Except in the Batterbee Mountains, we find that glacier flow is in close balance with present climate, despite the general warming trend that has occurred in the Antarctic Peninsula region over the past 30 years.

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AIR TEMPERATURE AND SNOW ACCUMULATION IN THE ANTARCTIC PENINSULA DURING THE PAST 50 YEARS (Abstract)

by

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ABSTRACT

Trends in climate affecting the West Antarctic ice sheet may be detected first in the Antarctic Peninsula region. Although the area contains the most comprehensive weather records for any part of Antarctica, reliable snow-accumulation data are lacking.

Mainly as a result of the large snow-accumulation rate in the region (typically in the range 4.0–10.0 kg m^{-2} a^{-1}), stratigraphic evidence of climate derived from ice cores can be resolved in much greater detail than is possible over most of the continent. Ice cores have been drilled at two sites, representing the extremes of climate type encountered in the region. A 133 m core has been obtained from Dolleman Island (70°35.2′ S, 60°55.5′ W) to represent the continental-type climate of the Weddell coast region, and an 87 m core has been obtained from the Palmer Land plateau (74°01′ S, 70°38′ W) to represent the more maritime regime of the west coast and central areas. Replicated cores were obtained at both sites in order to assess the contribution of local noise factors to the climatic signal preserved in the cores. Climatic trends during the period 1938–86 have been assessed on the basis of stable-isotope analysis of the top 47 m of the Palmer Land core and of the top 32 m of the Dolleman Island core.

A statistical analysis of derived profiles of mean annual $\delta^{18}O$ and accumulation rate indicates that the local noise factors at these sites are sufficiently small that data averaged over periods as short as 5 years should reveal climatic shifts at the level of 0.2‰ and 5% respectively. These changes are much smaller than trends that have actually occurred during the past 50 years.

The most notable trend over the past 30 years is an increase of more than 30% in the snow-accumulation rate that has occurred in parallel with an overall temperature increase of 0.06°C/a during the same period. Increases of similar magnitude can be inferred from studies in East Antarctica, and may be related to a significant increase in precipitation rate that has been documented recently at mid- to high-latitude stations in the Northern Hemisphere. The finding may have relevance to studies of the possible consequences of a CO_2-induced climate change. More extensive accumulation time series are now required from Antarctica, if satisfactory models of the long-term balance of the ice sheet are to be derived.

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