

Interactive comment on “Identification of the cloud base height over the central Himalayan region: Intercomparison of Ceilometer and Doppler Lidar” by K. K. Shukla et al.

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The paper deals mainly with the potential of a Doppler lidar (DL) to determine the cloud base height (CBH). The retrieval from a ceilometer (CM) is used as reference. There is already one review (anonymous reviewer #1) available so I only want to add a few very brief comments that were not already covered by him/her:

- A very well elaborated study comparing DL and CM has been published by Schween et al. (2014). This paper should be considered in the framework of this manuscript.
- The specific properties of the used ceilometer must be taken into account, e.g.

C1

overlap, calibration, water vapor absorption etc.; in particular the overlap might influence the retrieval of the CBH. Note, that the CT25k provides 'backscatter' but not 'aerosol backscatter' in a quantitative way.

Moreover, there are several methodologies to retrieve the CBH developed by the manufacturer and/or the scientific community. Depending on the methodology the results might be different. Consequently, the applied algorithm should be briefly outlined or characterized by a (easy to access) publication.

- Are problems of multi-layer clouds encountered when retrieving the cloud coverage of opaque and thin clouds from the TSI? How often are several cloud layers observed by the CM? Is this an issue?
- The good agreement between the time-height cross sections from DL and CM as shown in Fig. 4 is not surprising ('It is interesting to note that the temporal...'), the authors should rather focus on a discussion of the differences. A comment how they distinguish opaque and thin clouds from Fig. 4 would be welcome (from the DL/CM or from the TSI?). What is 'Backscatter' meaning (right color code): $0.004 \text{ km}^{-1} \text{ sr}^{-1}$ seems to be quite low for a thick cloud?
- When comparing the CBHs from MODIS and DL/CM (Fig. 9) differences are likely due to the different sampling (i.e., point measurement vs. spatial average over 1×1 degree, different temporal averaging). At least an estimate of the accuracy of MODIS-algorithm for the CBH should be added (Sec. 3.3). UT should be changed to LT (as used in the rest of the paper).
- When comparing CBHs at different sites the authors switch from height 'above ground level' to height 'above mean sea level' and found agreement with their own site (Tab. 1). Is the 'amsl' more reasonable from a meteorological point of view? Is there a 'need' that the CBH at Nainital is similar to that at, say, Lindenberg? Nobody will in principle doubt the CBHs retrieved from the CM in this paper, thus no justification is required.

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- page 10, line 23: 'The observations from all the instruments...'. There is something wrong with this sentence.
- There are several redundancies, e.g. lines 12/13 on page 11 already appear in the previous paragraph.

Suggested references:

Schween, J. H., Hirsikko, A., Löhnert, U., and Crewell, S.: Mixing-layer height retrieval with ceilometer and Doppler lidar: from case studies to long-term assessment, *Atmos. Meas. Tech.*, 7, 3685-3704, doi:10.5194/amt-7-3685-2014, 2014.

Wiegner, M., Madonna, F., Binietoglou, I., Forkel, R., Gasteiger, J., Geiß, A., Pappalardo, G., Schäfer, K., and Thomas, W.: What is the benefit of ceilometers for aerosol remote sensing? An answer from EARLINET, *Atmos. Meas. Tech.*, 7, 1979-1997, doi:10.5194/amt-7-1979-2014, 2014.

Haefelin, M., F. Angelini, Y. Morille, G. Martucci, S. Frey, G. P. Gobbi, S. Lolli, C. D. O'Dowd, L. Sauvage, I. Xueref-Remy, B. Wastine, and D. G. Feist: Evaluation of Mixing-Height Retrievals from Automatic Profiling Lidars and Ceilometers in View of Future Integrated Networks in Europe, *Boundary-Layer Meteorol* (2012) 143:49–75, DOI 10.1007/s10546-011-9643-z.

Münkel, C., Schäfer, K., and Emeis, S.: Adding confidence levels and error bars to mixing layer heights detected by ceilometer, *Proc. SPIE* 8177, 817708–1 – 817708–9, 2011 [this is a paper on a more recent Vaisala-ceilometer].

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