Interactive comment on "Retrieval of snowflake microphysical properties from multi-frequency radar observations" *by* Jussi Leinonen et al.

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Dear Reviewer,

You are correct that the fixed β is a major assumption in this study. It is also correct that the number of retrieved variables need not be limited by the number of measurements.

It would indeed be ideal to reformulate the algorithm to retrieve β along with α. The reason this was not done was, as the reviewer suggests, the lack of directly measured α, β in prior data: If we assume β, we can at least estimate α from Eq. (13) if we know W_{ice}, N_0 and Λ. But given the high correlation of α and β, accurate measurements of these are required to establish a proper prior.

Another reason to avoid retrieving β directly at this stage is the amount of redesign and

testing it would require. This would probably not be feasible in the time available for the revisions.

Following the reviewer's suggestions in the last paragraph of the review, we have instead conducted a sensitivity study similar to the already-included test of sensitivity to prior assumptions. This is shown in the new Fig. 7 and Sect. 7.3 in the revised version. The considerable sensitivity of some parameters to the choice of β confirms that this was indeed a worthwhile addition to the paper, and suggests that the algorithm should definitely be modified to retrieve β in future versions.

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