.
(see Pal and Haeffelin, 2015; Poltera et al. 2017;
Geiss et al. 2017)

Fog diagnostics for near-range forecast

Hygroscopic growth of aerosol prior to
radiation fog formation tracked by ALC
attenuated backscatter.
The rate of change of ALC attenuated
backscatter is used to provide pre-fog alerts
(see Haeffelin et al. 2016)

PUBLICATIONS

Technical documents:

Scientific publications:
• Kotthaus et al. 2016: Recommendations for processing atmospheric attenuated backscatter profiles from Vaisala CL31 ceilometers, Atmos. Meas. Tech., 9, 3769–3791
• Poltera et al. 2017: PathfinderTURB: an automatic boundary layer algorithm. Development, validation and application to study the impact on in-situ measurements at the Jungfraujoch. ACPD.
• Wiegner et al. 2015: Correction of water vapor absorption for aerosol remote sensing with ceilometers, Atmos. Meas. Tech., 8, 3971–3984