Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Enhanced submarine melting of glaciers due to the effect of sediments on subglacial discharge plumes[1] CLAUDIA CENEDESE, Woods Hole Oceanographic Institution, CRAIG MCCONNOCHIE, University of Canterbury, JIM MCELWAINE, Durham University — Recent studies suggest that marine terminating glacier faces melt at particularly high rates where subglacial discharge plumes are present. These subglacial discharge plumes have high sediment concentrations, as revealed by the surface expression of some of them, yet the impact of suspended sediment on the plume dynamics and the melting has, until now, been overlooked. Recent laboratory experiments and Direct Numerical Simulations (DNS) suggest that the sediment load could have an important and complex effect on the plume dynamics and thus the melting of the ice face. In particular, dilute concentrations of small and dense particles can increase the entrainment of ambient waters into the plume as much as 50%, leading to a 50% increase in the melt rate. In these experiments and simulations, the settling velocity of the particles is smaller than and in the opposite direction to the plume velocity at all heights and particle inertial clustering, leading to convective instability in the fluid, is thought to be the mechanism responsible for the enhanced entrainment.

[1]NSF OCE-1658079

Claudia Cenedese
Woods Hole Oceanographic Institution

Date submitted: 01 Aug 2019 Electronic form version 1.4