

Interactive comment on “The sea level fingerprint of 21st century ice mass fluxes” by J. Bamber and R. Riva

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R Way raises the interesting question of whether we should update our estimates of ice sheet mass balance as a consequence of the paper by Wu et al, 2010, in Nature Geoscience. There are three key issues concerning this: 1) The values we use in Table 1 of the paper are not intended to be definitive estimates that should be generally adopted by the community: i.e. this is not a review paper of mass balance estimates for continental ice. Nonetheless, the values we use are, we believe, the most appropriate to use and are sufficiently reliable to make the key points and conclusions that we make.

2) There are a large number of estimates that have now appeared in the literature for the mass balance of the ice sheets and there is a growing literature on understanding

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the differences that are present in some of these estimates (see for example, van den Broeke et al, 2009, Science, and Thomas et al, 2008, J Glac.) Because a paper is the most recent does not, necessarily, make it the most reliable or "best" estimate. Different approaches have different advantages and disadvantages and we now have a greatly improved understanding of the origin for the differences between published values. It is not, however, the role or purpose of this paper to explore this particular issue.

3) The study by Wu et al is an exciting and novel approach to simultaneously solving for GIA and mass exchange (what they call PDMT). We consider this paper to be an interesting proof of concept for the approach but certainly not the "last word" on the topic. It is important to realise that they are producing a global solution for GIA and PDMT by finding a least squares minimisation for the GRACE, GPS and modelled OBP data sets. The solution has not been tuned for any one location and the quality of the solution will depend on the quality and spatial density of the data sets that went into it. As far as we can tell, the solution is not constrained to pass through the observations. In Greenland, there are very few GPS sites with a sufficiently long record (just 3) that could be used and none in the interior of either Antarctica or Greenland. In the future the GPS networks set up within IPY for both ice sheets will greatly help with solving for GIA in these areas.

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