COMPONENT



MIXING LAYER HEIGHT (MLH) CALCULATION

from the CS135 LIDAR ceilometer for air quality applications

Overview

Mixing Layer Height (MLH) is an important parameter in modelling air quality and predicting air pollution episodes. It has previously been a very difficult parameter to measure without expensive sounding systems. The CS135 operating system includes a MLH assessment option.

This estimates the height of the mixed aerosol layer by applying the gradient method to the ceilometer's backscatter signal. The automated process is based on the algorithm developed by KNMI* and searches for the drop in backscatter associated with the transition from boundary layer aerosols to free troposphere. Since the signals measured depend on the type and amount of aerosol present as well as the background light level, the accuracy of the method varies and therefore a quality factor is assigned which indicates the confidence in the reported layer height. Up to three mixing layers can be reported (mixing layer, residual layer and aerosol layer). The algorithm runs within the CS135 itself and the results are incorporated in data messages making it easy to use the MLH with whatever systems are already in use without the need to run external special software. It is activated by an alphanumerical 'key' that is specific to a particular CS135 serial number. All existing CS135s can be upgraded to include the MLH algorithm.

The optional 'Viewpoint' display software will also display mixing layer heights from a CS135 either graphically or numerically.

*Determination of mixing layer height from ceilometer backscatter profile, Marijn de Haij; Wiel Wauben; Henk Klein Baltink

Proc. SPIE 6362, Remote Sensing of Clouds and the Atmosphere XI, 63620R (October 11, 2006); doi:10.1117/12.691050



The top picture above shows scatter coefficients recorded by a CS135 and corresponding assessments of mixing layer heights (black dots). For comparison the lower picture shows actual clouds identified over the same period.

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