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Glacial uplift: fluid injection beneath an elastic sheet on a poroelastic substrate JEROME NEUFELD, DUNCAN HEWITT, University of Cambridge, GREG CHINI, University of New Hampshire — Supraglacial lakes can drain to the base of glaciers extremely rapidly, causing localised uplift of the surrounding glacier and affecting its sliding velocity. The means by which large volumes of drained water interact with and leak into the subglacial hydrological system is unclear, as is the role of the basal till. A theoretical study of the spread of fluid injected below an elastic sheet (the ice) is presented, where the ice lies above, and initially compresses, a deformable poroelastic layer. As pressurized fluid is injected, the deformable layer swells to accommodate more fluid. If sufficient fluid is injected, a 'blister of fluid forms above the layer, causing the overburden to lift off the base. The flow is controlled by the local pressure drop across the tip of this blister, which depends subtly on both the flow of fluid through the porous layer below the tip, and on poroelastic deformation in the till ahead of the tip. The spreading behaviour and dependence on key parameters is analysed. Predictions of the model are compared to field measurements of uplift from draining glacial lakes in Greenland.

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