Supplementary Information for

Ice shelf retreat decouples Piglet Glacier from the Pine Island catchment and amplifies dynamic mass loss

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This file includes:

Figs. S1 to S9

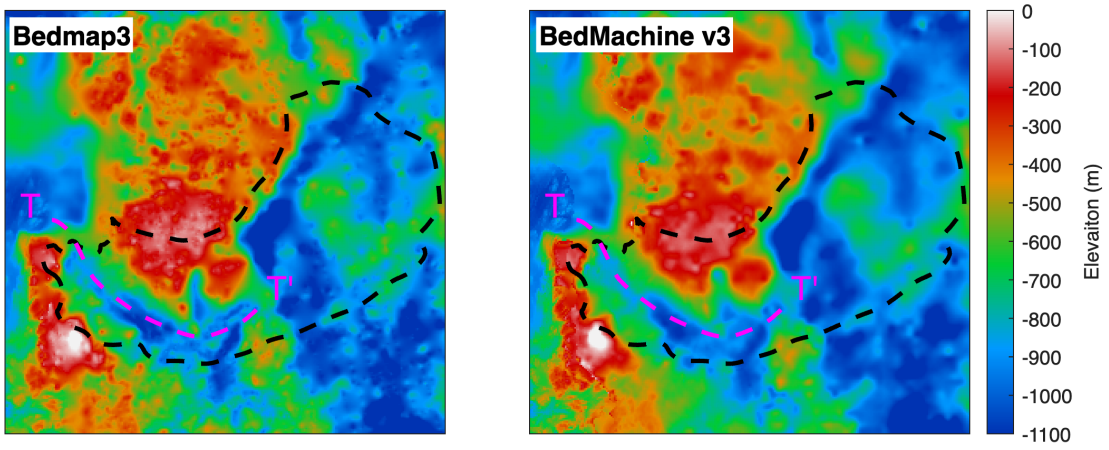

Fig. S1. Bedrock elevation of Piglet Glacier from Bedmap3 and BedMachine v3. The glacier boundary is outlined by a black dashed line, and the magenta dashed line marks the same transect shown in Fig. 1A.

