The Cryosphere

Supplement of

Gravity-derived Antarctic bathymetry using the Tomofast-x open-source code: a case study of Vincennes Bay

**Lawrence A. Bird et al.**

Correspondence to: Lawrence A. Bird (lawrence.bird@monash.edu)

1   Supplementary Figures

Figure S1 shows normalised results of individual model success criteria for the Synthetic model second stage ensemble modelling. Figure S2 shows normalised results of individual model success criteria for the Vincennes Bay model initial stage ensemble modelling. Figure S3 shows normalised results of individual model success criteria for the Vincennes Bay model secondary stage ensemble modelling. Figure S4 shows the water column thickness from our gravity-derived bathymetry. Figure S5 compares our gravity-derived bathymetry that from (Charrassin et al., 2025). Figure S6 shows two-dimensional cross-sections of ocean temperatures along Northing -905 km, through the Vanderford Glacier ice shelf cavity.
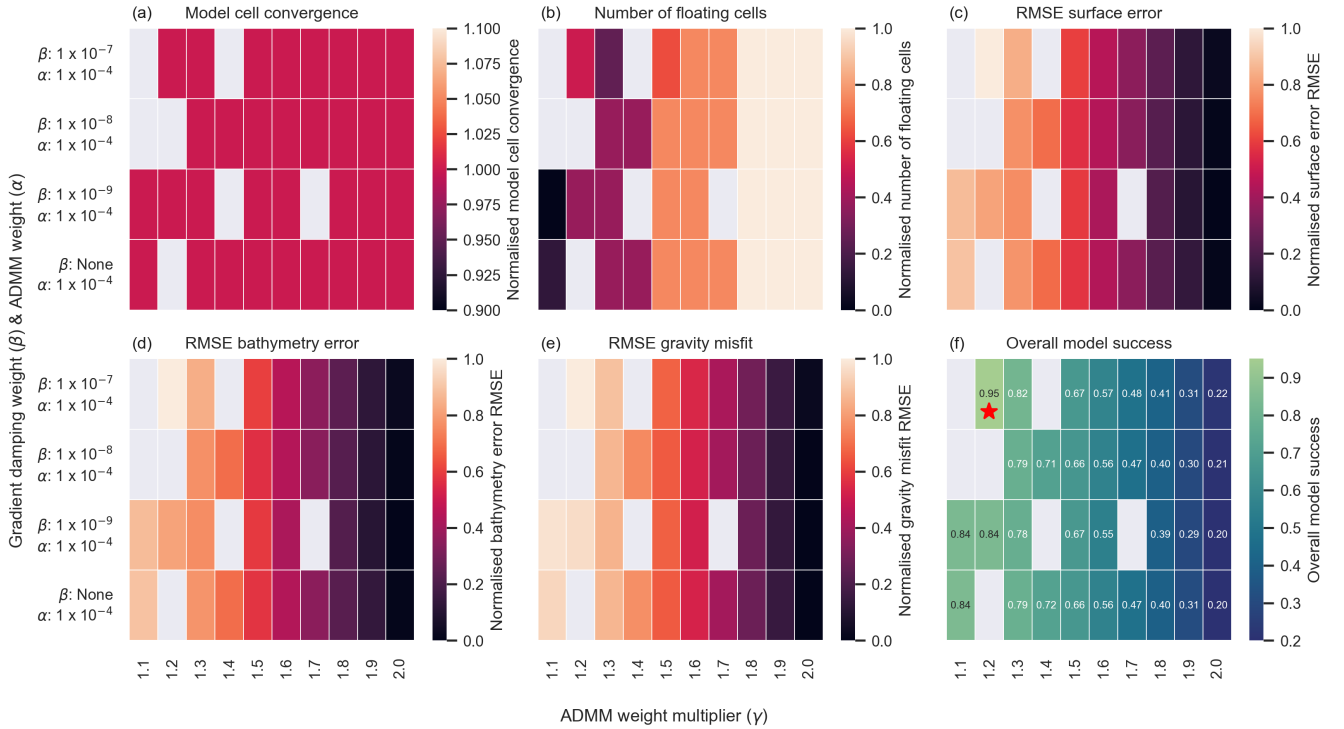

