

TITLE: A Fuel Injected Ice Stream? Melt Water Drainage from Saturated Crevasses into the Jakobshavn Isbræ Shear Margins

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ABSTRACT

Recent estimates show that Greenland's contribution to sea level more than doubled in the past decade. Coincident with the changes in flow dynamics on Jakobshavn is an increase in surface melt accompanied by the proliferation of surface lakes which rapidly drain due to hydrofracture or through moulins along the margins of the Greenland Ice Sheet. Though the importance of supraglacial lake hydraulics and its impact on ice sheet mass balance is a subject of contemporary investigations, much of the focus has been on larger lakes outside the main trunk of Jakobshavn. We have recently documented surface melt water infiltration due to drainage from water-filled crevasses 'saturated crevasses' within the shear margins of Jakobshavn Isbræ. Estimates on potential drainage volume from the largest crevasse system are $\sim 9.23 \times 10^{-3} \text{ km}^3 \pm 2.15 \times 10^{-8} \text{ km}^3$ and $\sim 4.92 \times 10^{-2} \text{ km}^3 \pm 3.58 \times 10^{-8} \text{ km}^3$ respectively over a 16-day interval. Drainage from these structures has implications for ice mass contribution by Jakobshavn to the ocean as well as basin-scale ice mass flux.