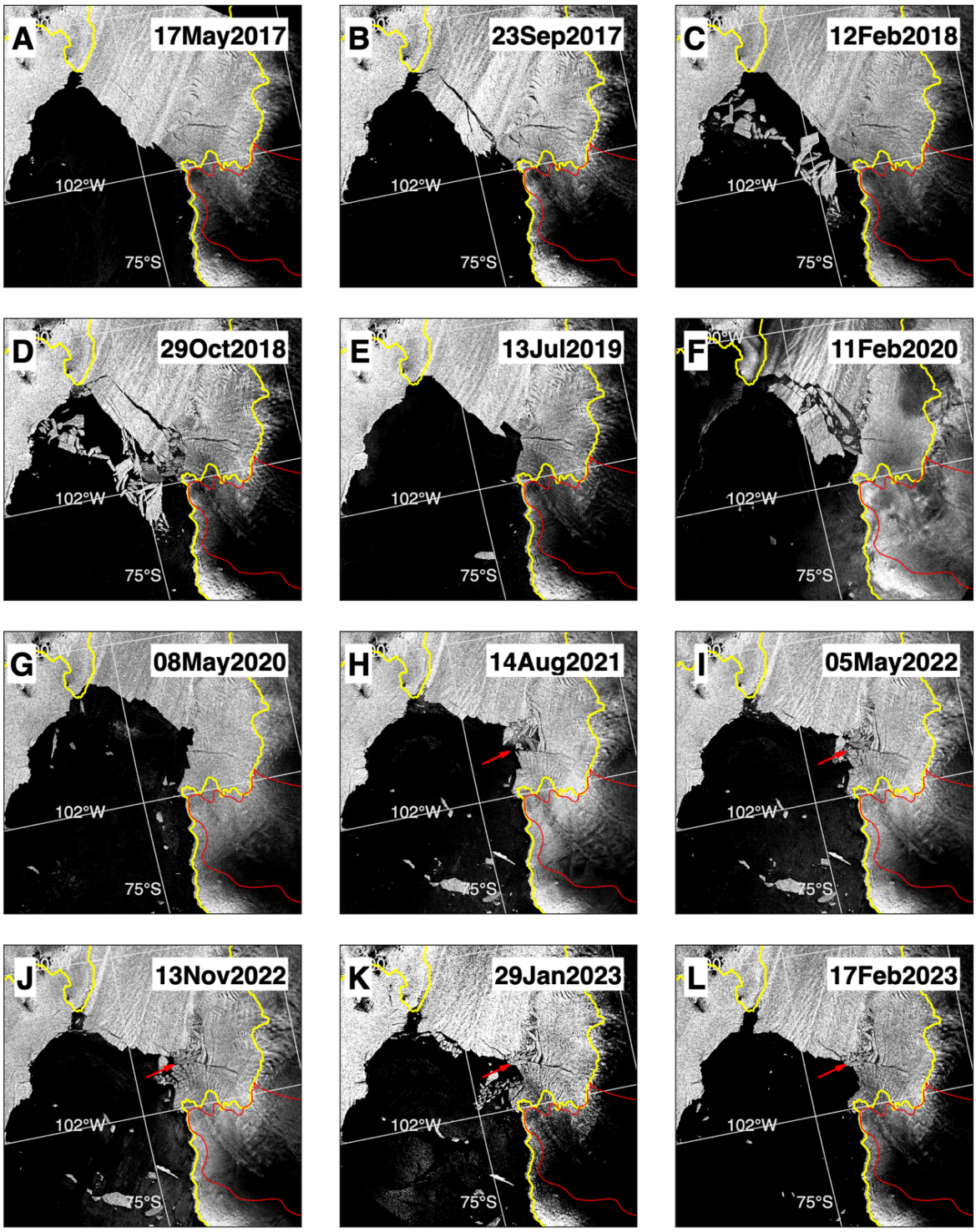

Fig. S2. Ice shelf collapse (A-G) and readvance (H-L) processes in the downstream areas of Pine Island and Piglet Glaciers identified by Sentinel-1 SAR GRD (Ground Range Detected) imagery. The yellow line marks the MOA2014 grounding line, and the red line marks the Piglet Glacier boundary.

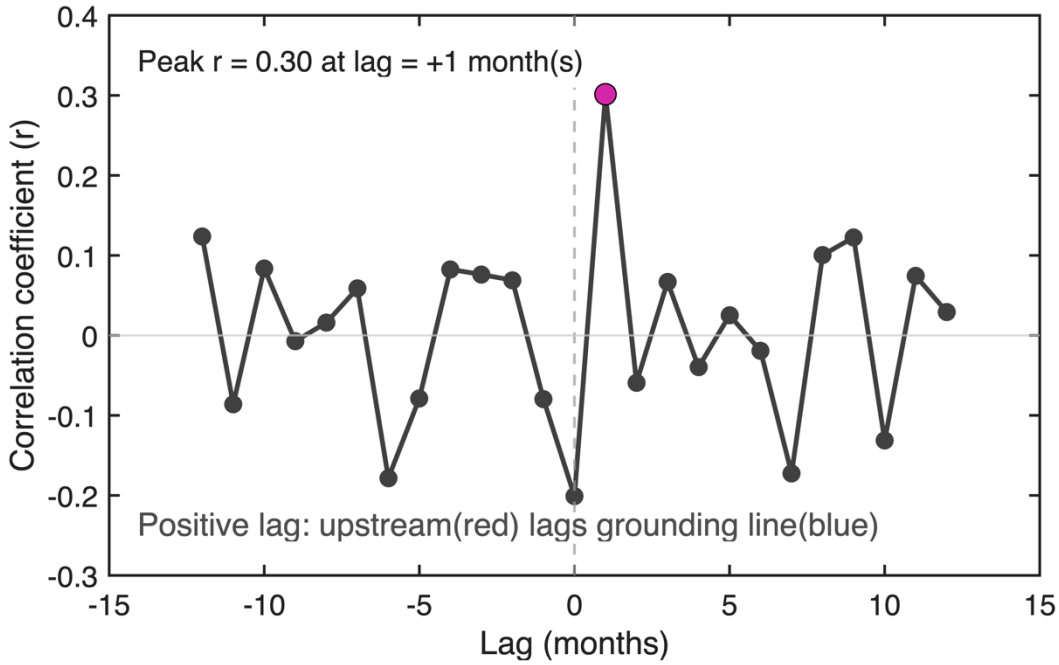

Fig. S3. Cross-correlation analysis of monthly velocity changes at two sites on Piglet Glacier, one near the grounding line and the other ~20 km inland.

