**Absolute calibration of LIDAR based remote sensing instruments**

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Remote sensing applications based on Light Detection And Ranging (LIDAR) devices are growing in importance. The measuring principle always relies on sending out an optical signal using a laser and detecting the backscattered light and analysing it. Two types of LIDARs are extensively used in the field of meteorology: elastic automatic LIDARS to measure the cloud base height (ceilometers) and the backscatter profile, and wind LIDARs to measure wind speed and direction. The detection range of such instruments can vary from a few hundred meters to several kilometres.

International traceability for such instruments is still in its infancy and limited by the use of transfer standards based on older technologies. For instance, absolute calibration of wind LIDAR devices relies on comparison with cup anemometers mounted on masts. This calibration procedure imposes uncertainty constraints from the cup anemometer and extrapolation issues.

Moreover, thanks to technical advances during the last decade, state-of-the-art ceilometers are capable to provide not only cloud base but also the attenuated backscatter signal of aerosols. Therefore, ceilometers have rapidly become a cost-effective way to study the atmosphere using aerosols as tracers. Unfortunately, a precise absolute calibration of the light signal of such devices is not available yet and therefore hinders the determination of aerosol extensive properties such as backscatter and extinction coefficients.

METAS, in collaboration with MeteoSwiss, is developing demonstrators to investigate new principles and procedures, based on state-of-the-art technologies, to perform absolute calibrations of wind LIDAR devices and of the main ceilometer’s properties like the explicit calculation of the emitter-receiver overlap function and the LIDAR constant. The aim is to overcome the limitations from the current calibration methods. The proposed principles and procedures, as well as first preliminary results, will be presented.