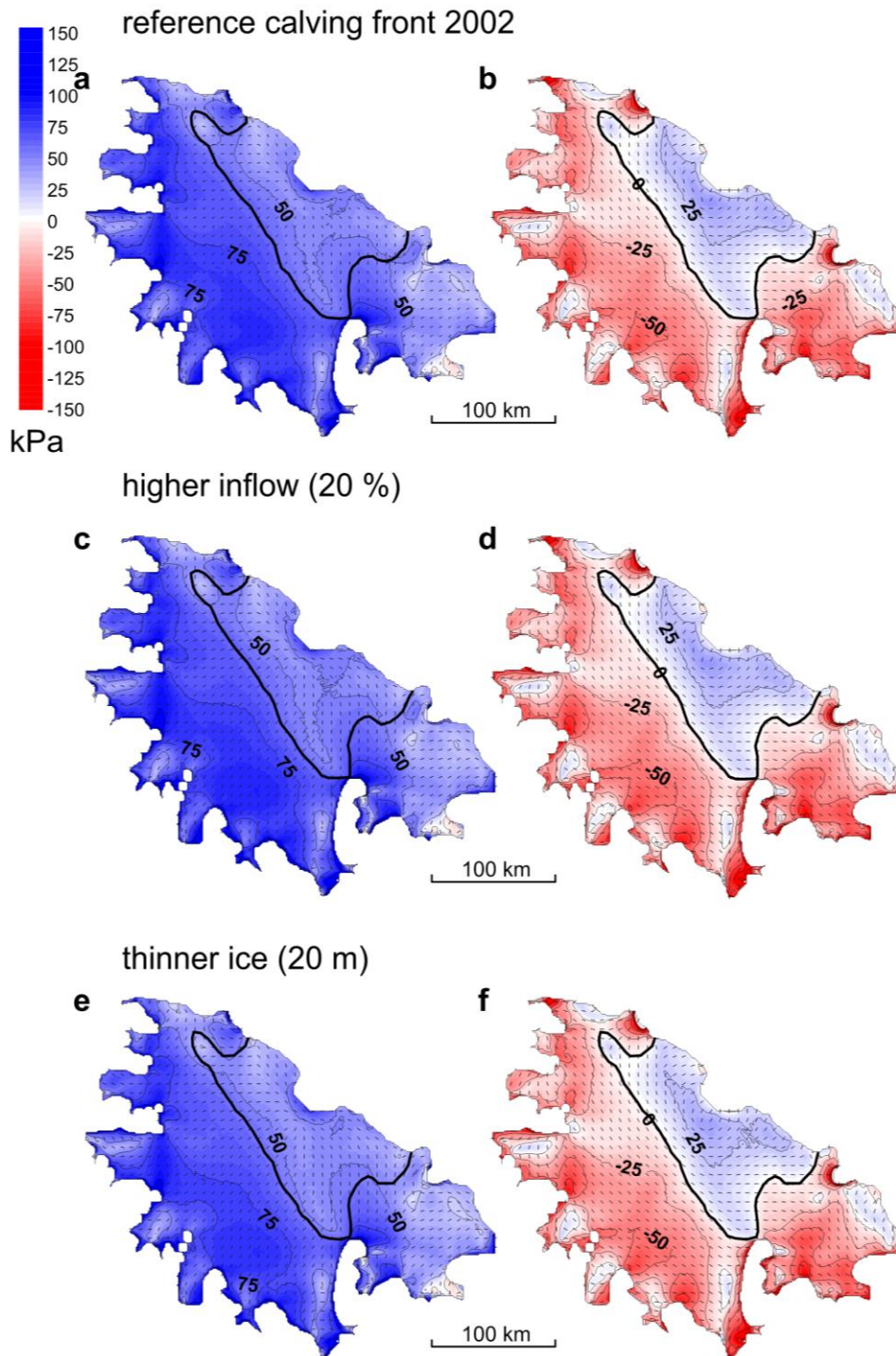
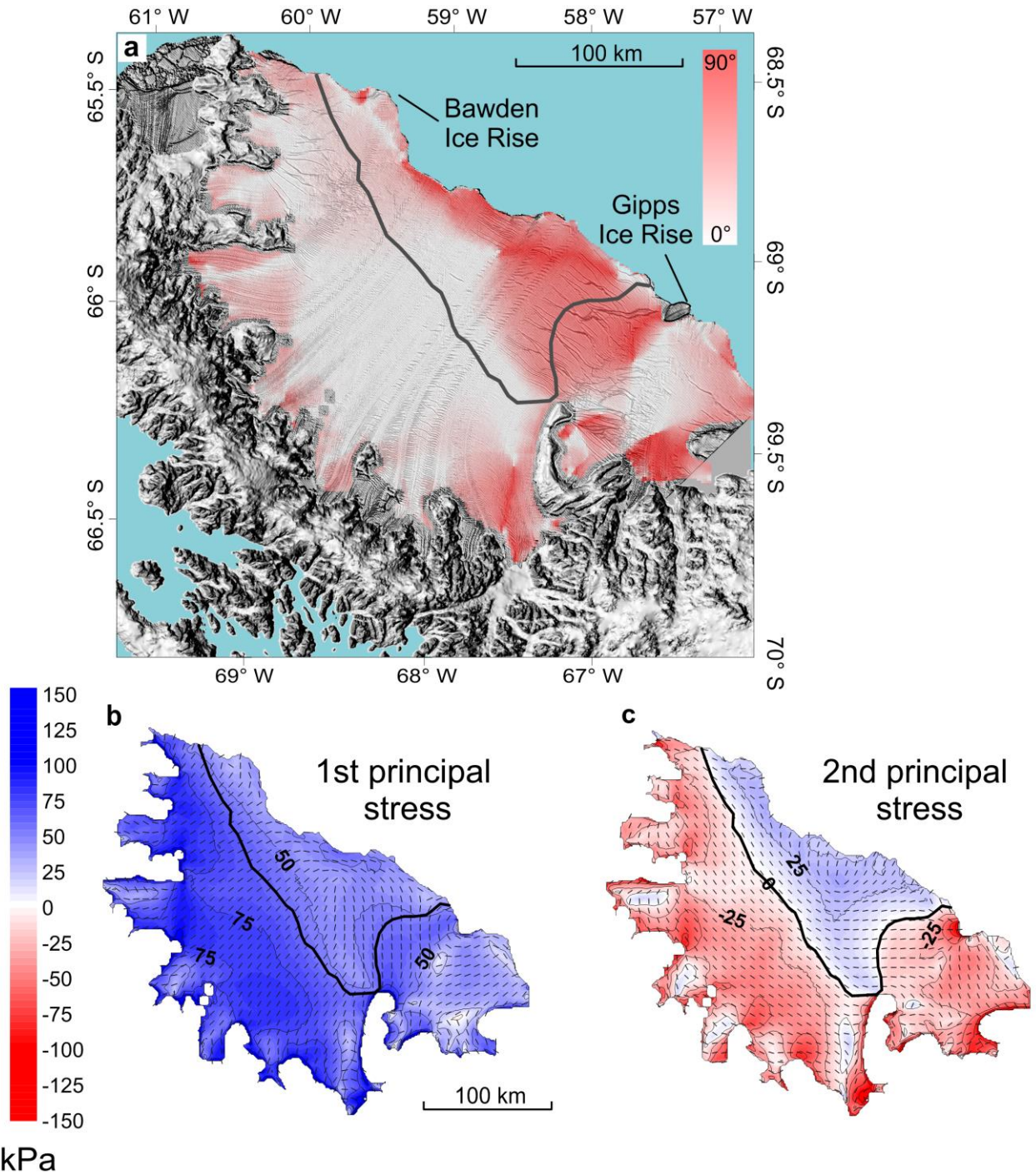