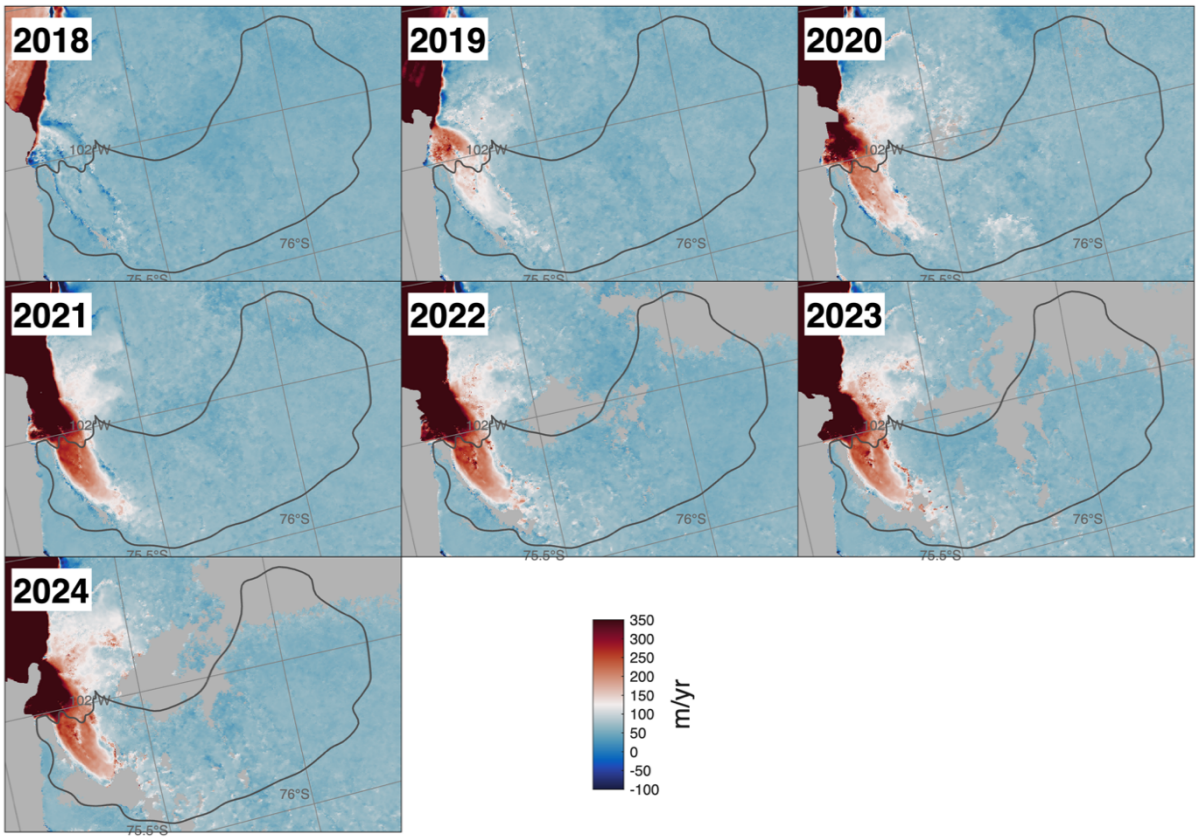

Fig. S4. Spatial distribution of ice velocity anomalies relative to the 2015-2017 mean. Pixels with no data are masked in gray.

