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Ice Shelf Water plumes and frazil ice modelling

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Results are presented from a modelling study of various aspects of Ice Shelf Water (ISW) plumes. Buoyant ISW plumes form near the grounding line of ice shelves due to ice melt and, due to the pressure variation of seawater's freezing temperature, become supercooled as they ascend along the underside of an ice shelf. Frazil crystals form and multiply in the supercooled ISW. As the frazil crystals are buoyant, they can precipitate onto the ice shelf base to form marine ice. In a one-dimensional (vertical) section through an ISW plume, a novel formulation of ice crystal precipitation allows a closer examination of the vertical balance of forces governing frazil deposition, and the effect of depth-dependent supercooling within the plume is also examined. Results from a depth-averaged model in a two-dimensional horizontal plane emphasise the importance of Coriolis effects on ISW plumes.