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Laboratory investigations of granular and hydrodynamic processes in tidewater glacial fjords[1] MAC CATHLES, Michigan Society of Fellows, University of Michigan, OLUWATOYIN THOMPSON, JUSTIN BURTON, Department of Physics, Emory University — Accelerated warming in the past few decades has led to a dramatic increase in glacial activity. This is perhaps most apparent in tidewater glacial fjords, where gravitational flows from ice sheets are focused into narrow channels of thick, fast-flowing ice which terminate into the ocean. The result is a complex system involving both melting and iceberg calving which has a direct impact on the Earths climate and sea level rise. However, there are numerous inherent difficulties in collecting field data from remote, ice-choked fjords. To address this, we use a laboratory scale model to measure aspects of tidewater glaciers which are not observable in nature. Our model has helped to uncover the source of glacial earthquakes, where floating, cubic-kilometer scaled icebergs capsize due to gravitational instability, and temporarily reverse the velocity of the glacier. In addition, we use our model to address two other important components of tidewater glaciers involving a granular ice mélange which applies stresses on the glacier, and the role of iceberg capsize in disrupting the stratified heat transport at the glacier's terminus.

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