

Iceberg tracking along the Dronning Maud Land coastline, Antarctica, with seismic stations at regional distances

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A dataset of about 200 seismic signals was recorded between April and December 2012 at various stations of the international seismic network in Dronning Maud Land, Antarctica. All signals were recorded at station TROLL, while variable numbers were recorded at SNAA, the Neumayer III seismic network, and NVL. From these stations, TROLL and SNAA are situated at the central part of the study area, while the Neumayer stations and NVL are located at the western and eastern end, respectively. TROLL has the longest distance from the edge of the ice shelf (~220 km), whereas the station nearest the open ocean is VNA1 of the Neumayer network.

The analysis of the recorded signals showed that their sources moved westwards, off the edge of the ice shelf, roughly between 15°E and 10°W, which corresponds to an approximate distance range of 200-500 km from TROLL. They could be associated with the drift of five large, tabular icebergs that crossed the Eastern Weddell Sea at the same time interval. By eliminating all highly uncertain seismological source-estimates and comparing the results with daily iceberg positions from tracking agencies, a subset of 99 signals was associated with particular icebergs.

During the initial screening of the signals, spectrograms were used to facilitate their discrimination from other sources, such as earthquakes, icequakes or hydroacoustic phases. They revealed a wide variety of frequency characteristics, from signals that appeared almost chaotic to signals with highly structured frequency content, such as iceberg harmonic tremor. A classification scheme was compiled to divide the signals into groups on a purely phenomenological basis.

We present the spatiotemporal distribution of this dataset, show statistics regarding signal representation for each iceberg and class, and discuss the significance of the regional, seismic network in Dronning Maud Land for iceberg tracking.