S 1: Secondary Synthetic model ensemble modelling results. Red star in (f) denotes final selected model. All values in (a) are 1.0 as models that did not reach 100 % cell convergence are removed. The colour bars used in (a) – (f) show models with good success in light colours and models with poor success in dark colours.
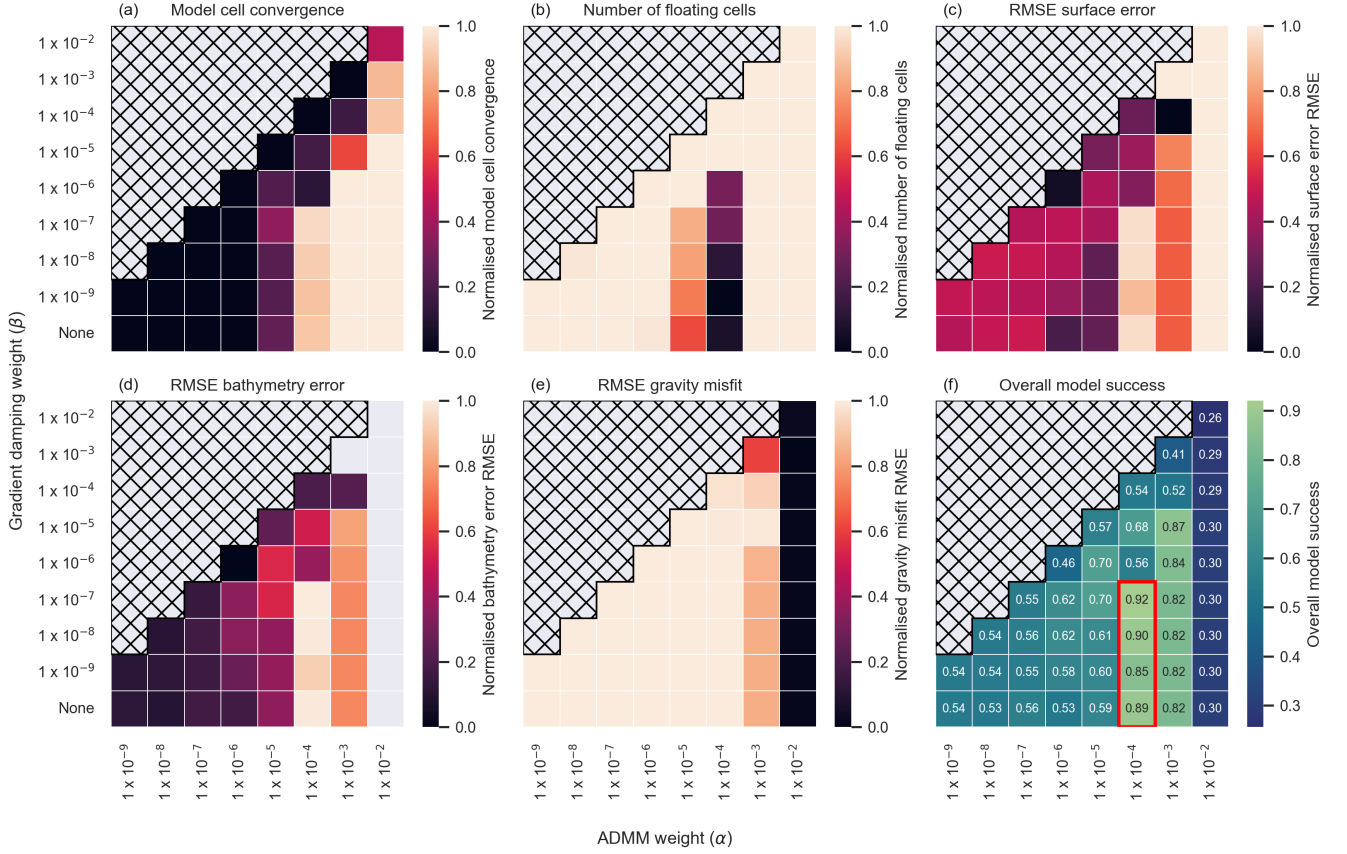
S 2: Initial Vincennes Bay model ensemble modelling results. Red polygon in (f) denotes preferred models. The colour bars used in (a) – (f) show models with good success in light colours and models with poor success in dark colours.
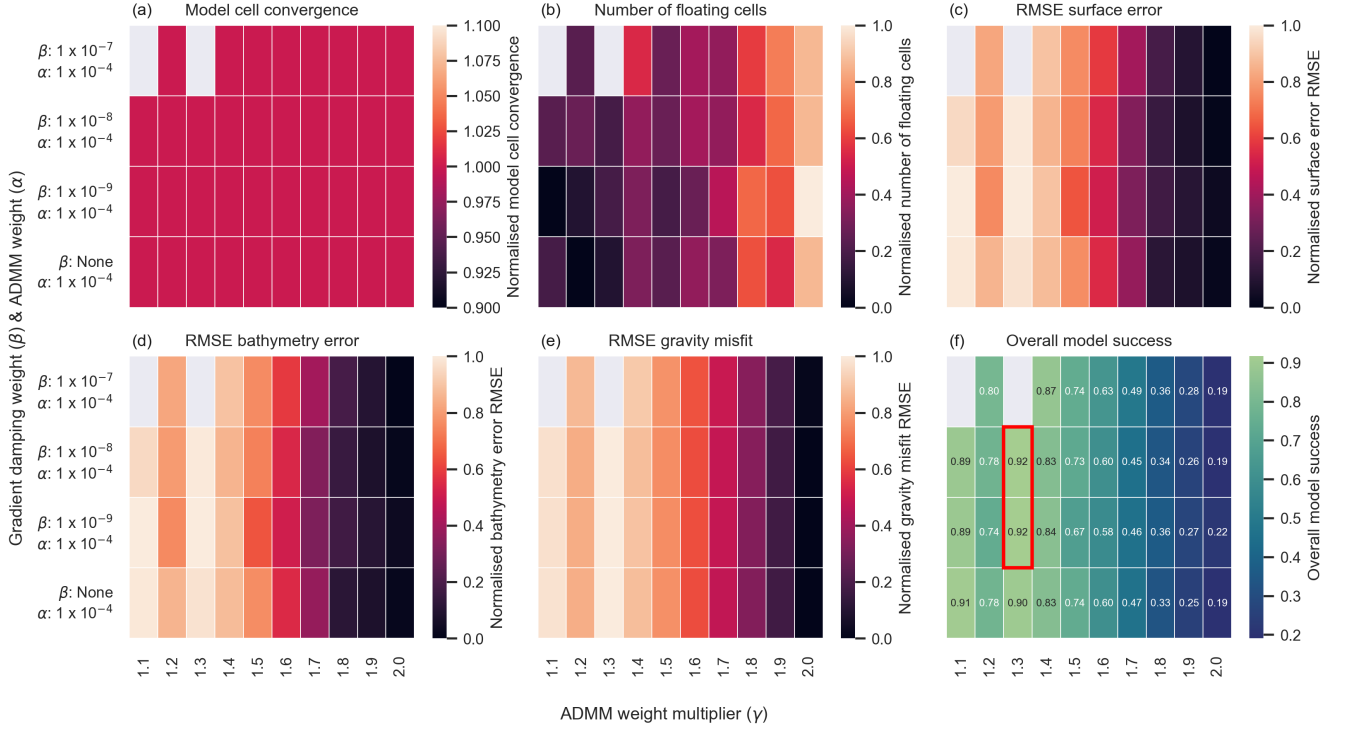
