The University of Maine
DigitalCommons@UMaine

Earth Science Faculty Scholarship | Earth Sciences

1990

Detailed Glaciochemical Investigations in Southern Victoria Land, Antarctica — A Proxy Climate Record

Paul Andrew Mayewski
University of Maine, paul.mayewski@maine.edu

Follow this and additional works at: https://digitalcommons.library.umaine.edu/ers_facpub


Part of the Atmospheric Sciences Commons, Climate Commons, Geochemistry Commons, Glaciology Commons, and the Hydrology Commons

Repository Citation

Mayewski, Paul Andrew, "Detailed Glaciochemical Investigations in Southern Victoria Land, Antarctica — A Proxy Climate Record" (1990). *Earth Science Faculty Scholarship*. 230.
https://digitalcommons.library.umaine.edu/ers_facpub/230

This Article is brought to you for free and open access by DigitalCommons@UMaine. It has been accepted for inclusion in Earth Science Faculty Scholarship by an authorized administrator of DigitalCommons@UMaine. For more information, please contact um.library.technical.services@maine.edu.

Detailed glaciochemical investigations in southern Victoria Land, Antarctica—A proxy climate record

PAUL A. MAYEWSKI

Glacier Research Group
Institute for the Study of Earth, Oceans, and Space
University of New Hampshire
Durham, New Hampshire 03824

The production of environmental change records using time-series data retrieved from ice cores has seen minimal application in the Transantarctic Mountains despite the existence of a well-developed lower resolution glacial geologic record for this area which forms the primary basis for understanding the glacial history of East Antarctica. In addition, records derived from marine and lake cores, glacier margin fluctuation studies, measures of volcanic activity, and meteorological data sets from within or close to the Transantarctic Mountains are available for comparison. This emerging environmental database provides the tools needed to define the change characteristics, over a period of thousands of years, of several major dynamic components in this region, e.g., climate, atmospheric chemistry, sea-ice extent, volcanic activity, and atmospheric turbidity.

During the 1987–1988 austral field season, several sites in southern Victoria Land were investigated as potential core sites (Mayewski and Twickler 1988). The site chosen for investigation during the 1988–1989 season was the Newall Glacier (center point: 77°37'S 162°30'E) in the Asgaard Range.

The major goal of the 1988–1989 field program was the collection of two cores, 150 and 175 meters deep, which was accomplished in conjunction with the Polar Ice Coring Office (University of Alaska at Fairbanks). The drill site was located in a relatively flat portion of the glacier close to the heads of the Lacroix, Suess, and Canada glaciers of Taylor Valley. One core was dedicated to the measurement of major anions, major cations, and radionuclides (now completed at the University of New Hampshire), carbon-14 dating (in progress by A. Wilson, University of Arizona), and oxygen isotope measurements (P. Grootes, University of Washington). Preliminary results appear in Mayewski, Lyons, and Twickler (in press). The other core will be sampled in a similar fashion for purposes of calibration and for gas studies (carbon dioxide and methane) by M. Whalen (New York State Department of Health).

As an addition to our Newall Glacier glaciochemical program, we also conducted, during the 1988–1989 field season, a pilot glaciochemical program at a site 33.6 kilometers east of South Pole. The primary emphasis of this work was the retrieval of a high-resolution nitrate time-series since this chemical species plays a role as an end product in reactions involved in ozone depletion. As part of this effort, we collected snow samples for major anions and cations, oxygen isotopes, and beryllium-7 at 1.6-kilometer intervals along the traverse from South Pole to our remote site. At the remote site, we excavated a 6-meter snowpit and collected:

- oxygen isotope and major anion and cation samples every 1 centimeter;
- continuous stratigraphy and density;
- radionuclide samples every 5 centimeters; and
- sulfur and nitrogen isotope and dissolved organic carbon samples at selected levels.

Results of this study appear in Mayewski et. al. (1988), Dibb et. al. (1990), and Mayewski and Legrand (in press).

This research was supported by National Science Foundation grant DPP 86-13786.

References

Dibb, J., P.A. Mayewski, C.F. Buck, and S.M. Drummey. 1990. Beta radiation from snow. *Nature*, 345, 25.

Mayewski, P.A., and M.R. Legrand. In press. Recent rise of nitrate in snow from inland Antarctica and a possible cause. *Nature*.

Mayewski, P.A., W.B. Lyons, and M.S. Twickler. In press. Detailed glaciochemical investigation in southern Victoria Land—A proxy climate record 1988/89.

Mayewski, P.A., M.J. Spencer, W.B. Lyons, M.S. Twickler, and J. Dibb. 1988. Ice-core records and ozone depletion—Potential for a proxy ozone record. *Antarctic Journal of the U.S.*, 23(5), 64–68.

Mayewski, P.A., and M.S. Twickler. 1988. Detailed glaciochemical investigation in southern Victoria Land, Antarctica—A proxy climate record. *Antarctic Journal of the U.S.*, 23(5), 68–69.