

Solid Earth Physics Seminar, Harvard University

Tuesday, 28 July 2015, 1:15 pm

Faculty Lounge, 4th Floor, Hoffman Lab, 20 Oxford Street

***Layers, ripples and channels: shocks
and surprises with ice-ocean interaction***

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Abstract:

Understanding the interactions between ocean heat transport and ice sheet dynamics remains a significant challenge, with implications for projecting future sea level rise. Melting of submerged marine glacier snouts and floating glacial ice shelves modify ice geometry and impacts the dynamics of ice sheet discharge. The melting rates of submerged ice faces are strongly moderated by ocean flow and turbulence near to the ice face. This talk will explore several feedbacks between glacial melting and the buoyancy-driven flow of fresh meltwater rising through the ocean along the ice face. I will first consider how the ocean stratification can control the dynamics of rising meltwater plumes, before looking at intrinsic feedbacks between meltwater-plume dynamics and the evolving slope of an ice shelf. A range of patterns can form from this coupling between melting ice and ocean flow, including ocean layers and the development of ripples and channels in an ice shelf base. Simple scaling laws are determined to capture the resulting dynamics, which may prove useful as a parameterisation of glacial melting in larger scale models.