EGU22-4904
https://doi.org/10.5194/egusphere-egu22-4904
EGU General Assembly 2022

The effects of rheological parameters on ice-shelf flow on centennial time scales.

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On timescales longer than several months, ice flow is treated as a non-Newtonian fluid, which viscosity depends on the second invariant of the strain-rate tensor and the temperature-dependent ice-stiffness parameter. This power-law dependence is known as Glen's flow law. Although results of laboratory experiments and inferences from *in situ* observations suggest a range of the power-law exponent n from 1 to 5, the value of 3 is widely used. In studies focused on ice-shelf dynamics, the traditional approach is to use remote-sensing observations to infer the ice-stiffness parameter by means of inverse methods assuming a constant value of n=3. Focusing on the floating tongue of Pine Island Glacier, the inversions of the ice-stiffness parameter are performed for various constant as well as spatially variable values of n using present-day observations. Using the inferred parameters and basal melting derived from remote-sensing observations, the Pine Island Glacier Ice Shelf flow is simulated for hundred years. Results of simulations indicate that the effects of rheological parameters are of the order of 5%. The difference between results of hundred years simulations with observationally derived and spatially uniform basal melting are of the order of 40%. These results indicate that on centennial timescales the ice-shelf flow is more sensitive to details of basal melting than to rheological parameters, provided the latter are constrained by observations.