

Answers to comments of Referee #3

We want to thank the referee for providing constructive feedback and helpful comments regarding our submitted manuscript.

Our replies are structured as follows:

(1) *Referee comment*

(2) Author response

(3) Manuscript changes (given line numbers refer to the revised manuscript)

(4) References are listed in case they were not included in the original manuscript

The paper presents methods to retrieve a) effective radius of snow grains and liquid water fraction of a snow layer and b) melt pond depth during the first phase of the Arctic melt season by using airborne measurements with imaging spectrometers.

The data base consisting of three analysed flights is quite limited. However, a key aspect of the paper is the further development or modification of existing retrieval methods based on the use of additional instruments (e.g., the SMART albedometer) compared to previous studies.

Since retrieval of melt pond depth from airborne measurements is still rare, to my mind, the modified use of the model by König and Oppelt (2020) is most useful.

A weak point is the missing in situ data from ground-based measurements, a fact that prevents a thorough validation of the results.

However, the paper addresses very relevant questions within the scope of AMT. Substantial conclusions are reached. Scientific and technical methods are clearly outlined and the results are sufficient to support the conclusions.

The title reflects the content of the paper, the abstract provides a complete summary and the paper is generally well structured. The review of existing published work is very good, the number of references is appropriate. Overall, figures and tables are clear and their captions self-explanatory. Mathematical formulae, symbols and abbreviations are correctly defined and used. The use of the English language is very good.

We appreciate your positive feedback, thank you. We agree to your comment concerning the validation. Reference measurements would be highly beneficial for retrieval validation and improvement.