**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Diurnal evolution of cloud base heights in convective cloud fields from MSG/SEVIRI data" *by* R. Meerkötter and L. Bugliaro

M. Lawrence (Referee)

lawrence@mpch-mainz.mpg.de

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This manuscript describes a newly-developed algorithm for determining cloud base heights (CBH) from Meteosat-9 geostationary satellite data, and evaluates the quality of the algorithm by applying it to three diverse cloud fields over central Europe and comparing the retrieved CBH values with several other independent determinations of the CBH. Because of the application to a geostationary satellite, a very good temporal resolution (15 minute) and coverage (sunrise to sunset) are possible. Although my expertise lies more in cloud physics than in remote sensing and retrieval algorithms, the approach is described well and appears to me to be robust. I particularly like the

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innovative step of applying the retrieval only to vertically thin clouds (in the early stages of their growth), and assuming, since the CBH is usually rather constant over time within a region, that this will also be representative of the CBH for thicker clouds as well. There are several applications, especially in studying atmospheric solar radiation budgets, where this new approach is likely to prove valuable. I recommend publication in ACP with only a few minor modifications, and one caveat, as described below.

1) My only caveat to recommending publication is that I think it would be very valuable if an additional referee with expertise in remote sensing were able to provide comments on the viability of the retrieval algorithm prior to acceptance to ACP.

2) Is it also possible to determine the cloud base height from the radiosonde data by scanning for where RH first reaches 100%? The application of the dew point depression (Eq. 3) to determine the CBH (i.e., LCL) is probably very accurate in all three of the cases examined, approaching the theoretical maximum accuracy for ideal conditions shown by Lawrence (2005), which the authors apply as a sensible justification here. However, if it were possible to add one more piece of information by using the direct observation of CBH in the radiosonde data, that would add nicely to the manuscript. Of course, this might not work well in some cases, for instance, if the sonde ascends in cloud-free regions between the clouds, or it could alias the signal if the sonde is blown horizontally into the side of a cloud somewhere above its base. Thus it would be wise in any case to keep the application of the dew point depression equation and the error computation from Lawrence (2005), but worth checking if a few additional data points for validation might be available.

2) p. 18943, l 20: how much of an uncertainty is introduced by using the standard atmosphere for the underlying profiles here? Since radiosonde profiles are available for a few of the cases (Area O in each of the days), it would be sensible to check this and give a rough indication of the error that is likely introduced by this assumption.

3) I think it would be helpful to add the green triangles from the radiosonde data on

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Figure 9, since these are discussed in the text (to prevent the reader from having to look back to Figs 5-7 to confirm these). Also, in Figs 5-7, it was a bit confusing to me at first having the cielometer CBH in the legend of all the panels, but the data only in the Area O panel; it would be helpful if the panels could be remade with this left out of the other legends and only included where the data is available.

4) on p. 18950, l. 16-17, it seems that the description is reversed: shouldn't it be how the MSG/SEVERI data follow the minimum CBHs from the ceilometer measurements (rather than the minimum CBHs from MSG)?

5) Nearly all of the minor language/technical corrections that I noted were taken care of prior to publication in ACPD; a few remaining ones are:

- p. 18938, l 21: "structure *such* as..." (add "such")

- p. 18940, l 14: "Principle ideas..." -> "The principle ideas..."

- p. 18946, l 2: "The 30 May 2007 *scene* is dominated by..." (add "scene")

- p. 18947, l 19: "satellites instruments" -> "satellite instruments"

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