Response to John Paden, Referee #2

The authors would like to thank John Paden for his valuable comments and suggestions, complying with which, we believe, will improve the quality of the paper. We are going to add descriptive information about the algorithm, add and update the references in the revised version of the paper. Hereby we provide our response to the main comments from the supplement document of your review.

Referee, p. 5, line 20, Eq. 10: *Explain why this is here.*

Authors: The comment is regarding the presence of the refractive index of ice in the Eq. 10. The equation calculates the slope of the bed and internal layers from the corresponding geometry in a SAR focused echogram. We compare slopes derived using Eq. 10 with the slopes derived from azimuthal spectrum of SAR focused echograms (Eq. 8). The latter is calculated assuming wave propagation in the air, so to compare the two, we need to adjust the former to the air case. We agree that this notation might be counterintuitive, and the alternative would be to adjust for the propagation media in Eq. 8.

Referee, p. 11, caption of Fig. 8: *Recommend to include a plot of internal layer SNR improvement.*

Authors: As we didn't correct for the antenna diagram during SAR processing, SNR improvement for internal layers will vary depending on the incidence angle for a particular layer. The estimated 10dB improvement we've declared assumes a uniform antenna pattern in azimuth. We intend to include an explanatory illustration and refined estimation for SNR improvement in the revised version of the paper.

Referee, p. 11, line 10 and 11: *Provide parameters for this.*
Please clarify what filter was used? Is it a boxcar filter response (zero everywhere except inband where it is one)? That is what it sounds like from the description.

Authors: We will provide parameters and an illustrative example of the piecewise linear regression used for the SNR improvement of the internal layers in the revised version of the manuscript. As for the filter, we applied a depth dependent bandpass filter in azimuth spectral domain, which will be described in more detail.