



Late Holocene changes in character and behaviour of land-terminating glaciers on James Ross Island, Antarctica

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Virtually no information is available on the response of land-terminating Antarctic Peninsula glaciers to climate change on a centennial timescale. This paper analyses the topography, geomorphology and sedimentology of prominent moraines on James Ross Island to determine geometric changes and to interpret glacier behaviour. The moraines are very likely due to a late Holocene phase of advance and were formed by (1) shearing and thrusting within the snout, (2) shearing and deformation of basal sediment, (3) more supraglacial debris than at present and (4) short distances of sediment transport. Retreat of ~ 100 m and thinning of 15 - 20 m has produced a loss of 0.1 km³ of ice. The pattern of surface lowering is asymmetric. These geometrical changes are suggested most simply to be due to a net negative mass balance caused by a drier climate. Comparisons of the moraines with the current glaciological surface structure of the glaciers permits speculation of a transition from a polythermal to a cold-based thermal regime. Small land-terminating glaciers in the northern Antarctic Peninsula region could be cooling despite a warming climate.