General comment by authors:

We appreciate the generally positive and encouraging feedback from the three reviewers. We also acknowledge the reviewer comments which led to improvements of the manuscript.

Below, the reviewer's comments are recalled in black, our response is given in blue, and changes to the manuscript are given green.

Anonymous Referee #1

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This manuscript presents a good reference for an extense dataset of cloud base height (CBH)measurements by ceilometer. CBH is a very important measure to estimate the downwelling longwave irradiance at the surface. This magnitude is mentioned in the mansucript in section 3.1. It would be interesting include the specifications of the instruments (upwelling and donwelling) used.

> We agree that this information is important, and added the according information and a reference to the section.
>
> >> As the ceilometer is operated in close vicinity to the instrumental set-up for the Baseline Surface Radiation Network (BSRN) **described in Maturilli et al. (2015)**, all surface radiation balance parameters are available. The presented case refers to December, implying polar night conditions at Ny-Ålesund and therefore reducing the contribution to the radiation balance to the long-wave components **measured by Eppley PIR pyrgeometers**.

I would also suggest to include this magnitude averaged for cloudy cases in Figure 5.

> We have added the longwave net radiation for the cloudy cases in Figure 5.
>
> >> page 5, lines 27 pp.
>
> Regarding a potential change of the cloud base height over the 25-year period, Figure 5 shows the observed seasonal median cloud base height, together with the longwave net radiation LWnet = LWdown – LWup from the BSRN surface radiation measurements for simultaneous times. The periods of different ceilometer instrumentation are indicated…
>
> >> Figure caption:
>
> Figure 5: Median cloud base height **(dots; left axis)** for spring months March-April-May, summer months June-July-August, autumn months September-October-November, and winter months December-January-February, shown from uppermost to lowermost panel, respectively. Only data with >20% available cloud detection data during the season are considered, leading to gaps especially in winter. The background shading indicates the different instrumentation (light blue – LD-WHX, light red – LD-40, light yellow – CL-51). **Additionally, the median longwave net radiation LWdown – LWup from simultaneous BSRN surface radiation measurements is shown for the same cloudy periods (triangles; right axis), respectively.**

Addtionally, because there are measurements from satellite (CALIPSO and CloudSat), I would suggest to compare for the available cases or at least some cases, the CBH measured from the ceilometer to those measured from CALIPSO and CloudSat.

Cloudsat and Calipso data have been used to analyze cloud properties in the Arctic (e.g. Mioche et al, 2015). However, cloud base height is a variable which is rather difficult to retrieve from satellite based remote sensing instrumentation due to several reasons. CloudSat provides information on the vertical profile of hydrometeors (cloud particles + precipitation). In the presence of precipitating hydrometeors, the detection of cloud base height from cloud radar measurements alone is thus not possible (as demonstrated for the ground-based radar measurements in Fig. 3). Another serious problem is the presence of the "blind zone" in the CloudSat obervations: This blind zone is caused by ground-clutter contamination of the CloudSat radar and covers the lowest 1200 m above land/ice surface (Marchand et al., 2008; Maahn et al., 2014). Since low-level clouds with CBHs lower then 1 km are very common in the Arctic (Shupe et al., 2011), CloudSat will always miss these low-level clouds. This will be likely the case for most of the clouds in the case studies presented in this paper having CBHs of ~1 km. This issue is also discussed in more detail in Mioche et al. (2015) who also perfomed a comparison between combined space-borne radar/lidar observations and ground-based lidar observations at Ny-Ålesund. They showed that uncertainties in satellite-based in cloud fraction are 20-25 % between 500 m and 2 km.

As for the ground-based ceilometers, CALIPSO very well detects cloud layers with higher particle backscatter characteristics, in particular liquid layers. In this way, the upper part of the cloud and thus cloud top height can be very well detected, but due to the strong attenuation of the lidar signal, CALIPSO might not even see down to the cloud base.

Due to these well known limitations in the Cloudsat and CALIPSO observations of low-level clouds and the CBH in particular, adding these observations will not provide an added value to the manuscript.

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