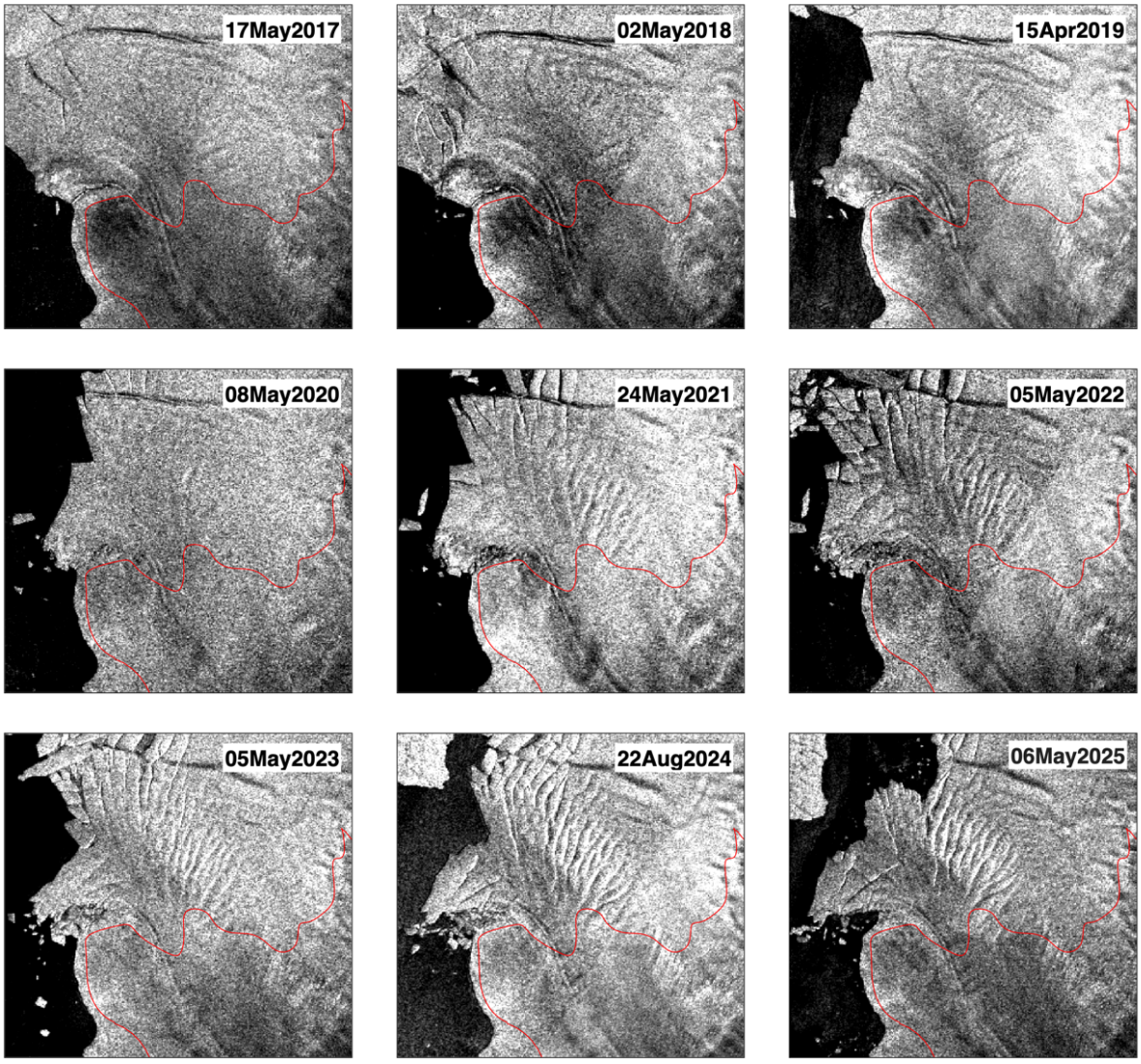

Fig. S5. Evolution of the ice tongue fractures in the downstream sector of Piglet Glacier from Sentinel-1 SAR GRD (Ground Range Detected) imagery. The red line marks the Piglet Glacier boundary.

