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Evaluation of aerosol properties from sun-photometer and ceilometer by means GRASP algorithm

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Remote sensing techniques are essential to monitor and characterise atmospheric aerosol. On the one hand, ceilometers have been proved to be an effective tool for detection and monitoring not only clouds, but also aerosol particle. In recent years, the developments of automatic lidars and ceilometers with profiling capabilities as well as advances in the calibration techniques related to such devices offer the capacity of characterizing optical properties such as aerosol backscatter coefficient. On the other hand, sun-photometers are a commonly employed instrument to monitor integrated products. $GRASP_{pac}$ is a new retrieval algorithm which is gaining relevance in recent years using the synergy between both instruments to obtain aerosol vertical profiling and microphysical properties (Román et al., 2018).

This study presents the comparison of vertical aerosol backscattering coefficient (β_{aer}) profiles obtained by $GRASP_{pac}$ retrieval from the synergy between the CHM15K (Lufft, Germany) ceilometer and the sun-photometer CE318-T (Cimel, France). In this way a comparison with Klett inversion (backward and forward) method using CHM15K ceilometer data is carried out. Forward retrieval is based on E-PROFILE calibration (Weigner and Geiß, 2012). A total of 48 β_{aer} profiles measured during daytime at the aeroogical station of MeteoSwiss at Payerne (Switzerland) between 2017 and 2019 were used for this comparison.

$GRASP_{pac}$ profiles are provided in a logarithmic vertical scale. The Klett ceilometer profiles were interpolated. The same GRASPpac height grid to enable a valid comparison. Moreover, the ceilometer signal was averaged in 30-minute bins to match $GRASP_{pac}$ time resolution. After all the corrections were applied, a statistical analysis was conducted to validate the profiles.

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