Abstract Submitted
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Laboratory experiments investigating the influence of fjord circulation on submarine melting of Greenland's Glaciers[1] CLAUDIA CENEDESE, Woods Hole Oceanographic Institution — A set of idealized laboratory experiments investigates the ice-ocean boundary dynamics near a vertical "glacier" (i.e. no floating ice tongue) in a two-layer stratified fluid, representative of Sermilik Fjord where Helheim Glacier terminates. Two fjord circulations are compared to a control experiment with no forced flow. The estuarine circulation is generated by introducing fresh water at melting temperatures from a source at the water free surface near the ice block representing the glacier. The wind driven circulation is generated by vertically displacing a solid block at the end of the tank opposite the ice block, mimicking the observed fjord circulation driven by wind events. The magnitude of both circulations can be systematically varied. The circulation pattern observed in the control and estuarine experiments is similar to those observed in previous studies. A thin boundary layer of cold melt water mixes with ambient waters and rises until it finds either the interface between the two layers, if in the bottom layer, or the free surface, if in the top layer. The results suggest that the melt water mainly deposits within the interior of the water column and not entirely at the free surface, as confirmed by field observations. In the wind driven experiments, the submarine melting of the glacier is enhanced and it increases with increasing wind frequency, suggesting that this circulation is more efficient in transporting heat to the glacier.

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