

## Observations from the ice-ocean boundary

Keith W Nicholls, British Antarctic Survey, Cambridge, UK

kwni@bas.ac.uk

If observations beneath floating ice shelves and tongues are sparse, measurements focussed on processes at the ice-ocean boundary are almost non-existent: getting access through 100s of metres of ice is difficult, and in some cases traumatic (ask any hot-water driller). Nevertheless, the advent of reliable, miniaturised instruments has meant that programmes studying this crucial part of the ice-ocean system have recently begun, with more awaiting funding decisions.

Observations from the ice-ocean boundary have been made since the late 1970s, when access holes through ice shelves allowed the exploration of the underlying water column using CTD profilers. But with most of the early exploratory interest dedicated to finding the general conditions in these exotic locations, the instrument typically spent only fleeting seconds in the boundary layer itself.

Time series of conditions in the boundary layer started to become available in the late-1980s, when a glaciologically-inspired programme deployed thermistor cables through George VI Ice Shelf, occasionally including sensors at the top of the water column. Particularly exciting results were obtained when data loggers connected to the thermistors yielded the first observations of thermistors melting out of the ice and into the ocean.

I will describe various methods adapted to obtaining data from the ice-ocean boundary layer, and will present measurements both old and new. I will show turbulence and melt rate data recently obtained from beneath two Antarctic ice shelves that demonstrate the difficulties involved, but also illustrate how much there is yet to be learned from this under-observed environment.