Supplementary Figure 1 | Principal stress fields and stress-flow angles calculated from observed velocity data. Aster-GDEM derived DEM [<http://nsidc.org/data/docs/agdc/nsidc0516-cook/>] is superposed on a 2008 MODIS Mosaic of Antarctica (MOA) image of Larsen C ice shelf [<https://earthdata.nasa.gov/data/near-real-time-data/rapid-response/>]. (a) Stress-flow angle distribution. Part of the Churchill-Peninsula derived suture zone is obscured by clouds. (b) Magnitude (colours) and direction (grey dashes) of first principal stresses. (c) Magnitude (colours) and direction (grey dashes) of second principal stresses.



Supplementary Figure 2 | Principal stress fields for three representative model sensitivity experiments. All images use Larsen C's 2002 geometry prior to a large tabular calving event; compare with 2008 post-calving results in Fig. 2 in main article. Colours and grey dashes represent respectively stress magnitudes and directions, and compressive arches are marked by thick solid lines. (a) First principal stresses. (b) Second principal stresses. (c) First principal stresses for 20% higher inflow velocities of the feeding glaciers. (d) Second principal stresses for 20% higher inflow velocities of the feeding glaciers. (e) First principal stresses for a Larsen C ice shelf thinner by 20m. (f) Second principal stresses for a Larsen C ice shelf thinner by 20m.



Supplementary Figure 3 | Principal stress fields and stress-flow angles for a hypothetical retreat from Bawden ice rise. Calculations use modelled flow-velocity data for Larsen C ice shelf. Aster-GDEM derived DEM [<http://nsidc.org/data/docs/agdc/nsidc0516-cook/>] is superposed on a 2008 MODIS image [<https://earthdata.nasa.gov/data/near-real-time-data/rapid-response>]. Compare with Fig. 2 in main article. Thick solid lines mark the location of the compressive arch. **a**, Stress-flow angle distribution. Part of the Churchill-Peninsula derived suture zone is obscured by clouds. The solid grey lines indicate the compressive arch. **b**, Magnitude (colours) and direction (grey dashes) of first principal stresses. **c**, Magnitude (colours) and direction (grey dashes) of second principal stresses.