

We would like to thank the reviewer for their comments, which are addressed below.

This paper has clearly been thoroughly reviewed and the original referees raised two major points

1. That the input of several overlapping 50 km means in ice thickness as prior information to a methods that aims to estimate finer scale variation in thickness results in a prior at effectively finer than 50 km resolution.

2. That the recovered ice thicknesses are notably lower than the radar derived thickness.

The authors answer point 1 by carrying out a new simulation, that as far as I understand it, computes a 50x50 km thickness map *before* deriving the thicknesses used to create the overlapping regions, which I think is reasonable but I had to re-read the new text a few times to work out what had been done, so I think a re-wording here may help

We have updated the wording of the discussion about this new simulation to be clearer as suggested by the reviewer.

The original wording

To explore the role that the 50km averaged ice thickness plays in the results of the inversion, we re-ran the inversion over the Lower Thwaites region (where we have existing swath radar), using a 50km gridded version of the Bedmachine Antarctica ice thickness (Figure 9). In this alternate ice thickness input, each 50 by 50km region contains only one ice thickness value, which is the average over that region. The average ice thickness in overlapping patches in this re-run does therefore not contain any more regionally specific values, which may have been of concern.

The updated wording

To explore the role that the 50km averaged ice thickness plays in the results of the inversion, we computed a 50km gridded version of the Bedmachine Antarctica ice thickness (Figure 9) and then carried out a new inversion over the Lower Thwaites region (where there is existing swath radar). In this alternate ice thickness input, each 50 by 50km region contains only one ice thickness value, which is the average over that region.

Point 2 is answered by noting that the method appears to obtain the medium wavelength variability (greater than a few ice thickness but less than 50 km) well, but the longer wavelength variations less well. This seems a reasonable response to me: the authors have made progress and documented its merits and flaws. I think the abstract needs a clear statement along these lines.

We have altered the following sentence in the abstract to read:

'Although the topographic output from the inversion is less successful where the bed slopes steeply, it compares well with radar data from the central trunk of the glacier for medium wavelength features (5-50km).'