

Interactive comment on “In-situ sounding of radiation flux profiles through the Arctic lower troposphere” by Ralf Becker et al.

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I was very intrigued to see this paper, as I believe that the research community needs to make *many* profiles with sensor like these to truly help evaluate the accuracy of radiative heating rate profiles in the Arctic (and other atmospheres), as traditionally these profiles have only been computed using atmospheric and cloud properties and radiative transfer models. Thus, I am very supportive of this work.

However, the last sentence of the abstract is misleading. The LW radiative cooling seen at the top of a stratiform cloud in the Arctic can be quite variable, as it depends on the liquid water path (LWP) of the cloud, the distribution of that liquid water vertically, whether there is ice in the cloud also (i.e., if it is mixed-phase or not) and if there are

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other cloud layers above the one being sampled. These issues have been discussed in papers such as Turner et al. J. App. Meteor. Clim. 2018. I would encourage the authors to broaden there discussion in section 4 to include caveats such as this, and to indicate how remote sensors or additional instruments on the tethered balloon system will be needed to address these concerns.

However, it is also important to understand the uncertainties in this tethered measurement approach. Would the authors be able to provide uncertainty estimates for both their flux and radiative heating rate values? This seems to be a critical piece of information to know how far these observations can be trusted.

Thanks.

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