

ICE-SHEET FLOW IN THE VICINITY OF SOUTHERN
VICTORIA LAND, ANTARCTICA:
IMPLICATIONS FOR GLACIAL CHRONOLOGY

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ABSTRACT. Systematic radio echo-sounding during three seasons since 1971-72 has produced data on the configuration of the ice sheet in East Antarctica. In the sector extending inland from southern Victoria Land, the ice sheet exhibits a large ridge which drives ice towards David Glacier in the north and Mulock and Byrd Glaciers to the south. Within 100 km of the McMurdo dry-valley region soundings along ten sub-parallel lines (*c.* 10 km apart) provides detail on ice surface and flow patterns at the ridge tip. A small surface dome lies just inland of Taylor Glacier. The surface drops by 100 m or more before rising to join the major ridge in East Antarctica.

Only Mawson and Mulock Glaciers in this area currently discharge any ice from central East Antarctica. The small outlet glaciers including Taylor, Wright Upper, and Victoria Upper are nourished by local ice originating within a few tens of kilometres of the exposed Transantarctic Mountains.

Oxygen and deuterium isotope determinations on samples taken from Taylor Glacier snout in January 1978 corroborate this hypothesis of a nearby source. $\delta^{18}\text{O}$ values between -38 and -41‰ are isotopically much heavier than we would anticipate for ice derived from central East Antarctic ice sheets (-45 to -55‰). Minimum δ -values for Taylor Glacier, predicted from elevation-temperature considerations close to the local ice divide based on a measured mean annual surface temperature of -41.5°C are in the order of -42 to -43‰ . It would appear that the glaciological regimes of these minor outlet glaciers are controlled by local, near-mountain climatic effects. Such a conclusion has important implications for certain glacial-geologic studies of ice-sheet events in the McMurdo Sound region.

Advances and retreats of Taylor Glacier, for instance, have been considered to reflect volume changes of the East Antarctic ice sheet directly (e.g. Denton and others, 1971). Only very large-scale ice-sheet events (involving several hundred metres thickening) would be of sufficient magnitude to reverse or modify local surface slopes, allow penetration of additional ice through the mountains, and thus be reflected by movement of Taylor Glacier terminus. Denton and others (1971) suggest that a recent advance of this outlet glacier indicates that the East Antarctic ice sheet is currently at its maximum dimensions since Late Wisconsin times. Our results lead us to question such conclusions. It is perhaps the local increase in accumulation adjacent to the Transantarctic Mountains, in response to more open water conditions in the Ross Sea during the last few thousand years, which is responsible for the extension of Taylor Glacier. We conclude that such minor outlet glaciers within southern Victoria Land, nourished principally by local ice, appear insensitive gauges of small- to medium-scale fluctuations of the East Antarctic ice sheet.

REFERENCE

- Denton, G. H., and others. 1971. The late Cenozoic glacial history of Antarctica, [by] G. H. Denton, R. L. Armstrong, and M. Stuiver. (In Turekian, K. K., ed. *The late Cenozoic glacial ages*. New Haven and London, Yale University Press, p. 267-306.)