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Experimental Investigation of the Flooding of Snow-Laden Sea Ice

L Stone-Drake (1), DL Feltham (1,2), T Maksymn (2), PR Sammonds (1)

(1) Centre for Polar Observation and Modelling, UCL, London, UK, (2) British Antarctic Survey, Cambridge, UK

The surfaces of sea ice floes can become flooded with seawater. This is usually a result of the floe sinking under the weight of snow on its surface, and the subsequent infiltration of seawater into the snow layer by overflowing the sides of a floe, or by percolating upwards through the permeable sea ice. This process, and the subsequent formation of snow ice, impacts on ice and snow thermodynamics, influences the physical and compositional properties of sea ice, and plays a role in sea ice ecosystems. Tank experiments have been designed to investigate the dynamics and thermodynamics of these processes. The experiments take place in a cold room and involve the use of thermocouples, hypodermic needles, thin- sectioning techniques, and a digital refractometer. Measurements of temperature and salinity, and inferred local solid fractions, reveal the changing distribution of salt during flooding and refreezing.