

Major advance of South Georgia glaciers during the Antarctic Cold Reversal following extensive sub-Antarctic glaciation

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Abstract

The history of glaciations on Southern Hemisphere sub-polar islands is unclear. Debate surrounds the extent and timing of the last glacial advance and termination on sub-Antarctic South Georgia in particular. Using sea-floor geophysical data and marine sediment cores, we resolve the record of past glaciation offshore of South Georgia giving insight into glacier response to climate variability through the transition from the Last Glacial Maximum to Holocene. We show a widespread, coherent sea-bed imprint of shelf-wide ice-sheet advance and retreat in the form of glacially-carved cross-shelf troughs, suites of end and recessional moraines, as well as populations of streamlined bedforms. Glacial troughs began to infill with sediments after *c.* 18 ka B.P. consistent with interpretations of an extensive last glacial advance and early onset of a progressive, and potentially rapid, deglaciation to coastal limits. A fjord-mouth moraine formed during renewed glacier resurgence between *c.* 15,170 and 13,340 yrs ago. From the geometry of moraines in adjacent fjords, we infer that many of South Georgia's glaciers advanced during this period of cooler, wetter climate, known as the Antarctic Cold Reversal, extending the geographic footprint of the cryospheric response to an Antarctic climate pattern into the Atlantic sector of the Southern Ocean. We conclude that the last glaciation of South Georgia was extensive, and the sensitivity of its glaciers to climate variability during the last termination more significant than implied by previous studies.

Keywords: Sub-Antarctic; ice-cap reconstruction; multibeam bathymetry; sediment cores