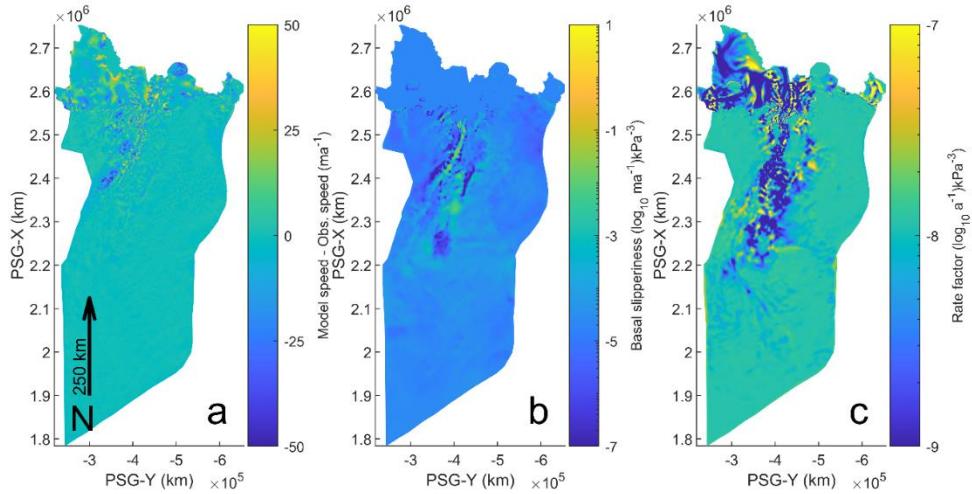
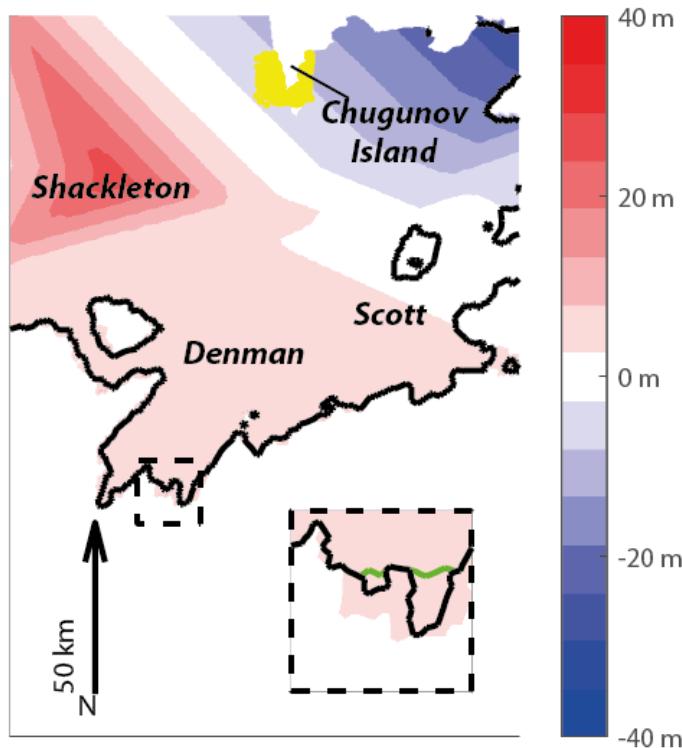
Supplementary figure 1: Resurs – KATE-200 image of Denman Glacier taken on September 23rd 1984 showing Denman's last major calving event. The image preview was obtained from the Australian Antarctic Data Centre – Satellite Image Catalogue, but we could not access the full resolution image. https://data.aad.gov.au/aadc/satellite/display_image.cfm?image_id=354

Supplementary figure 2 - Model validation and inverted parameters: a) model speed minus 2009 observations, b) basal slipperiness, *C*, and *c)* rate factor, *A*.

Supplementary figure 3 - Ice geometry perturbation summary: Ice geometry is perturbed in three ways; i) ice shelf thickness change (colours, with red, positive values showing where present day ice thickness has been increased to recreate the 1972 ice geometry), ii) grounding line migration (inset, where the present day grounding line (black) has been advanced 10 km to a location representing its estimated 1972 position) and iii) grounding of floating ice on the Chugonov island pinning point (yellow area).