

Supplementary material to Gutiérrez-González et al., "Ensemble reconstruction of the Greenland Ice Sheet evolution through the last deglaciation"

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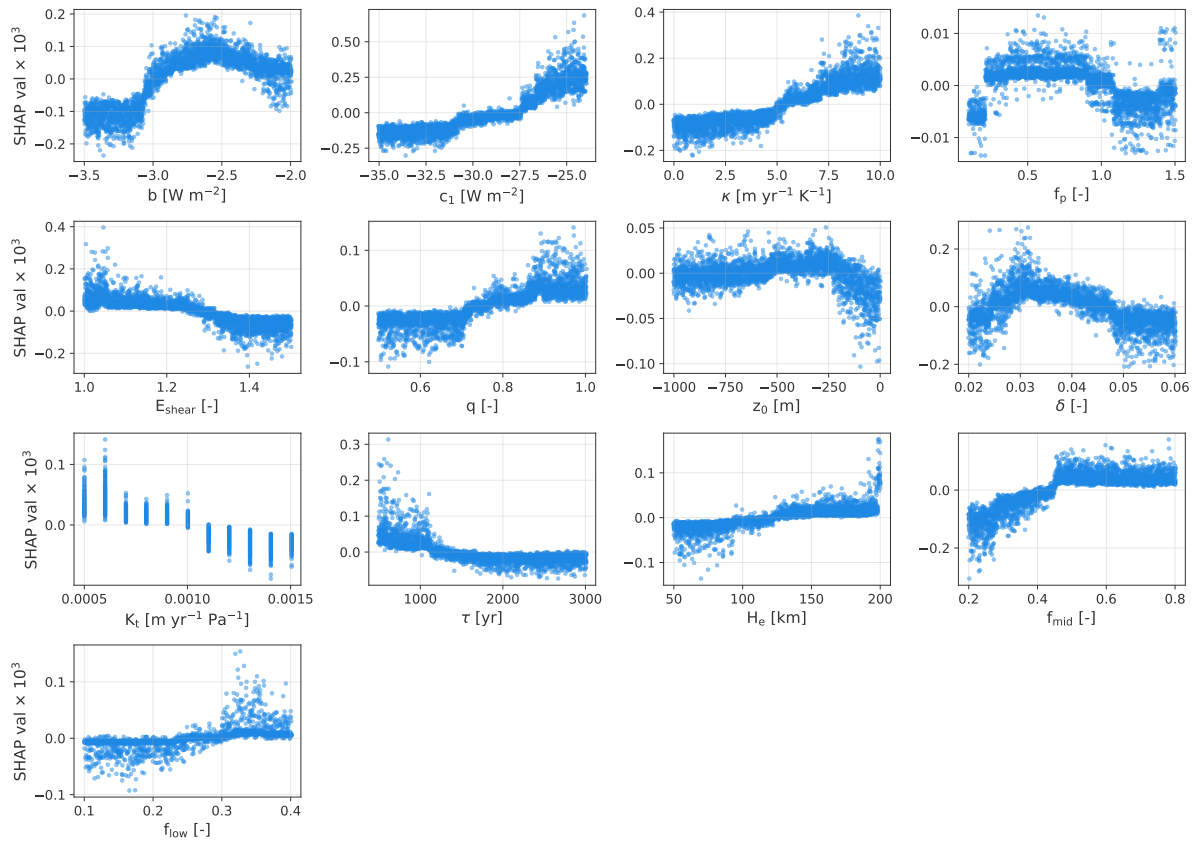


Figure S1. SHAP scatter plots showing the relationship between individual parameter values and their contribution to the global score S . Positive SHAP values indicate an increase in the score, while negative values indicate a decrease.

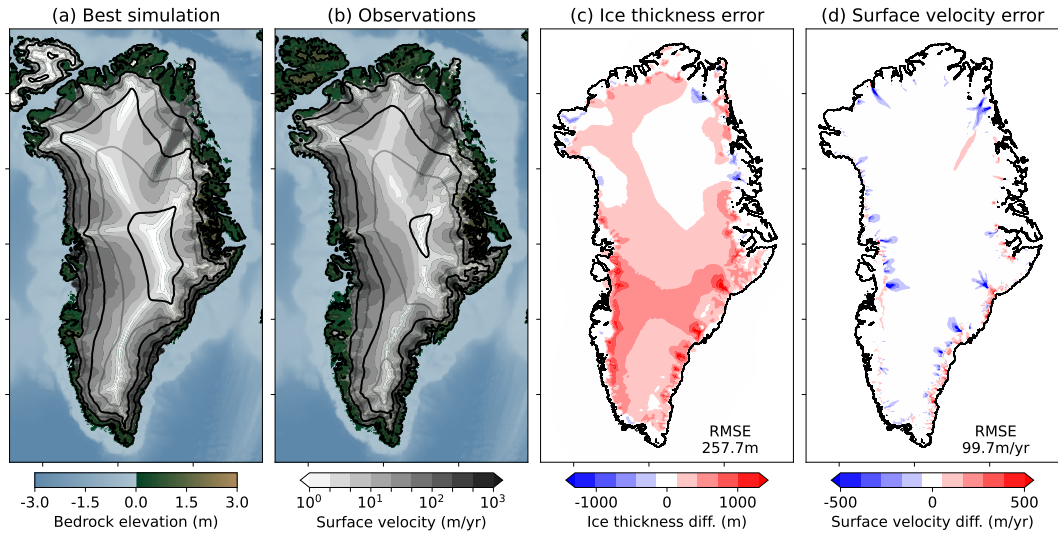


Figure S2. (a) Ice surface velocity for the best-fitting ensemble simulation from the Tabone et al. (2024) study and (b) observations from Morlighem et al. (2017) for topography and Joughin et al. (2019) for ice surface velocities. Black and gray contours show ice surface elevation at 1000 and 500m intervals, respectively. Panels (c) and (d) show the differences in ice thickness and ice surface velocity between the best simulation and present-day observations.

Table 1. Coefficients of the weighted and unweighted second-order polynomial fits ($y = ax^2 + bx + c$) with their associated standard errors of fig. 15 of the manuscript.

Fit	$a (\times 10^{-5})$	$b (\times 10^{-3})$	c
Weighted	1.5 ± 19.2	1.3 ± 55.6	0.25 ± 4.01
Unweighted	0.8 ± 1.4	2.4 ± 3.5	0.26 ± 0.21

References

- Joughin, I., Smith, B. E., and Schoof, C. G.: Regularized Coulomb friction laws for ice sheet sliding: Application to Pine Island Glacier, Antarctica, *Geophysical research letters*, 46, 4764–4771, 2019.
- Morlighem, M., Williams, C. N., Rignot, E., An, L., Arndt, J. E., Bamber, J. L., Catania, G., Chauché, N., Dowdeswell, J. A., Dorschel, B., et al.: BedMachine v3: Complete bed topography and ocean bathymetry mapping of Greenland from multibeam echo sounding combined with mass conservation, *Geophysical research letters*, 44, 11–051, 2017.
- Tabone, I., Robinson, A., Montoya, M., and Alvarez-Solas, J.: Holocene thinning in central Greenland controlled by the Northeast Greenland Ice Stream, *Nature communications*, 15, 6434, 2024.