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Drivers of drivers of ongoing changes in the ice flow of Antartica

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The largest uncertainty in future sea-level rise projections is the contribution from the land ice stored in Antarctica and Greenland. In Antarctica, floating ice shelves restrain the flow of grounded ice upstream and thinning of ice shelves can reduce this effect, increasing the grounded-ice discharge and consequent rise in global sea level. Here, we use a numerical ice-flow model to calculate the changes in ice flow on a continental scale due to ice shelf thinning. We discuss some technical aspects of this approach and some potential pitfalls. We present estimates of upstream impacts on ice flow velocity and compare those with observations. A large part of the recent increase in grounded-ice flux from the West Antarctic Ice Sheet to a direct mechanical response to thinning of ice shelves.