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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The vertical structure of cloud radiative heating over the Indian subcontinent during summer monsoon" *by* E. Johansson et al.

Anonymous Referee #1

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This paper shows plots of geographic and seasonal variation of cloud radiative heating profiles over India, and speculates on the role that these heating rates may play in the monsoon, shows pdf's of cloud radiative heating in the TTL, and compiles some regional mean estimates of radiative energy balance terms. I don't have a substantive criticism with the analyses in the paper. However, the paper is mainly descriptive, and does not contribute a compelling contribution to any particular topic, in my opinion. For example, a substantive paper might have compared the estimates of cloud radiative heating, ice and liquid water path, and cloud fraction they were using with the global CERES, or other, data sets. Maybe they could have looked at cloud vertical overlap

statistics, an important consideration in cloud radiative modelling with larger grid cells. Perhaps these quantities could have been compared with model output. Perhaps the variation in cloud radiative heating rates could have been lacked at in relation to other geophysical variables such as rainfall. I would therefore like to see a more strengthened and focused paper, and think the best option would be to reject and perhaps resubmit later.

Technical Issues

I didn't find the cross-sections shown in Figure 4, 6, 8, 9, and 10, S1 - S5 very illuminating. What would have been more useful, and easier to interpret, would have been mean vertical profiles (and perhaps comparisons with other observational data sets).

The paper at times contains odd language, e.g. "palpable", "potentcy", "tangible" in the Introduction

How are equations (5) and (6) related. Is "f" the same as "factor"?

It is unclear what "absolute fraction" after Eq (7) means.

At various times, the paper has motherhood statements about the effects of cloud radiative heating on tropical dynamics. Of course this is true, but the paper does not really treat this topic, so the references to these interactions seems misleading. The paper also contains unneccessary references to e.g. the indirect aerosol effect.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 5423, 2015.