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Glacial sedimentation, fluxes and erosion rates associated with ice retreat in Petermann Fjord and Nares Strait, north-west Greenland

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S1. Drainage basins for glacial erosion rate calculations

In order to estimate glacial erosion rates for the Petermann Ice Stream and other Greenland outlet glaciers for comparison, the area of the glacier catchment or drainage basin area (A_{dr}) is required (see Equation 1 in the main text). For subglacial erosion to occur the ice sheet must be moving over the bed, i.e. ice cannot be frozen to the bed and, therefore, we exclude areas where ice velocities are <50 m a^{-1}. For Petermann and Jakobshavn glaciers, the erosion rates that we calculate are for a period during deglaciation. Thus, in the absence of ice-sheet velocities for a deglacial ice sheet (modelled or otherwise inferred), we utilise ice-sheet velocities from the modern Greenland Ice Sheet (GrIS) to define the drainage basin areas for these catchments. Modern GrIS velocities for the three glacier systems considered – Petermann (NW Greenland), Jakobshavn (W Greenland) and Kangerdlugssuaq (SE Greenland) - are from the MEaSUREs Greenland Ice Velocity: *Selected Glacier Site Velocity Maps from Optical Images, Version 2* dataset for 2017-2018 (Howat, 2017). In both catchments we extend the drainage basin to include the part of the fjord up to the fjord-mouth sill but now not occupied by ice (Supplementary Fig. S1a, b). The northern and southern boundaries of the Jakobshavn drainage basin were digitised from the Zwally et al. (2012) drainage system divides. For calculations for Kangerdlugssuaq Glacier, East Greenland, we have also modified the drainage basin area to only include areas not frozen to the bed, as discussed in the main text (Supplementary Fig. S1c).

References

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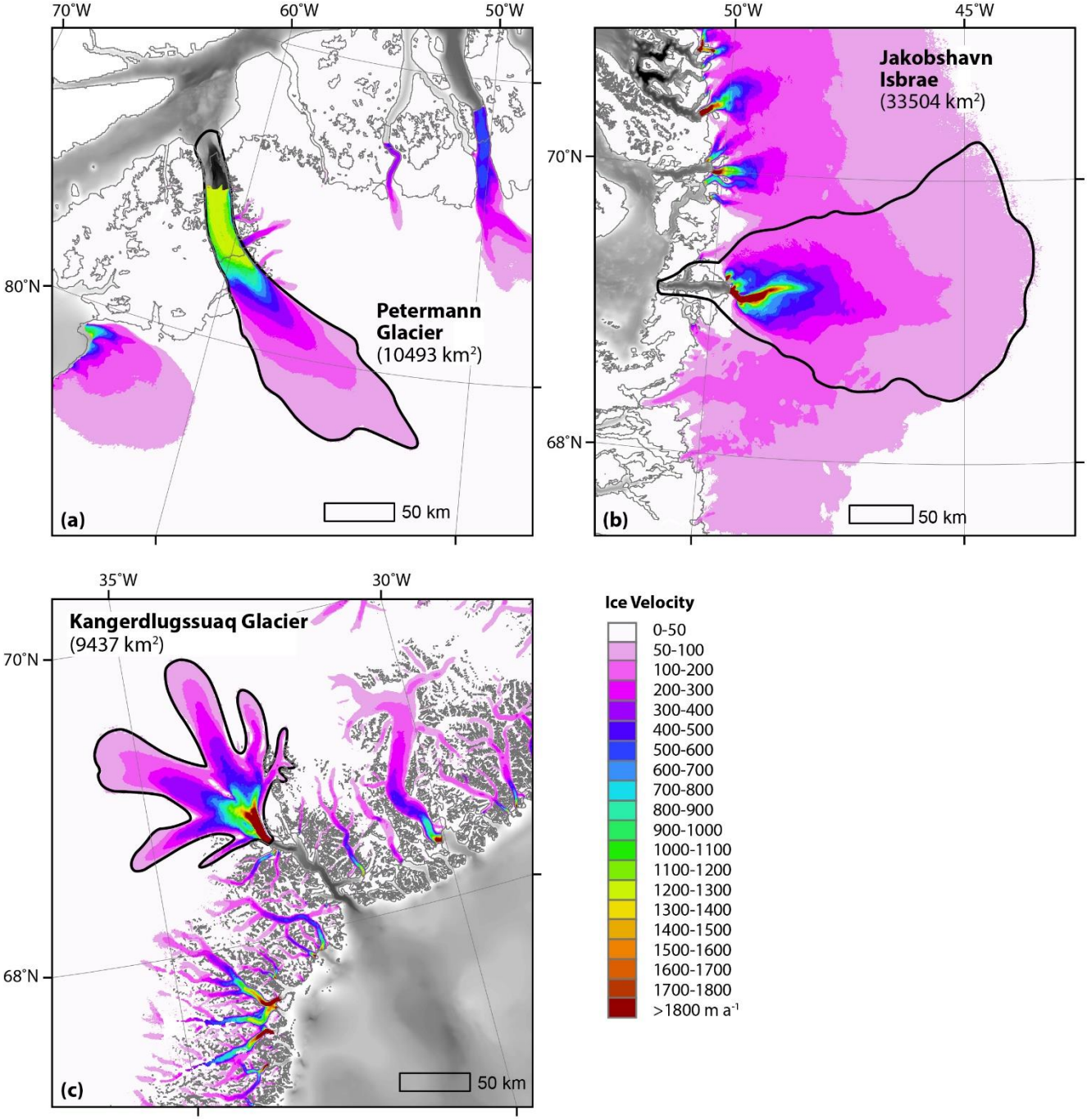

Supplementary Figure S1. Maps of Greenland outlet glaciers discussed in main text showing modern ice-sheet velocities (Howat, 2017) with drainage basins (black lines) and areas used in glacial erosion rate calculations for: (a) Petermann Glacier, Northwest Greenland; (b) Jakobshavn Isbrae, West Greenland; (c) Kangerdlugssuaq Glacier, East Greenland.