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Using control methods to evaluate the effect of unpinning on the Roi Baudouin Ice shelf, East Antarctica

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Numerous seamounts emerge from the edge of the Continental Shelf in Dronning Maud Lands. Those features translate into pinning points when they attach to the otherwise freely floating ice shelves from beneath, leading to buttressing and ice shelf stability. The observed thinning of ice shelves, enhanced through Circumpolar Deep Water incursions across the shelf makes pinning points lose their contact, hence increase ice flow speed. Here, we study the effects of de-pinning on the Roi Baudouin Ice Shelf (RBIS), which is currently buttressed through a small pinning point that has a large effect on the ice dynamics.

A control method is used to infer the viscosity pattern from a very high resolution (50 m) InSAR flow-field. The surface elevation from which is deduced the thickness stems from a DEM which was produced from local data at the same resolution. The background model is based on the Shallow Shelf Approximation. Using the inferred viscosity pattern, the contact between the pinning point and the ice shelf is removed and the instantaneous effect on the ice flow field investigated.