Antarctica on sequential Landsat and ERS SAR images: King George VI Ice Shelf.

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Abstract

The breaking up of ice shelves on the Antarctic Peninsula has raised concerns owing to its linkage to a warming trend (Vaughan and Doake, 1996, Nature, 379, 328-331). These authors showed that the current -5°C isotherm may represent the limit of ice-shelf viability. The George VI Ice Shelf, between Alexander Island and the southern regions of the Antarctic Peninsula, lies near this isotherm. We examined the ice-shelf front for recent changes on older Landsat and more recent ERS images. The 1974 ice-shelf front (Landsat image) extended from just north of Niznik Island all the way across the George VI Sound. This observation is contrary to the portrayal of the front on maps. The shelf behind this front was complexly divided into large shelf segments separated by rifts; it also included the fractured tongue of an unnamed glacier. Along Alexander Island, the front of 1992 and 1995 (ERS images) was near the southern margin of a polynya that was already established in 1979. This position is 30 km back from the 1974 front. Along the eastern side of the shelf, the front retreated more than 20 km from 1974 to 1992, and another 6 km from 1992 to 1995. The latter retreat site retains many small icebergs in situ. Furthermore, for a distance of 8 km along the ice-shelf margin, crevasses opened to as much as 1 km wide. The observations are consistent with Vaughan and Doake's (1996) criteria for rapid ice-sheet disintegration and may indicate that the loss of ice shelves due to the warming trend is spreading south.