

Atmos. Meas. Tech. Discuss., referee comment RC3  
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## Comment on amt-2022-49

Anonymous Referee #3

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Referee comment on "Latent heating profiles from GOES-16 and its impacts on precipitation forecasts" by Yoonjin Lee et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-49-RC3>, 2022

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This article describes a latent heating (LH) estimation method that can be applied to geostationary (GEO) satellite observations. The method consists of two steps: 1) convective cloud detection using temporal changes and spatial patterns in visible reflectance and IR brightness temperature (TB), and 2) once a convective cloud is identified, LH profile assignment based on IR TB by searching a lookup table (LUT) created using WRF model simulations. The authors compared the GEO-based LH retrievals (applied to GOES-16 hourly measurements) with LH from NEXRAD and GPM CSH. Similarities and differences are documented. Finally, they examine the impacts of GEO-based LH on precipitation forecast by applying LH to initiate convection. Forecast results are similar to the one using the NEXRAD LH.

General comments:

Overall, this is an interesting and useful study that has great potential in various applications, because GEO provides much higher spatial and temporal coverages than space-borne and ground-based radars. The proposed method and data product should contribute to convection and precipitation forecasting. For this reason, I'd like to see this paper published.

I only have one major point: the GEO-based LH estimation method described in this study contains two steps: convective cloud detection and LH retrieval for the detected convective cloud. The first step uses a lot more information than the second step. For convective cloud detection, they used multiple channels and their temporal change and spatial structure. In contrast, for LH retrieval, they only used a single piece of information, namely, 11.2-um TB. I wonder if they can consider adding more predictors in their LUT for retrieving LH profiles, given that there are such observations around. Temporal change in TB is an obvious candidate. Meanwhile, environmental parameters will also help. For example, the ambient sounding profile or CAPE has bearings on convective intensity,

which should affect the magnitude and vertical structure of LH.

Specific comments:

(Figure 1) The total LH: are they vertical integrals of the LH profile? Can we really integrate LH this way? If LH is 1K/hr at one level and 2K/hr at another level, do we simply add them up? Some clarification is needed.