

The internal structure of the Brunt Ice Shelf, Antarctica from ice-penetrating radar

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The Brunt Ice Shelf is a small feature on the Coats Land Coast of the Weddell Sea, Antarctica. It is unusual among Antarctic ice shelves because the ice crossing the grounding line from the ice sheet retains no structural integrity, so the ice shelf comprises icebergs of continental ice cemented together by sea ice, with the whole blanketed by in-situ snowfall. The size and distribution of the icebergs is governed by the thickness profile along the grounding line. Where bedrock troughs discharge thick ice to the ice shelf, the icebergs are large and remain close together with little intervening sea ice. Where bedrock ridges mean the ice crossing the grounding line is thin, the icebergs are small and widely-scattered with large areas of sea ice between them.

To better understand the internal structure of the Brunt Ice Shelf and how this might affect the flow dynamics we conducted ice-penetrating radar surveys during December 2015 and January 2016. Three different ground-based radar systems were used, operating at centre frequencies of 400, 50 and 10 MHz respectively. The 400 MHz system gave detailed firn structure and accumulation profiles as well as time-lapse profiles of the active propagation of a crevasse. The 50 MHz system provided intermediate-level detail of iceberg distribution and thickness as well as information on the degree of salt water infiltration into the accumulating snow pack. The 10 MHz system used a high-power transmitter in an attempt to measure ice thickness beneath salt-impregnated ice.

In this poster we will present example data from each of the three radar systems which will demonstrate the variability of the internal structure of the ice shelf. We will also present preliminary correlations between the internal structure and the surface topography from satellite data.