



Parameterising the grounding line in ice sheet models

Rupert Gladstone, Tony Payne, Vicky Lee, and Stephen Cornford
University of Bristol, UK (r.gladstone@bristol.ac.uk)

In order to make model-based predictions regarding the behaviour of marine ice sheets, the models must be able to represent grounding line migration. Fixed grid ice sheet models have recently been shown to exhibit inconsistent and hence unreliable grounding line migration behaviour. In this study we present several different approaches to parameterising the grounding line, distinguished by choices regarding the ice thickness profile from the last grounded to the first floating grid point, and how this profile is allowed to impact on the forcing terms driving stress and basal drag. We demonstrate that the most obvious choice of thickness parameterisation, linear interpolation from the last grounded to the first floating grid point, is not the most effective. We show that at a model resolution of 2.4km the choice of a better grounding line parameterisation can bring greater improvements in terms of both accuracy and more self consistent behaviour than halving the grid resolution. The parameterisations are presented in the context of a 1D shelfy-stream flowline model, but could be extended to cope with more than one dimension and other model formulations.