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## “Peripheral glaciers matter” by Hugonnet R. & Berthier E.

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Community comment on "Mass balance of the Greenland and Antarctic ice sheets from 1992 to 2020" by Inès N. Otosaka et al., Earth Syst. Sci. Data Discuss., <https://doi.org/10.5194/essd-2022-261-CC3>, 2022

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We commend the authors for continuing to develop the IMBIE effort and provide a multi-technique estimate of ice sheet mass balances. We leave it to the reviewers to evaluate the study in detail.

The authors explain how the two ice sheets were split into different basins (i.e. two sets of ice sheet drainage basins were used). However, as in earlier IMBIE studies, *they did not explain how they took into account (or not) the mass changes of glaciers peripheral to the ice sheets* (Rastner et al., 2012; Pfeffer et al., 2014; Gardner et al., 2013). This issue is important because the three techniques have different spatial resolution and hence varying capabilities to separate the mass changes from the main ice sheets and the glaciers lying at their periphery. Our understanding is that gravimetric studies include peripheral glaciers, altimetric studies exclude peripheral glaciers, and input–output studies do both. Therefore, there might be important **systematic errors** in the IMBIE estimates.

This is relevant for both ice sheets, but especially for the Greenland Ice Sheet where the losses from peripheral glaciers amounted to  $36 \pm 6$  Gt/yr (95% confidence) during 2000–2019 (Hugonnet et al., 2021). This was independently assessed at  $27 \pm 12$  Gt/yr during 2003–2010 and  $42 \pm 12$  Gt/yr during 2019–2022 (Khan et al., 2022). A loss of 36 Gt/yr translates to about **19%** of the overall Greenland Ice Sheet mass loss over the period of 2000–2019, and is more than twice the uncertainty range of  $\pm 16$  Gt/yr provided by Otosaka et al. for 1992–2020. We foresee that removing the mass contribution of peripheral glaciers (in particular for gravimetry-based estimates of Greenland and the Antarctic Peninsula) will increase the uncertainties.

To conclude, the authors should provide a clear definition of the Greenland and Antarctic ice masses for which they estimate mass losses for each of the applied techniques. This would avoid double counting the mass change from peripheral glaciers when IMBIE results are combined with glacier-specific mass change estimates to evaluate closure of the sea level budget.

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