

Response to the

Interactive comment on “Application of a two-step approach for mapping ice thickness to various glacier types on Svalbard” by Johannes Jakob Furst et al.

O. Eisen

olaf.eisen@awi.de

Received and published: 24 March 2017

*First of all we want to thank the reviewer for constructive comments on our manuscript. All comments have been taken into account and a list of answers and undertaken actions is given below. Answers are indented and in italic type while a **short summarising reply** is provided in italic, bold-face type.*

The authors spend some effort on providing formal estimates on the overall accuracy of the method, which is greatly appreciated. I suggest that they also look into the detailed comparison of various radar processing schemes provided by Moran et al. (2000). Those authors compare raw 1D vs. 2D vs 3D array radar data processing and come up with estimates of ice thickness errors which are larger than those often used in other studies. Lapazaran, as the most recent and comprehensive study on this issue, cite it, too, but the original paper might be worth looking into, as your study also includes very mountainous valleys.

We certainly appreciate this comment and checked how the error estimate in Moran et al. (2000) compares to the study from Lapazaran et al. (2016), which we considered. Moran et al. (2000) describe differences between inferred thickness values from treating the GPR data as single measurements, line measurements or as a 3D measurement array during the processing. They only give relative differences for their specific setup, which are difficult to transfer to our geometries. Lapazaran et al. (2016) recognise that this uncertainty term can become important. Yet they are unable to estimate it for Werenskioldbreen and were forced to discard it from their analysis. However, they gave an advise for how this term should be included if known.

As our results are based on the same GPR measurements as used in Lapazaran et al. (2016), we follow their analysis and thus ignore this extra source term in the measurement error.

Added reference to Moran et al. (2000) stating that the analysis of Lapazaran et al. (2016) discards an important but not well quantifiable source term in the error analysis.

Delineation of a complexly dipping temperate glacier bed using short-pulse radar arrays Moran, M. L.; Greenfield, R. J.; Arcone, S. A.; Delaney, A. J. Journal of Glaciology, Volume 46, Number 153, March 2000, pp. 274-286(13)