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Atmospheric Measurement Techniques Discussions

Interactive comment on "Use of spectral cloud emissivity to infer ice cloud boundaries: Methodology and assessment using CALIPSO cloud products" *by* Hye-Sil Kim et al.

Anonymous Referee #3

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General comments This study uses spectral cloud emissivity to derive information regarding the minimum and maximum values of cloud top height (CTH). Authors primarily use MODIS data to derive the relationship between brightness temperature (BT) or brightness temperature difference (BTD) and emissivity values to infer information of cloud top temperature (CTT), and then convert CTT into CTH. They used CALIPSO data to validate their products. Though such type of study is essential to improve our understanding regarding CTH retrieval accuracy by MODIS and other satellite sensors, this study needs more improvement to full this gap as explained in detail in the specific comments below. The present version of the manuscript needs substantial revision. The presentation is not clear and discussion is relatively poor. The study method (Fig-

ure 2) is ambiguous. For example, what information do authors use from ice cloud pixels to determine the permissible ec ?, what is the meaning of permissible ec ?, do authors use emissivity data or uncertainty in emissivity? There are a number of such confusions to the reader. Further, It is not clear how this study can address the problem of cloud vertical inhomogeneity as stated in the first line of abstract. It should be either removed or discussions are necessary to show how this study can address such problem. The discussions presented in the second half are relatively poor. For example, what are authors' view for relatively large difference in min(Hc) and CALIOP base height in Figure 9?. The English also needs to be improved.

Specific comments 1. L63: Write the full form of NWP as it appears for the first time here. 2. Section 2 :It is better to separate data and methodology in different sections. 3. L95: Specify what method is used while remapping NWP fields to the resolution of satellite imaginary and interpolating to the time corresponding to satellite observation. 4. L140: Are ec and âŰş ec are obtained are SDS data of 'cloud_emiss11_1km' and 'cloud_emission12_1km' as expressed in L200. Are they the emissivity or emissivity uncertainties? If 5. L140:L155: Make this section clear and easy to understand. For example, how do you constrain 11 micron cloud emissivity for an ice cloud pixel (L147), and how do you use this information with LUT values? 6. L197-L204: This paragraph is also confusing. The first line of this paragraph states that you derive an empirical relationship, however, the last section discusses about taking percentile values. Do you use empirical relationship or percentile values to define the minimum and maximum values of the emissivity? 7. Subsections 3.1 and 3.2 may be moved to data section. 8. L297: A brief description regarding the procedure of collocating CALIOP and MODIS is useful here. 9. What are authors' view for deviated CBH and min(Hc)? 10. Why not to write min_CTH or similar instead of min(Hc) ? Same for max (Hc) as well. 11. The discussion of section 4 may be strengthen by referring past studies and/or putting authors' own logic. 12. It is better to show the dependence of CTH or CBH difference between CALIOP and this study on CALIOP COT in Figure 10 instead of the mean value difference. What information do authors want to convey from the difference of

mean values? 13. Figure 1:Make the caption clear. Write about Iclr and B in the caption. 14. Figure 2: 'The logo of Copernicus Publications' should be removed from the caption. 15. If COT is not used here, why do you use COT for y-axis title ? 16. Table 1: What is IR cloud phase here ? 17. Table 2: Why 700 and 705 appear in this table?

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