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Elmer/Ice results on the CalvingMIPintercomparison project using a level-set function

Cruz Garcia-Molina, Fabien Gillet-Chaulet, Mondher Chekki, Gael Durand, Olivier Gagliardini, and Nicolas Jourdain
Univ. Grenoble Alpes, CNRS, INRAE, IRD, Grenoble INP*, IGE, 38000 Grenoble, France *Institute of Engineering and Management Univ. Grenoble Alpes

Ice-calving plays a major role in the mass balance of the water-ending glaciers. Thus, it is crucial to have a well-adapted calving law for simulations over long periods. Due to its dependence on several physical parameters, this phenomenon is usually poorly parametrized in long-term numerical simulations. A worldwide model intercomparison project on ice damage and calving, CalvingMIP (see https://github.com/JRowanJordan/CalvingMIP/wiki), is proposed as part of the European project, PROTECT. The CalvingMIP project aims to evaluate the uncertainties in modelling the ice and to provide recommendations to improve the calving laws in the ice-sheet models. This intercomparison project consists of five experiments using two topographic profiles: a hill and Thule bathymetry. For the first phase, a steady-state configuration is implemented for a fixed calving position. In the second phase: the front velocity is prescribed, forcing the front to advance and, then, to retreat. Finally, the last experiment aims to test a realistic calving law. We study the experiments of this configuration by using the community finite element code, Elmer/Ice (see http://elmerice.elmerfem.org/). We study the front evolution using a level-set function (φ), defined as a signed distance to the front. Here, we present the results obtained with our model for this intercomparison experiment, discuss the sensitivity to different physical and numerical parameters, and its application to a realistic configuration.