

Interactive comment on “A simplified method for the detection of convection using high resolution imagery from GOES-16” by Yoonjin Lee et al.

Anonymous Referee #2

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General comments:

There are some issues as below.

- No comparisons with past studies. It would also be feasible to compare with the results from ABI data of 15 min. on the same dates.
- It is hard to see the details in some figures.
- A table for accuracy is not found in the manuscript.

Specific comments:

Line 7: What is the meaning of the proper heating?

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Line 9: Why is the latent heating especially mentioned here?

Line 11-12: Shouldn't it be more sensitive to the drop size?

Line 14: I don't understand how better spatial and temporal resolutions could be a solution to the intrinsic problem that optical sensors can only get information from the top layers of clouds.

Line 15: What are the life stages to be analyzed?

Line 17-18: Does this mean that the detection accuracy of the method for the clouds at early stages was 71%?

Line 19: How the rapid temporal evolution is identified? It needs to be clear, . . . rapid temporal evolution of what?

Line 21: Do the convective clouds here are clouds at all different life stages?

Line 22: It seems that the statement does not match with what is mentioned above in Line 14.

Line 26: What is 'this issue'?

Line 55: What does 'to initiate convection' mean?

Line 71: Is cooling really not seen in mature clouds? The sentence needs to be corrected.

Line 88: Where are the mesoscale sectors? What's the size?

Line 90-91: . . . ten consecutive data with 1-minute interval were used.

Line 89-94: It seems that the last part of the introduction is a bit detailed. They would be rather explained more concisely, and the details would be addressed in the method section.

Line 91: What are the errors from cloud movements?

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Line 107: It seems that Table 1 is not really necessary. It can be removed and explained in the text.

Line 118-120: Need to add references. What about using channel differences? Past studies on detecting convective initiation have widely used channel differencing between water vapor channels and IR channels (c.f. Mecikalski2006, Lee2017)

Mecikalski, John R., and Kristopher M. Bedka. "Forecasting convective initiation by monitoring the evolution of moving cumulus in daytime GOES imagery." *Monthly Weather Review* 134.1 (2006): 49-78.

Lee, Sanggyun, et al. "Detection of deterministic and probabilistic convection initiation using Himawari-8 Advanced Himawari Imager data." (2017).

Line 140-141: Clouds do not necessarily reach the tropopause. Clouds form when air parcels reach the equilibrium level.

Line 142-143: How can the availability of higher temporal resolution data simplify the method to use two channels?

Line 159: What height does each channel usually reflect?

Line 189-190: "Clouds that develop into deep convective clouds are eventually captured by these thresholds in later times even if they had small decrease in the beginning." This sentence is a bit unclear.

Line 227-229: "It is intentionally chosen so that the method considers warmer convective clouds without those features in the next step when evaluating lumpiness of cloud top." This sentence is a bit unclear.

Results -> Results and Discussion

Line 253: It is almost impossible to see the Gaussian shape in Figure 3c. Maybe a close-up subfigure could be used here.

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Line 258-259: “Since the same method is used in each time step, the same window can be captured throughout an overlapping time period despite the starting time. Therefore, this method can be used continuously in time.” This sentence is a bit unclear.

Line 261-275: It would be better to move this paragraph to the beginning of this section.

Line 269-271: It would be much better to illustrate this as one Figure in the manuscript by merging both figures together.

Line 288-290: “These results show that even though the thresholds for the Tb method can be strict for some growing clouds, the thresholds were adequate for detecting convective storms in their earliest stages.” This sentence is a bit unclear.

Line 299: “Since clouds do not grow at the same speed, . . .”, which is a bit unclear.

Line 302: Why is the number of samples different?

Line 311: Why is it important to have the ability to detect convection earlier than radar? You mentioned earlier that the method of this study is to complement ground-based networks for either off-shore or other regions lacking coverage of radar data.

Line 318-322: It seems to be redundant.

Line 326: “The upper threshold does not change results much, . . .” The result for upper threshold is not shown here.

Line 328: However, the choice of 0.4 seems to lose a lot of convective regions.

Line 342-343: “. . . in preventing the method from detecting convective regions.”, which needs to be corrected.

Figure 8 caption: “. . . due to only one of the thresholds.”, which is a bit unclear.

Line 345: “. . . have flat cloud top surfaces.” What percentage was this case? It would be good to provide quantitative values for one-month data.

Line 348: Q: Why are convective clouds in a decaying mode not considered?]

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Line 349-350: “It is also possible that it is due to a misclassification of trailing stratiform regions using radars. Previous studies (Qi et al. 2013; Shusse et al. 2011) have indeed tried to improve the radar classification schemes.” The sentences are a bit unclear.

Line 355-360: Reporting accuracy would be placed at the beginning of this section.

Line 354: to avoid FAR -> to avoid high FAR

Line 356: There is no Table 4 in the manuscript.

Line 360-362: However, further study on relating the detection of convection to precipitation is needed.

Technical corrections: - Tense in Abstract should be consistent.

- Line 15: ABI is not defined.
- Line 27: put a period after references.
- Line 42: ... types using ... -> ... types by using ...
- Line 67: Interest fields include ... -> The interest fields include ...
- Line 79: a feature of OT that it is ... -> a feature of OT in that it is ...
- Line 107: table 1 -> Table 1
- Line 148: Can't find Bedka et al. 2019 in References.
- Line 196: make -> makes
- Line 233: implies -> imply

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