

Supplemental Information: Monitoring Shear-Zone Weakening in East Antarctic Outlet Glaciers through Differential InSAR Measurements

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Figures: S1, S2, S3, S4

Videos: Video S1.gif

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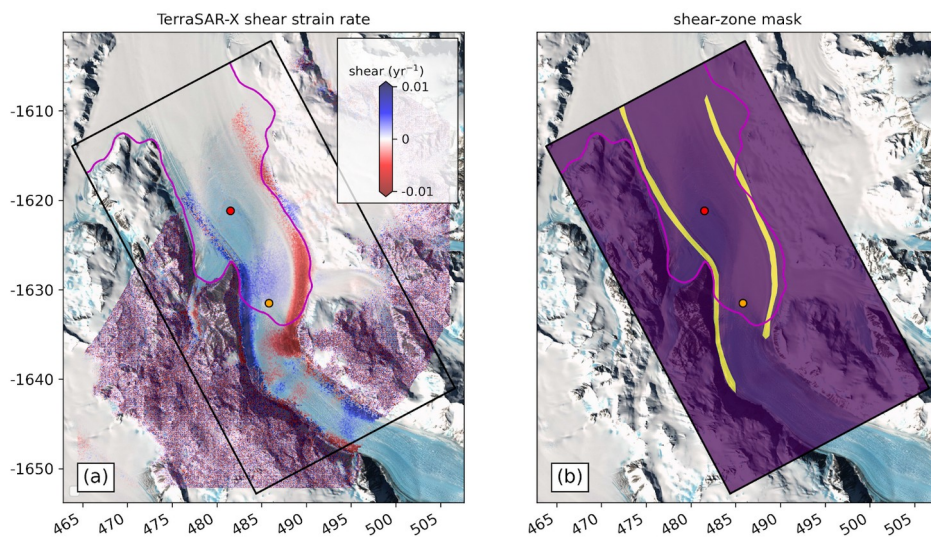
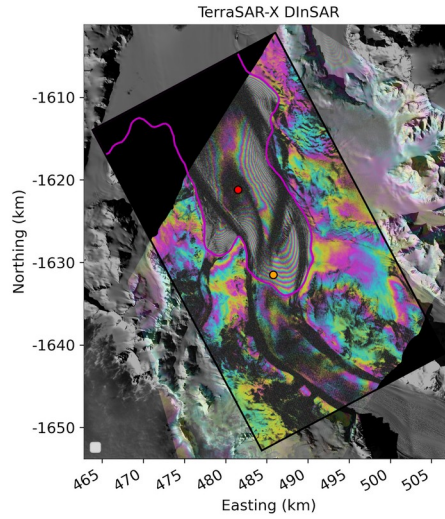


Figure S1: Shear strain rates in the grounding zone of the Priestley Glacier measured with TerraSAR-X data used to delineate lateral shear zones where the Young's modulus was systematically reduced from its surrounding value.



40 **Figure S2:** Double-differential interferogram obtained from TerraSAR-X for precise grounding line
determination along Priestley Glacier. The refined grounding line is subsequently employed for the
Local model. The map background displays contrast-stretched panchromatic Landsat-8 imagery. The
red dot marks the location of the Shirase GPS station on the freely-floating part of the ice shelf, the
orange dot marks the location of the Tuati GPS station within the tidal flexure zone.

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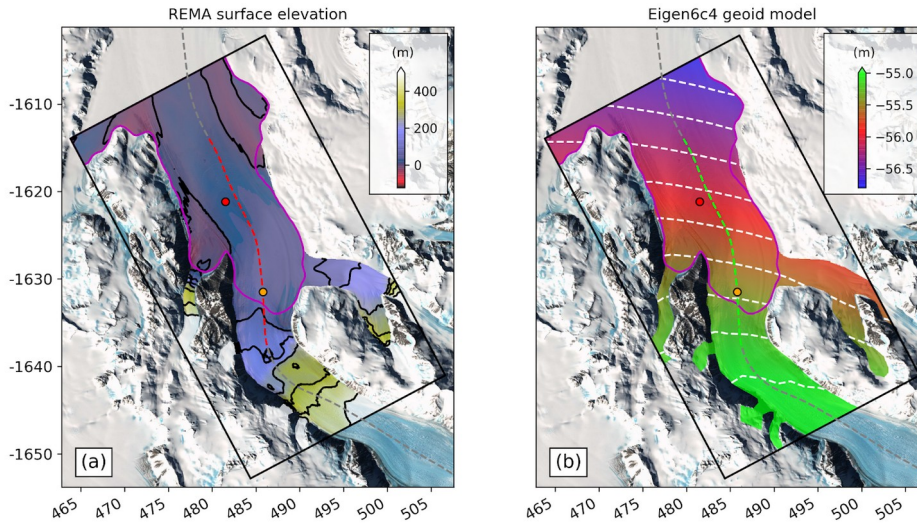


Figure S3: Ice-surface elevation is derived from the REMA digital elevation model, while sea-level height is determined using the Eigen6c4 geoid model, both referenced to the WGS-84 ellipsoid for freeboard calculations. In panel (a), black 80 m contours are depicted, while panel (b) shows dashed white 0.2 m contours. The dashed red and green lines correspond to the additional data presented in the IceBridge transect in Fig. A1. The purple line represents the grounding line location from TerraSAR-X DInSAR. The black rectangle outlines the modeling domain for Local model experiments.

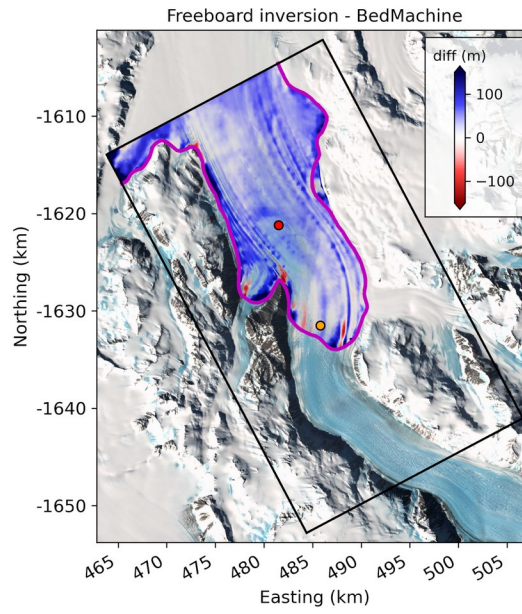


Figure S4: Difference between our updated ice thickness map based on the inversion of freeboard and the BedMachine ice thickness used in the Control model. Freeboard inversion gives thicker ice than in BedMachine which is expected because the hydrostatic equilibrium assumption is violated in the tidal flexure zone, where floating ice is not in hydrostatic equilibrium.