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Interactive comment on "A development of cloud top height retrieval using thermal infrared spectra observed with GOSAT and comparison with CALIPSO data" *by* Y. Someya et al.

Anonymous Referee #2

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General comments:

This paper presented an improvement to the CO2 slicing method for cloud detection using the hyper-spectral thermal infrared observations. By way of channel reconstruction, the measurement errors are reduced. Comparisons with the CALIPSO observations show that this improved algorithm apparently provides more accurate retrievals of the cloud top heights. This paper is well-constructed and concisely written. I recommend publication of this manuscript with the Atmospheric Measurement Techniques after minor revision.

Major issues:

* The authors used a lot of acronyms in this manuscript. Although using acronyms helps simply the long terms, too many of them also confuse people (and the authors themselves). I recommend the authors remove those acronyms that were used for only once, such as CLOUDIA (Page 3, line 10); LST (Page 14, line 7). Some acronyms are not defined before use, such as NIES (Page 5, line 21). As a result, it is highly recommended that the authors do a thorough check.

* I highly suggest the authors add a flow chart to help readers understand the procedures and steps of the retrieval process. Although the authors have described how the channels are reconstructed and optimized and how the method is applied to GOSAT, it is deemed necessary that a flow chart be added for better illustration.

* Page 12, line 24: "All the data for GOSAT and CALIPSO observed in January and July were analyzed." – The question is what is the temporal range of the data used? 2007 to present time? How many collocated observations are found? Please specify!

* About the differences in the retrieved cloud top height and cloud amount between this study and CALIPSO, how much of the bias is related to the differences in cloud optical properties used in the radiative transfer model? Also, the authors should specify what are the cloud optical properties they used in the radiative transfer calculation for retrieval purposes.

Minor problems:

* Page 2, line 23: "increasing 2.07 ppm" should be "increasing at 2.07 ppm"

* Page 3, line 14: "it enables to " should be "it is able to"

* Page 4, line 9: "calling" should be "called"

* Page 5, line 24-25: ". . . until July . . . from August" should be ". . . from January to July . . . from August to December"

* Page 6, line 28: "referred" should be "inferred"

* Page 12, line 8: "the seen" should be "the scene"

* Page 12, line 12: "compare the results" should be "compare with the results"

* Page 13, line 23: "determine" should be "distinguish"

* Page 14, line 12: remove "then"

* Page 16, line 7: "generally agreement" should be "general agreement"

* Page 17, line 24: "occur" should be "incur"

* Page 18, line 10: "simultaneous studies" should be "simultaneous results"

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