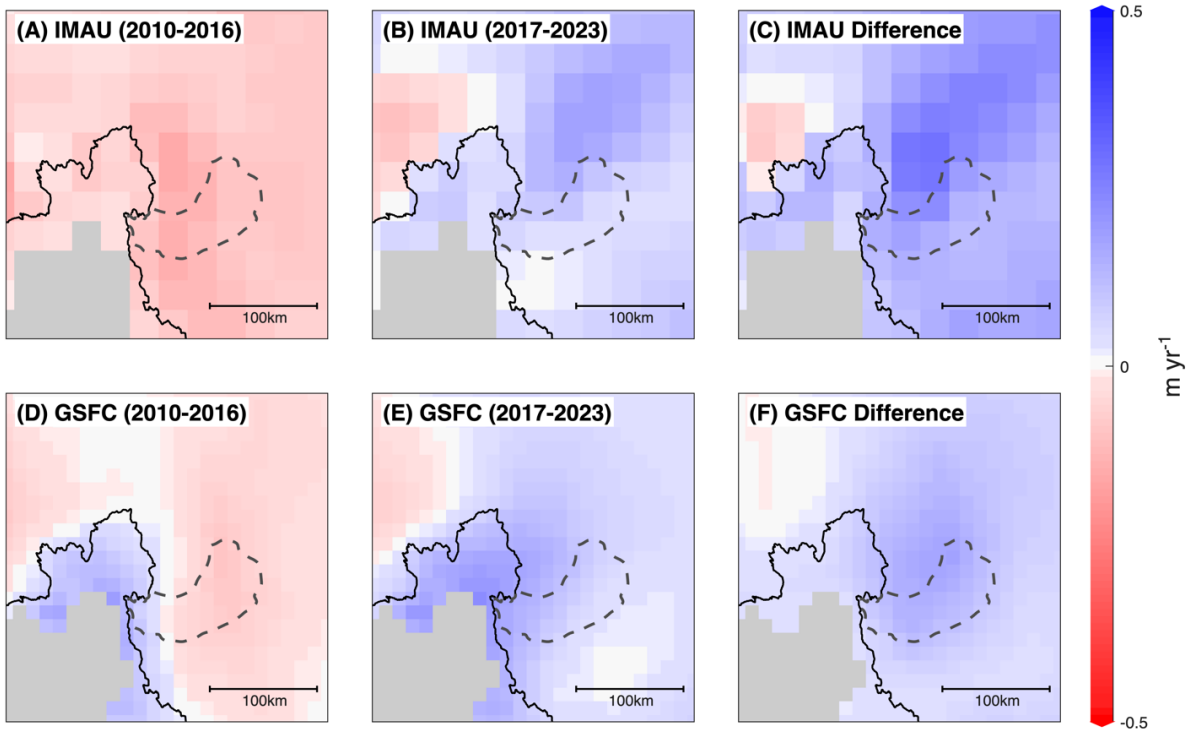

Fig. S6. Spatial trend maps of surface elevation change derived from the IMAU-FDM for 2010-2016 (A) and 2017-2023 (B), along with their difference (C; 2017-2023 minus 2010-2016). Panels (D-F) show the corresponding results from GSFC-FDM: 2010–2016 (D), 2017–2023 (E), and their difference (F). Solid black lines denote the grounding line, and dashed lines indicate the Piglet Glacier basin boundary. Pixels with no data are masked in gray.

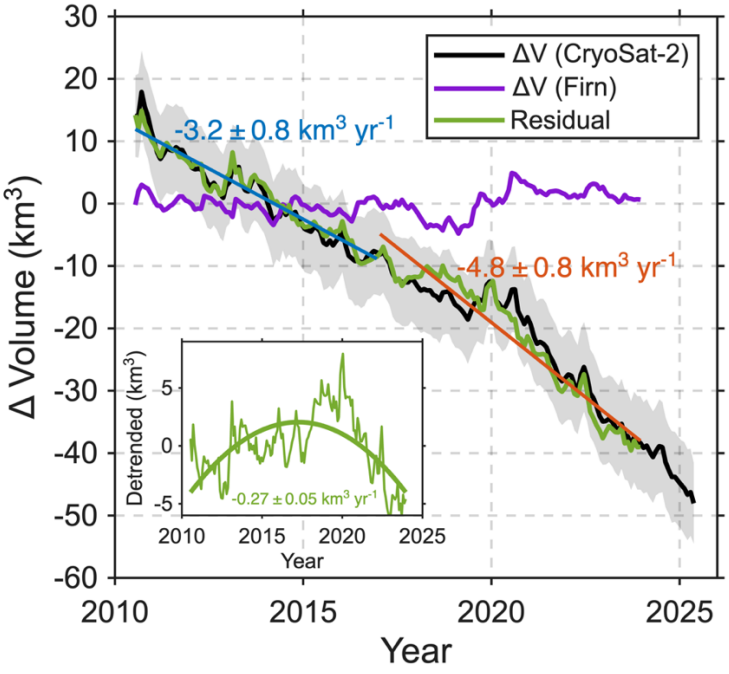

Fig. S7. Similar to Fig. 4F except for using the GSFC-FDM v1.2.1.

