

Modeling glacial hydrology: implications for submarine melt water discharge

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The distribution and timing of melt water discharged from beneath grounded ice has a potentially important influence on ice-ocean interactions. I will give an overview of established theories of subglacial hydrology, and discuss the possible structure of the drainage system beneath outlet glaciers in Greenland.

The seasonal melting cycle, penetration of surface water to the base of the ice sheet, and observations of hydraulically controlled sliding, have led to a general suggestion that the drainage system near the margins of the Greenland ice sheet may behave similarly to alpine glaciers; with drainage occurring through distributed sediments and linked-cavities as well as, potentially, through isolated channels.

If channels exist beneath outlet glaciers, they may provide a very localized source of fresh water that drives submarine melting and exerts a strong control on the shape of the ice front. I will discuss the likely structure of the drainage system close to the grounding line, where the adjustment to hydrostatic pressure is likely to cause an expansion of channel cross-section and a wider distribution of melt water discharge.