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Decadal changes in south west Antarctic Peninsula Ice Shelves

Tom Holt and Neil Glasser

Aberystwyth University

Over the latter half of the 20th Century and beginning of the 21st Century, ice shelves around the Antarctic Peninsula have been losing mass at an accelerating rate, attributable to changes in atmospheric and oceanic conditions. Ice shelves have declined in extent and thickness, and some show signs of structural weakening. Here we investigate the glaciological changes to Bach, Stange and George VI ice shelves that fringe the Southwest Antarctic Peninsula. We used satellite imagery from 2009/10 to 2019/20 (Landsat, Sentinel and ASTER) to measure areal changes, calculate flow speeds, and quantify structural changes, focusing on open fracture width and length. We reveal a total net loss of 797.5 km² from all three ice shelves since 2009/10, though spatial and temporal patterns of ice loss vary at individual ice fronts. Flow speeds have remained largely stable, but notable acceleration was calculated for Bach Ice Shelf, and at the northern and southern extents of George VI Ice Shelf. Open fractures have widened and lengthened over the observation periods. We conclude that Stange Ice Shelf is stable, and not under any immediate threat of enhanced recession. Continued ice-mass loss and consequential speed up of George VI South may cause further fracturing and destabilisation in the coming decades. Of more immediate concern are the glaciological changes noted for Bach Ice Shelf and George VI North; significant areas of passive ice have already, or will be soon removed, that could result in enhanced recession within the next decade.