S 3: Secondary Vincennes Bay model ensemble modelling results. Red polygon in (f) denotes final selected models. All values in (a) are 1.0 as models that did not reach 100 % cell convergence are removed. The colour bars used in (a) – (f) show models with good success in light colours and models with poor success in dark colours.
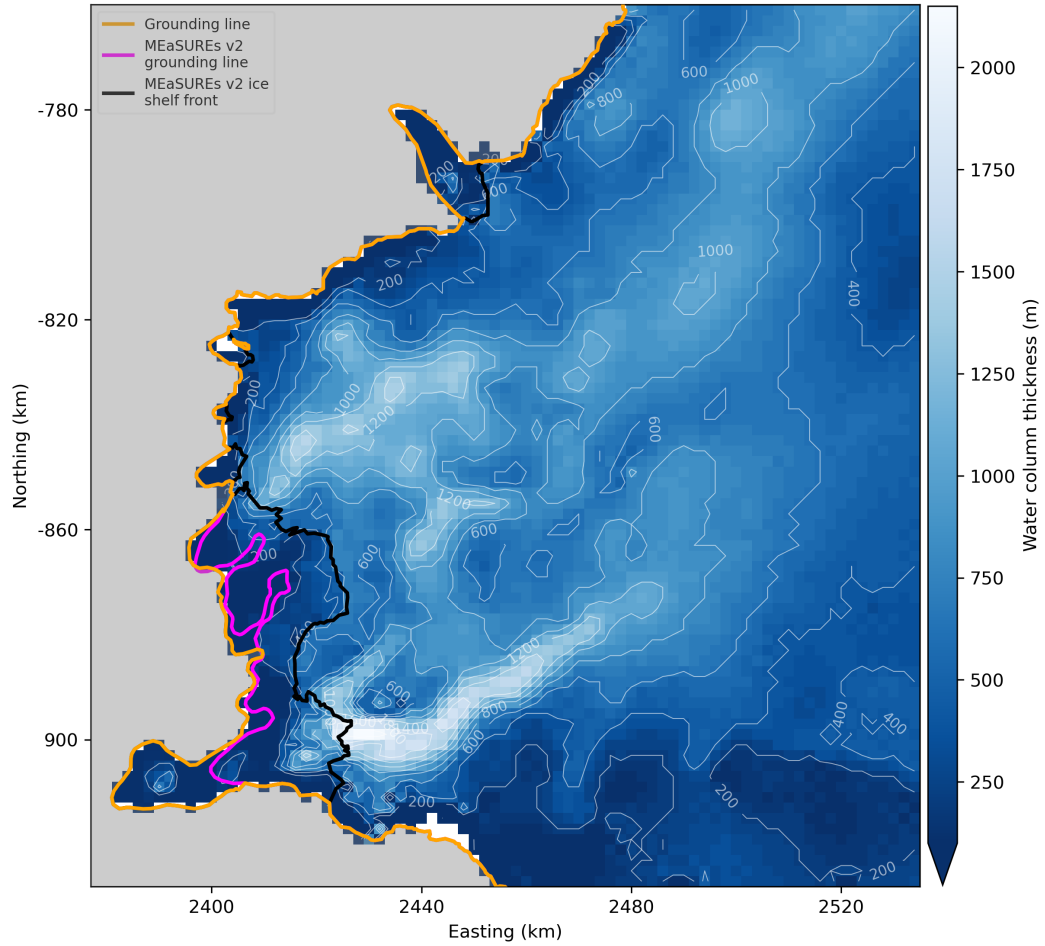
S 4: Gravity-derived water column thickness across Vincennes Bay. Below floating ice, the water column thickness represents the cavity height between the ice base and the bed. The orange line denotes the MEaSUREs v2 grounding line, modified to include the 2017 grounding