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Automatic detection of atmospheric boundary layer heights at the European scale (ABL testbed)

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A detailed understanding of atmospheric boundary layer (ABL) processes is key to improve forecasting of pollution dispersion and cloud dynamics in the context of future climate scenarios. International networks of automatic lidars and ceilometers (ALC) are gathering valuable data that allow for ABL layers to be derived in near real time. A new generation of advanced methods to automatically detect the ABL heights now exist. However, diversity in ALC models means these algorithms need to be tailored to instrument-specific capabilities.

In the framework of the ABL testbed project (funded by ICOS, ACTRIS and EUMETNET E-PROFILE), two advanced algorithms for the detection of ABL heights are being assessed for application in an operational network setting. A prime example of collaborations within the EU COST action PROBE on profiling the atmospheric boundary layer, the ABL testbed is a crucial step towards harmonised ABL height products at the European scale. A subset of 11 E-PROFILE sites in diverse geographical and land cover settings across Europe are selected where data from different ALC are available covering multiple years. Automatic layer detection is implemented, including instrument-specific corrections and calibrations. Algorithm performance for layer height detection is being evaluated via comparison of results from different ALC. Recommendations are formulated for implementation of automatic ABL height retrievals across a diverse sensor network. First results are very promising, revealing consistent temporal and spatial variations in ABL layer heights across the network.

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