Calibrated prediction of future Pine Island Glacier behaviour

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We present a calibrated prediction of the long term future behaviour of Pine Island Glacier (PIG) in West Antarctica. A grounding-line capable flowline model is used, incorporating "L1L2" physics and a parameterisation to represent ice shelf buttressing. Ice shelf basal melt is parameterised using ocean temperature. A large ensemble of simulations is carried out over recent decades, varying both initial conditions and forcing fields within plausible limits. This includes varying bedrock geometry due to sparse observations. A subset consisting of the "best" members of this ensemble (i.e. whose discrepancies with observed PIG thinning rates and ice velocity changes are small) is integrated forward for tens of thousands of years to provide an envelope of predicted long term future behaviours of the PIG. The required long term ocean temperatures and snow accumulation rates are prescribed, and sensitivity to uncertainty in these forcing fields is investigated. In particular we establish whether the flowline model predicts large scale retreat of the PIG grounding line under current conditions, and how sensitive such retreat is to changing ocean temperatures.