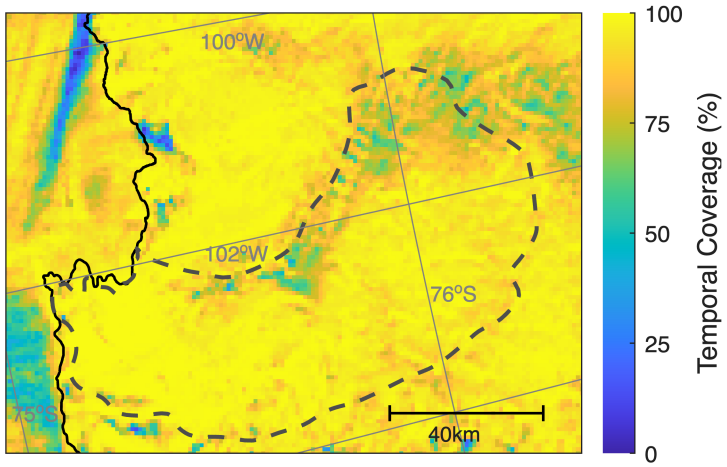

Fig. S8. Spatial distribution of CryoSat-2 swath-elevation coverage within the Piglet Glacier basin. For each 1 km grid cell, colors show the percentage of monthly epochs with valid observations relative to the full observation period. The dashed line marks the Piglet Glacier basin boundary, and the solid line denotes the MOA2014 grounding line.

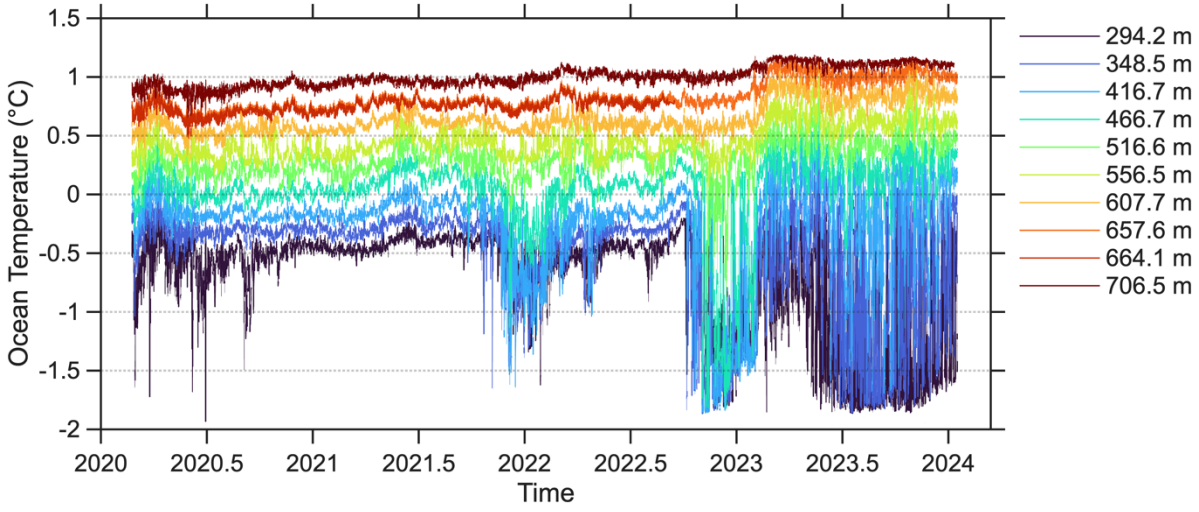

Fig. S9. Raw ocean-temperature time series from the PIG_S mooring near the northern flank of Piglet Glacier.