Subglacial plumes: dynamics, supercooling and frazil-ice formation.

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The continent of Antarctica is ringed by a series of floating ice shelves along a significant section of its coastline. Ice shelves are an environment where glacial ice interacts directly with the ocean. They can also exert an upstream influence on continental ice sheets. Thus warming oceans might affect continental ice, and hence sea-level change, over the coming centuries.

Subglacial plumes fed by meltwater rise buoyantly along the underside of the ice shelves. We discuss the dynamics of such plumes, which can be affected by buoyancy, drag, entrainment and melting. Ice shelves can be a kilometre below sea level, a depth range which is associated with significant variation in the pressure-dependent freezing point of saltwater. This means that plumes can become supercooled, that is, their temperature can fall beneath the *in situ* freezing point. This can trigger the formation of frazil ice, small crystals suspended in the turbulent plume. We discuss the role of frazil-ice formation in affecting the dynamics of plumes and show that the behaviour of frazil can affect whether a plume intrudes at depth or reaches the end of the ice shelf.

Reference:

D. W. Rees Jones & A. J. Wells, 2018. The impact of crystal growth on frazil-ice dynamics. *The Cryosphere,* 12, 25–38, doi:10.5194/tc-12-25-2018.