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Atmospheric Measurement Techniques Discussions

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.

Anonymous Referee #2

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General comments

Reliable detection of cloud base height is a key parameter in several scientifically and societally important applications. Ceilometers were developed for this challenging task. Performance of ceilometers, and subsequently developed retrieval algorithms, to detect cloud base heights (CBH) has been intensively investigated by several research groups. Reliability of CBH detection depends on several factors, including, used detection algorithm (Martucci et al., 2010), type of cloud hydrometeors (Van Tricht et al., 2014), sensor wavelength and likely its sensitivity (Schween et al., 2014). It is true, however, that a published comparison of a Doppler lidar (wavelength of 1.5 microm) and ceilometer (905 nm) is missing. This manuscript presents performance compari-

son of Vaisala CT25k ceilometer and Doppler lidar CBH detection which is well within scope of the Journal.

Specific comments

A major disadvantage of the manuscript is related to the fact that sensor performance is compared by using two different data retrieval methods. In addition to presented results, the authors should apply only one method to data from both sensors in order to reliably compare performance of the two sensors. The second major comment is related to amount of data employed in statistical analysis (Fig. 10). In addition to six days of case studies, the authors should show statistical comparison covering the entire measurement campaign, and subsequently, add figure 11 displaying CBH comparison from Doppler lidar and ceilometer. This would significantly add value to the manuscript.

Minor and technical comments

2.2 Doppler lidar

Page 4, lines 14-24: Add a sentence to explain how you determined SNR threshold (-20 dB), and mention model and manufacturer of the Doppler lidar. A discussion on data quality should cite at least to work by Manninen et al. (2016). It is true, however, that in this case study corrections to signal-to-noise ratio as suggested by Manninen et al. (2016) would have limited, if any, impact to presented results.

3.2 CBH retrieval using CM

Add more information on CBH retrieval or state that standard output of Vaisala CT25k has been used.

4. Results and discussion

Page 9, lines 1-2: 'It is interesting to note that the temporal evolution and duration of thin and opaque clouds in both the instruments are in reasonable agreement during all

events'. Discuss more on this topic since it is the fundamental question behind your research, i.e. why temporal evolution would be different etc.

Page 10, line 19: Table 1 does not show a detailed comparison of cloud base heights observed worldwide. In fact, I recommend removing Table 1 as it shows 8 single-day examples. To me main point of the current manuscript is not height of observed CBH, but rather, reliability of methods and sensors. Reconsider lines 15-33 on page 10.

5. Summary and conclusions

Discuss somewhere in the manuscript why you would expect, and in fact, present differences in CBHs from Doppler lidar and ceilometer.

Figures

Page 20, Fig. 4: Explain interpretation of color scales in the figure caption for the journal readership.

References

Manninen A.J. et al.: A generalised background correction algorithm for a Halo Doppler lidar and its application to data from Finland, Atmos. Meas. Tech., 9, 817-827, 2016.

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Schween, J. et al.: Mixing-layer height retrieval with ceilometer and Doppler lidar: from case studies to long-term assessment, Atmos. Meas. Tech., 7, 3685-3704, 2014.

Van Tricht, K. et al.: An improved algorithm for polar cloud-base detection by ceilometer over the ice sheets, Atmos. Meas. Tech., 7, 1153-1167, 2014.

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