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A CIRCUM-ANTARCTIC SURVEY OF THE ABUNDANCE AND SIZE CHARACTERISTICS OF NEAR-COASTAL POPULATION OF ICEBERGS

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A survey of the size characteristics of the population of icebergs around the whole of the Antarctic coastline was carried out using synthetic aperture radar images. A total of 36,900 separate icebergs were observed with sizes ranging from a fraction of a square kilometre to thousands of square kilometres. The results show the spatial distribution, abundance, and size characteristics of the iceberg population at a single epoch corresponding to the image acquisition in Sep-Oct 1997 by Radarsat. The extent of image coverage is generally of the order of 100-150 km from the coast and somewhat more in limited areas. Many of the observed icebergs occur close to the coast, typically in areas where few if any observations have been collected by ship-board observers or other means. Thus they represent new data on the iceberg population, especially for those close to their sources, the ice shelves or glaciers from where they had calved.

The icebergs are detected and their dimensions extracted by analysis of the texture properties present in high resolution SAR images. For this population, more than 95% in number are less than one sq km in area. More than half the mass is in icebergs of area more than 1 sq km. Spatial and temporal variability of the population is estimated by comparison with results from SAR images taken at other epochs. The presence of massive icebergs, such as those that calved in 2000-2002 skews the population characteristics dramatically.

Use of the ENVISAT “Global Monitoring” mode and time-series of coarse resolution images synthesised from scatterometer data facilitates semi-continuous monitoring of the region. Calving events are identified, and drift tracks of large icebergs are extracted from the series. Additional information on the free-board height is gained from satellite altimeters, which allow the spatial and temporal variability of the mass transport and subsequent re-distribution of fresh water over the ocean to be assessed.