Supporting Information for "Modelling the Greenland Ice Sheet's committed contribution to sea level during the 21st Century"

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Text S1. In order to test the impact of using the shallow-shelf approximation (SSA, ?, ?) on the response to retreat perturbations, we ran a small selection of the ensemble experiments using high-order physics (?, ?, ?). SSA neglects vertical shear stress and therefore can only represent ice flow due to basal sliding and not internal deformation, whereas higher-order models include longitudinal stresses as well as components of vertical shear stress. Firstly, we re-ran the initialisation procedure using the higher-order model configuration in ISSM (?, ?). We used 5 vertical layers, which has been shown to be adequate for solving the higher-order stress balance equations without the thermal model activated (?, ?). We then repeated three of the SSA ensemble members using the higher-order set up: the central member obtained directly from the initialisation process and the two friction end members (where the friction coefficient is 50% higher or lower than the field derived from the inversion). Both the perturbed simulation, where 2007-2015 terminus positions are imposed, and control simulation were run for each of the three ensemble members. The difference in the response to the retreat perturbations (i.e. perturbed - control or the "dynamic committed sea level rise") between the SSA and higher-order simulations can be seen in Figure **??**.

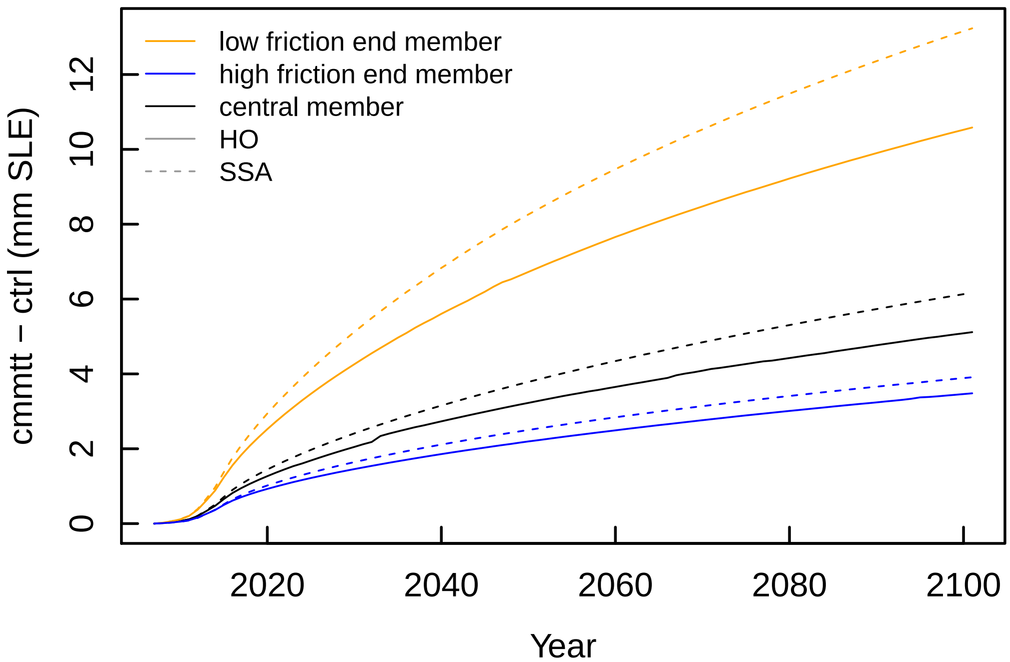

Figure S1. Dynamic committed sea level rise from the higher-order (solid curves) and shallow-shelf approximation (dashed curves) experiments for select ensemble members: the central member from the inversion (black curves) and the high (blue) and low (orange) friction end-members.

Table S1. Summary of ensemble data: parameter sampling information, calibration weights and committed sea level change (January 2007 - December 2100) for the central member (A0000), eight end members (A0001-A0008) and the 128 members sampled using the Latin hypercube (A1000-A1127). Total committed sea level change refers to the sea level contribution, in mm sea level equivalent, from the retreat perturbation simulations, and the dynamic committed sea level change is the contribution after the corresponding control simulation is removed and therefore is directly caused by the retreat perturbations. Please refer to main article for information about parameter sampling and calibration weights.