



Sensitivity experiments with a one-dimensional coupled plume – ice flow model

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Over the past two decades net mass loss from the Greenland ice sheet quadrupled, caused by enhanced surface melting and speedup of the marine-terminating outlet glaciers. This speedup has been related, among other factors, to enhanced submarine melting, which in turn is caused by warming of the surrounding ocean and by increased subglacial discharge. For the future and recent mass balance changes of the Greenland Ice Sheet, ice-ocean processes potentially play an important role, yet they are not properly represented in contemporary Greenland Ice Sheet models.

In this work we performed numerical experiments with a one-dimensional plume model coupled to a one-dimensional model of outlet glacier. We investigate the response of a coupled ice-flow plume model to possible outcomes of climate change. In particular, we examine the transient and equilibrium response of the outlet glaciers to changes in ocean temperature and subglacial discharge which affects both: glacier geometry and submarine melt rates.