Holocene glacier behavior around the northern Antarctic Peninsula and possible causes

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Abstract

We obtained 49 new Be-10 ages that document the activity of the former Northern Antarctic Peninsula Ice Sheet, and subsequently the James Ross Island Ice Cap and nearby glaciers, from the end of the last glacial period until the last similar to 100 years. The data indicate that from >11 to similar to 8 ka marked recession of glacier systems occurred around James Ross Island, including tidewater and local land-terminating glaciers. Glaciers reached heads of bays and fjords by 8-7 ka. Subsequently, local glaciers were larger than present around (at least) 7.5-7 ka and similar to 5-4 ka, at times between 3.9 and 3.6 ka and just after 3 ka, between similar to 2.4 and similar to 1 ka, and from similar to 300 to similar to 100 years ago. After deglaciation, the largest local glacier extents occurred between similar to 7 ka and similar to 4 ka.

Comparison with other paleoclimate records, including of sea ice extent, reveals coherent climate changes over similar to 15 degrees of latitude. In the early Holocene, most of the time a swath of warmth spanned from southern South America to the Antarctic Peninsula sector. We infer such intervals are times of weakening and/or poleward expansion of the band of stronger westerlies, associated with contraction of the polar vortex. Conversely, increased sea ice and equatorward expansion of the westerlies and the polar vortex favor larger glaciers from Patagonia to the Antarctic Peninsula, which typically occurred after similar to 8 ka, although warm stretches did take place. For example, on the Antarctic Peninsula and in Patagonia the interval from 4 to similar to 3 ka was typically warm, but conditions were not uniform in either region. We also infer that reduced and expanded glacier extents in Patagonia and the eastern Antarctic Peninsula tend to occur when conditions resemble a persistent positive and negative southern annular mode, respectively. (C) 2020 Elsevier B.V. All rights reserved.

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Palabras clave de autor: Antarctic Peninsula; cosmogenic dating; deglaciation; Holocene; Antarctica; paleoclimate

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