

Mixing height determination by ceilometer in cloudy situation

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A ceilometer is a suitable instrument determining the mixing height MH in clear-sky conditions (Eresmaa et al., 2006). If clouds are present, however, the usability of a ceilometer has not been evaluated. In this study we examined the use of Vaisala CT25K ceilometer in determining the mixing height in cloudy conditions.

We classified the data according to the cloud conditions in three different types: fog and cloud type I and II. In the case of cloud type I, the ceilometer profile had no local minimum between the lowest measurement height and the cloud; in the case of cloud type II there was a local minimum in the profile below the cloud. In a foggy case the backscattering signal exceeded the fixed threshold value at the lowest measurement height. Depending on the profile type we determined the MH utilizing the minimum below the cloud, idealized backscattering profile and threshold values.

We scrutinized a dataset of 249 profiles; as the reference mixing height we used a MH determined by radiosoundings. The best fit between MHs determined by ceilometer and soundings occurred in the case of cloud type II; the fit was poorest in the case of cloud type I.

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