line from (Picton et al., 2023) used in the inversion. The magenta line denotes the MEaSUREs v2 grounding line. The black line is the MEaSUREs v2 ice front.
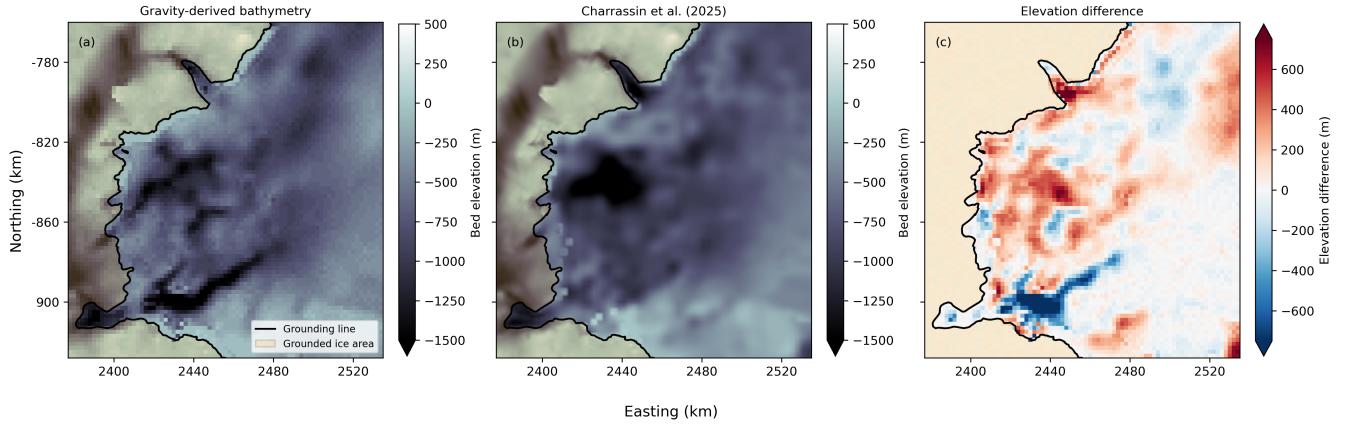
S 5: Comparison of (a) gravity-derived bathymetry with (b) gravity-derived bathymetry from Charrassin et al. (2025). (c) shows the difference in bed elevation, calculated as (a) - (b). Orange shading denotes grounded ice and the black line is the MEaSUREs v2 grounding line, modified to include the 2017 grounding line from Picton et al. (2023).
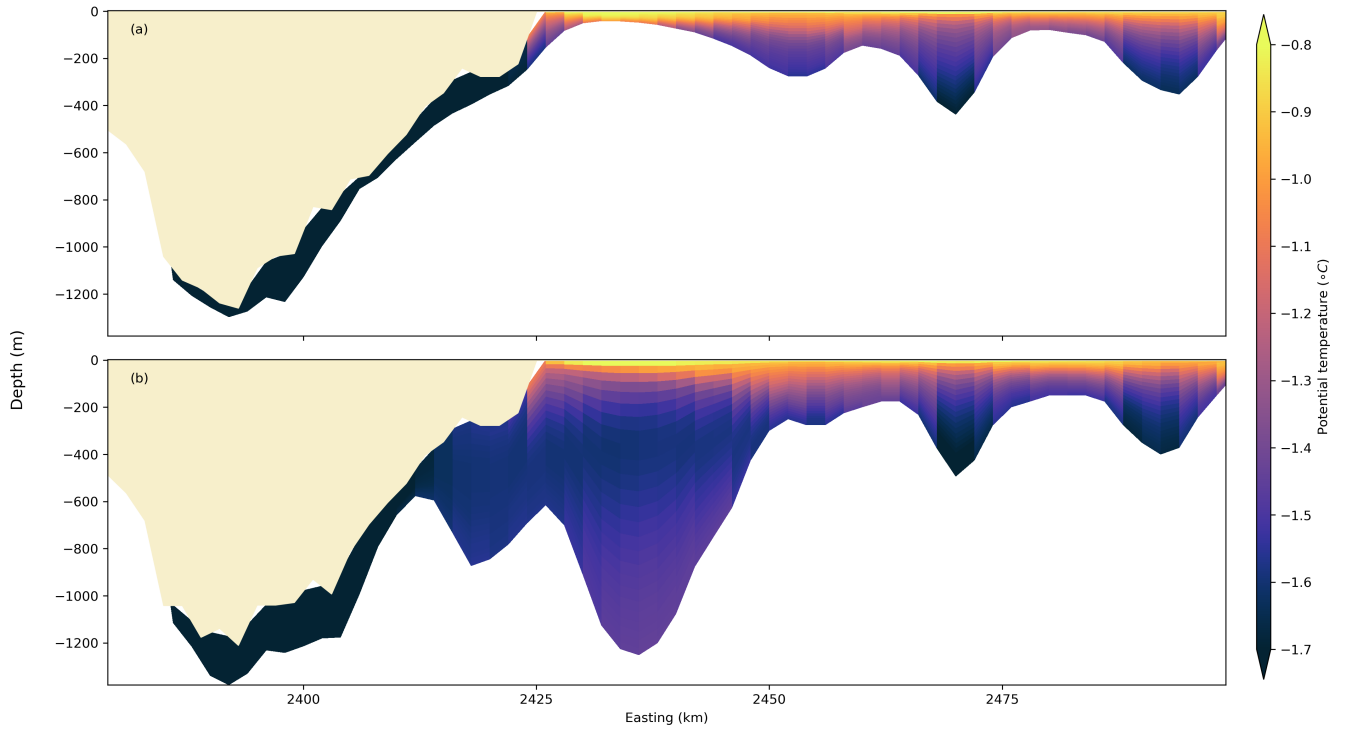
S 6: Potential temperature along Northing -905 km. Cream area represents the ice shelf and coloured regions represent ocean water.

References

10   Charrassin, R., Millan, R., Rignot, E., and Scheinert, M.: Bathymetry of the Antarctic Continental Shelf and Ice Shelf Cavities from Circumpolar Gravity Anomalies and Other Data, Scientific Reports, 15, 1214, https://doi.org/10.1038/s41598-024-81599-1, 2025.

Picton, H. J., Stokes, C. R., Jamieson, S. S. R., Floricioiu, D., and Krieger, L.: Extensive and Anomalous Grounding Line Retreat at Vanderford Glacier, Vincennes Bay, Wilkes Land, East Antarctica, The Cryosphere, 17, 3593–3616,
15   https://doi.org/10.5194/tc-17-3593-2023, 2023.