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OCEANOGRAPHIC CONDITIONS UNDER AND ADJACENT TO THE FIMBUL ICE SHELF

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The Fimbul Ice Shelf overlies a cavity with a water column thickness up to 800m deep and extending over 150 km from the grounding line to the ice shelf front. Unusually for such a large cavity it is separated from the relatively warm deep waters of the Southern Ocean by a relatively narrow continental shelf, allowing the possibility of relatively easy access to the cavity by these waters. The main ice stream feeding the ice shelf, Jutulstraumen, also feeds a narrower tongue of ice that, uniquely, overhangs the continental shelf. Consequently this ice is exposed directly to water from the deep ocean regime, and is likely to be a site of high melt rates. This may indicate the processes that operated during glacial maxima, when ice sheets routinely overhung the continental slopes.

In February 2005, as part of the UK's Autosub Under Ice thematic programme, scientists from a number of institutions did an extensive survey around the Fimbul Ice Shelf. This included a mission of the UK's Autonomous Underwater Vehicle the Autosub-2 into the sub-ice-shelf cavity, and a ship based hydrographic survey along much of the ice-shelf-front. In addition to standard temperature, salinity and velocity measurements from CTD and Lowered ADCPs, we collected water samples for oxygen isotope ratio analysis. The ratio of the stable isotopes of oxygen in seawater allows us to quantify the amount of ice shelf meltwater present.

We will show the oceanographic conditions on the continental shelf adjacent to the ice shelf collected during our field programme, including estimates of melt rates within the cavity, and under the floating ice tongue. Water laden with glacial melt water from the floating ice tongue can be seen passing from under the tongue towards the west, where it seems to be steered across the continental shelf towards the Antarctic Slope Front into which it is ultimately mixed.