

Line-by-line comments:

Comment 1: “P2L5-7, I do not think this is the best description of the Input/output method. "output of the SMB component". What about the discharge!!!”

Response: we rephrase this sentence as below:

We also consider results from the input-output method (IOM). The IOM quantifies the difference between the mass input and output of the GrIS by studying the surface mass balance (SMB) and the ice discharge (D). We use the Regional Atmospheric Climate Model version 2.3 (RACMO2.3) to model the SMB and derive the ice discharge from 12 years of high precision ice velocity and thickness surveys. (P2 L4-L8)

Comment 2: “P2L17, strange again. Either you conclude that the differences are not statistically different (because the IOM solution have larger uncertainties) or you have an idea for the differences between GRACE IOM (e.g., IOM is likely under/over-estimated).”

Response: we clarify the confusion as below:

We conclude that the approximated mass balance between GRACE and IOM are consistent in most GrIS regions, the difference in the northwest is likely due to underestimated uncertainties in the IOM solutions. (P2 L17-L19)

Comment 3: “space between 2000 and m”

Response: we update this term throughout the text.

Comment 4: “write *Landsat 7 Enhanced Thematic Mapper Plus* to *ETM+* if used later in the paper”.

Response: the new text is:

Landsat 7 Enhanced Thematic Mapper Plus (ETM+) (P7 L17)

Comment 5: “P9 L8, "," missing after "mass”.

Response: we want to make it more clear to read, it is changed to:

Contrary to the total mass represented in the GRACE data, the SMB, D and TMB are estimates of rates of mass change (i.e., mass flux) in “*Gt per month*” or “*Gt per year*”. (P9 L7-9)

Comment 8: “P9 L8, "." missing after "1990”.

Response: we add the period in the text. (P10 L4)

Comment 9: “P11 L2, add space between 1700 and m.

Response: space is added and everywhere else.

Comment 10: “P11 L10. Can the authors double check? Eq. (8) is for the costal region and then it is compared to estimate that, if I understand correctly, are for the "entire interior GrIS". Did I miss something?”

Response: it should be Eq. (7), and we change it in the text. (P11 L9)

Comment 11: “P12 L13. do you mean 2.1? Or 1 degree (a bit unclear to read). Improve.”

Response: the text is updated as below:

The Global Land Data Assimilation System (GLDAS) model (Rodell et al., 2004), specifically the 1° spatial resolution version 2 monthly data obtained from Goddard Earth Sciences Data and Information Services Center, is employed here to simulate the continental hydrology.

Comment 12: “P12 L18. no comma needed. check everywhere your references.”

Response: we change the typo of the citation throughout the text. We are sure every citation is in correct form.

Comment 13: “P14 L16. did not you mention a 20% uncertainty earlier (P7 L7)? Or did I miss something?”

Response: in our earlier version, it was 20% uncertainty in RACMO. During the updating we correct it as 18%. We didn’t correct the one in P7 L7 before, but is updated now, see P7 L7.

Comment 14: “P15, L8;acronym to be written (not so conventional as w.r.t)”

Response: we rephrase the sentence as:

This approach assumes that the anomaly of the discharge with respect to a reference SMB ($\delta D = \text{SMB}_0 - D$) is correlated with a reference runoff ($\delta R = R - R_0$), which is based on the anomaly of the 5-year averaged runoff. (P15 L6-L8)

Comment 15: *“P15, L14; not obvious what are the peripheral areas mentionned here? Glaciers at the periphery but disconnected from the ice sheet? Make it clear right away.”*

Response: we update the item by the term of [peripheral glaciers](#). (P15 L14)

Comment 16: *“P15, L14; what is the lower limit so that a correlation is considered as “strong”? Can you list right away the basins for which this is the case (DS1, DS3, DS7 and DS8, right?)”*

Response: we update the text as below to make it more clear.

In this study we provide runoff-based estimates for D_0 only for those ice sheet basins where the correlation coefficients between δD and δR are equal or higher than 0.7 (Fig. 2), i.e. for DS1, DS3, DS7 and DS8. (P15, L14-L16)

Comment 17: *“15, L17.the notation DSs is a bit weird, write fully*

Response: we replace the notation DSs with [“drainage areas”](#) throughout the whole text.

Comment 18: *“P16 L13 and L15. Again except if I miss something it should be Gt yr^{-1} ”*

Response: we update the unit to $\text{Gt}\cdot\text{yr}^{-1}$ accordingly. (P16 L13 and L15).

Comment 19: *“P16 L22 and L15. for the sake of consistency with L14 of the same page, write “DS” each time.”*

Response: we check the whole manuscript, and ensure that the same format of referring one DS is consistent as [“DS+number”](#) with no space in between.

Comment 20: *“P21 L1: a changes ”*

Response: we correct it to [a change](#). (P21 L1)

Comment 21: *“P21 L6: 40 $\text{Gt}\cdot\text{yr}^{-1}$ ”*

Response: the unit is corrected as $\text{Gt}\cdot\text{yr}^{-1}$ (P21 L6)

Comment 22: *“P21 L20–L21: it is an agreement with the IOM. Not only with SMB (GRACE and SMB cannot be compared directly!)”*

Response: the new text is:

For the regions above 2000 m altitude, GRACE inferred regional mass change rates agree with the estimations from IOM within their uncertainties. (P21 L20-L21)

Comment 23: *“P22 L15: glaciers)”*

Response: the plural is added. (P22 L15)

Comment 24: *“P24 L4: an underestimate by a negative amount could be mis-understood as an overestimation. if the value is 15 Gt/yr too low, it is underestimated by 15 Gt/yr (not -15 Gt/yr) or the the difference between this and that is -15 Gt/yr”*

Response: we change the text to $\sim 15 \text{ Gt}\cdot\text{yr}^{-1}$. (P24 L4)

Comment 25: *“P26 L4: seems to be repeated just two lines below. I would delete this sentence.”*

Response: the repeated sentence is deleted in the text

Comment 26: *“P26 L6: add “(noted D0-08)” if the sentence L4 is deleted as suggested.”*

Response: text added (P26 L5).

Comment 27: *“P26 L13: replace by “equals””*

Response: text replaced (P26 L12)

Comment 28: *“P26 L18: are they different from α_0 and α_1 in the text?”*

Response: we change all k_0 and k_1 in this section to the correct ones, i.e. α_0 and α_1 (P26 L17 – P27 L2).

Comment 29: *“P31 L1: spell out w.r.t”*

Response: we add “with respect to”. (P31 L1)

Comment 30: *“P32 L4: Why not writing D-08 for the sake of symmetry with D-14? (homogeneity)”*

Response: we replace “Rignot-08” with “D-08”. (P32 L4).

Comment 31: *“P34 L2: remind here to the reader the period which is considered for these estimates”*

Response: we add the period reminder and the new sentence is as below:

Comparison of the 2003 to 2013 regional mass change rates between the GRACE solution and the IOM solutions. (P34 L2)

Comment 32: *“P34 L3: write that the first column of for the entire GrIS”*

Response: it is changes to:

The first column on the left refers to the entire GrIS and the following ones to the right indicate the complete basins according to Zwally et al. (2012). (P34 L3-L4)

Comment 33: *“P36 L2: are they all linear? I think it would be best to have Rate of mass changes”*

Response: we update the text according your comment. (P36 L2)