

## Author comments: Generating synthetic fjord bathymetry for coastal Greenland

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### Review by: Anonymous

We thank the reviewer for their supportive comments and have made corrections in line with the suggested improvements to the manuscript.

1. I agree with John Goff that the description of the centreline method could be made clearer if Figures 5 & 6 were comparable, and if Fig.5 included a bend. Could you have Fig. 5a as a straight fjord to clearly demonstrate the algorithm, and then a 5b with a simple bend? Then you could probably leave Fig. 6 as it is.

We agree with both reviewers 1 and 2 on this point and have amended Fig. 5 so that (5a) now represents that which was Fig. 5(b) in the original manuscript. The new 5(b) now uses the same geometry as presented in Fig. 6.

2. I found it hard to compare Figs. 12 & 14 because of the different sizes of the plots and axis scales. I know they aren't displaying exactly the same thing, but it would help the visual analysis if the x and y axes were equivalent in scale.

We agree with the reviewer. This is a good point and we have now changed the width of Figure 14 (the high frequency stochastic model) to better match Fig. 12 (centreline elevation profiles). When doing this we realised that our stochastic model amplitudes were not correctly normalised, so we have re-done the plot 14 with correctly normalised amplitudes. The new, correctly normalised amplitudes appear significantly smaller than the real fjord elevation range (since they just deal with the higher frequency perturbation). In order to make this point clear, and to better relate Figs 12 and 14 we have modified caption 14 as follows:

Figure 14: Two different realisations for the stochastic model for high frequency perturbations to the synthetic fjord elevation profiles. The model uses the parametric fit in Fig. 13 to generate the profiles, and is statistically consistent with the OBS1516 bathymetric profiles (green lines in Fig. 12). The overall trend of the fjord bathymetry and lower frequency oscillations (corresponding to wavelengths  $\sim 14$  km or greater) are not synthetically generated and explains why the amplitude of the modelled elevation) is significantly less than the bathymetric observations in Fig 12.

3. p7, line 24: 'manner' not 'manor'

Done.

4. p10, line 7: should be 'analysis' rather than 'analyses'?

Done.