

The Cryosphere Discuss., referee comment RC1
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Comment on tc-2021-178

Anonymous Referee #1

Referee comment on "Mass evolution of the Antarctic Peninsula over the last 2 decades from a joint Bayesian inversion" by Stephen J. Chuter et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2021-178-RC1>, 2021

This manuscript presents the results of a Bayesian hierarchical model (BHM) applied to the mass balance of the Antarctic peninsula. The technique combines gravimetry data and a variety of altimetry data with statistical constraints on the spatial patterns of change based on velocity and RCM data to derive estimates of glacier mass changes and of the processes leading to those changes. The authors have performed this kind of analysis at a variety of scales on a few different regions, and have their science and presentation, as it were, down to a science. The manuscript shows a high degree of polish, and I had very few editorial or scientific concerns with it. The results are largely in line with other studies of the mass balance of the region, and the authors have reasonable explanations for any differences between their estimates and those in the literature.

My only misgiving about how the BHM results were in the estimates of the SMB shown in figure 6. It is somewhat apparent from this figure that the available data are not adequate to resolve the spatial pattern of the surface processes correctly for at least the year 2016, let alone their magnitude. The authors acknowledge that this is likely due to the small width of the region and the lack of data, but I would have expected this to result in larger error estimates in figure 7. Is it possible that the prior model for SMB variability is too smooth in this part of the AP? The RACMO gradient appears to be quite sharp, and it was not clear to me whether prior would allow a steep gradient in this specific part of the Peninsula.

Editorial comment (sorry, just the one)

Line 507: add a comma before 'yet,' and consider more drastic measures on this sentence

