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Atmospheric Measurement Techniques Discussions

Interactive comment on "The new BELUGA setup for collocated turbulence and radiation measurements using a tethered balloon: First applications in the cloudy Arctic boundary layer" *by* Ulrike Egerer et al.

Anonymous Referee #2

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This paper documents the setup and capabilities of the new tethered balloon "BELUGA" and presents results from flights that measured a single layer cloud, a multi-layer cloud, and clear-sky conditions during the PASCAL campaign. The setup currently includes instruments that measure winds, temperature, relative humidity, turbulent fluxes, and broadband radiative fluxes. The balloon can fly up to 1.5 km. Instruments are currently being developed to measure aerosols and cloud microphysics.

This paper is carefully written and provides a detailed description of the new modular tethered balloon system. This is a very important development that will provide new

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insights into Arctic boundary layers and will provide the measurements needed to validate and improve turbulent and microphysical model parameterizations. I believe this paper is suitable for publication after minor revisions.

Comments:

1) Page 1, line 5-6: “Collocated data acquisition allows for estimates of the driving parameters in the energy balance at various heights.”

2) Page 2, line 11: “The majority of Arctic clouds are located with the ABL.”

3) Page 5, Figure 2 caption: “HW” should read “HP”.

4) Page 6, line 11: “The data streams are synchronized by an analog. . .”

5) Page 18, line 6: “. . .are slightly separated in altitude...”

6) Page 19, line 2: “. . .north of Svalbard around 81.8N during 5-14 June 2017.”

7) Page 20, Figure 10 caption: “The cloud extent is indicated by gray shading.”

8) Page 21, line 3-5: Given the uncertainty in the estimates it is not clear that a near-surface mixed layer can be distinguished from the main cloud-driven mixed layer.

9) Page 21, line 9: “Contrary to Eq. 9. . .”

10) Page 24, line 12: “. . .they provide near-vertical profiles of collocated measurements. These vertical profiles enable the study of . . .”

11) Page 25, line 4: “. . .instruments allows the pursuit of specific. . .”

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