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A circum-Antarctic survey of icebergs - abundance and size characteristics

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A survey of the population of icebergs around the whole of the Antarctic coastline was made using synthetic aperture radar images. The spatial distribution, abundance, and size characteristics of the iceberg population is for a single epoch corresponding to the time of image acquisition by Radarsat in Sep-Oct 1997, the RAMP (Radarsat Antarctic Mapping Program) mission. The survey area is from the coast out to a distance of the order of 100-150 km, and greater in some areas. A total of 36,900 separate icebergs were observed with sizes ranging from a fraction of a square kilometre to thousands of square kilometres. Many of these 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 which they had calved.

The icebergs are detected and their dimensions extracted by analysis of the texture properties of high resolution SAR images. Results for the population sample presented here, show that 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 one sq km.

The population characteristics depend on episodic recruitment from sources regions, mixing of the sub-populations within the East Wind Drift as the icebergs move anti-clockwise round Antarctica, export along preferred paths, and evolution of the population by breakage and melt, particularly as this varies with season. The presence of massive icebergs considerably skews the population characteristics. This effect is even more dramatic for the population following calving from Ross and Ronne Ice Shelves in 2000-2002.