

Fritz Müller with friends and colleagues during the 1968 Seminar on the Causes and Mechanics of Glacier Surges held at St. Hilaire, Québec. (L to R): Fritz Müller; Mark Meier, glaciologist; Pat Baird, former Director of AINA's Montréal office and in 1968 Director of McGill University's Gault Estate at St. Hilaire; A. T. Wilson, glaciologist; and William O. Field of the American Geographical Society's Office of Exploration and Field Research.

FRITZ MÜLLER

1926 - 1980

Fritz Müller, world-famous glaciologist and long-time member of the Arctic Institute of North America, died of a heart attack on 26 July 1980 while conducting a field excursion on the Rhone Glacier, Switzerland. He was 54 years old at the time of his death. He leaves his wife, Barbara, and two daughters, Hanna and Barbara, to whom we extend our deepest sympathy.

Fritz first came to the Arctic Institute in 1955 when it was located in its original home, Bishop Mountain House on University Avenue in Montréal. He came as a McGill-Carnegie Arctic Research Scholar to undertake the study of pingos which form the basis of his doctoral dissertation and of the definitive publications on pingos which were his first major scientific contribution.

The Carnegie Scholarship was awarded to Fritz on the strength of his already extensive experience of cold weather phenomena gained first in the mountains of his native Switzerland and extended through three summers, 1952-54, with the Danish Lauge Koch Expeditions to Eastern and Northern Greenland. In 1953, Fritz's contribution to the latter included a first crossing of the interior of Pearyland.

After two very full field expeditions to the Mackenzie Delta and Greenland in connection with the pingo work, Fritz left the Arctic Institute and McGill to accompany the successful Swiss Everest Expedition of 1956. Although he was attached to the expedition as a scientist, Fritz climbed to the 8200-m level, taking the opportunity to extend his studies of patterned ground, begun in Greenland, to levels

close to 8000 m in the South Col. After the expedition proper, he remained behind on the Khumbu Glacier to conduct observations throughout the Monsoon Season.

In 1959, Fritz returned to Canada as a Research Associate at McGill and as leader of the Jacobson-McGill Arctic Research Expedition to Axel Heiberg Island, which has effectively operated ever since. Fritz himself was in the field in the Arctic Islands for eighteen field seasons during the last two decades. From the first, the Axel Heiberg program deliberately included a wide range of disciplines although its principal focus was the variety of glaciers which are to be found around Expedition Fiord on the west side of Axel Heiberg Island. In several respects, the glaciological record for ice masses in the Expedition Fiord area is now the longest and best such record in Canada. For more than twenty years, the Axel Heiberg program has been a vehicle for the training of many students, graduate and undergraduate, including ourselves. Fritz's enthusiasm about ice and things northern was infectious, and will, with his numerous publications (selected bibliography attached), keep his influence alive for many decades to come.

Although Fritz left Canada in 1970 to become head of the Department of Geography at the Swiss Federal Institute of Technology (ETH) in Zürich, he maintained an expedition office and the title of Honorary Professor at McGill for the remainder of his life. He actually extended his research operations in the High Arctic during the Seventies through his extensive involvement in the North Water Project, a study of the relatively ice-free area between Devon and Ellesmere islands and Greenland, and its surrounding land and ice masses. Like the Axel Heiberg program, North Water was a highly interdisci-

plinary endeavour. During this time, Fritz almost literally straddled the Atlantic, teaching, conducting research and administering on both sides of it and spending, as a result, many hours above it. Many of us remember him "dropping in" to cities such as Montreal, Ottawa or Washington for a few hours of hectic activity on his way to or from the Canadian North.

Although Fritz always thought of himself as a "field man", a special type of field man bridging the gap between the old-style Arctic expeditions and the new-style "remote sensors" of the polar regions, his credentials as a scientific organizer within his universities, in connection with the Learned Societies and in connection with major research projects are remarkable. In addition to his roles as leader of the Axel Heiberg and North Water projects, he set up glaciological teaching and research programs at McGill and ETH, he was chairman of the Canadian National Research Council's Sub-Committe, on Glaciers, and was a member and official of committees of such organizations as the International Geographical Union, the Internation Commission on Snow and Ice (IUGG), the U.S. National Academy of Sciences and the International

Glaciological Society. He was also a member of a variety of other scientific committees in Canada, Germany, Switzerland and the United States.

Fritz Müller's death is a great loss for northern research in general and for glaciology in particular. It is also a great loss for all of those who knew him as a friend and teacher. We are pleased to report that the Government of the Northwest Territories has officially re-named the ice cap in central Axel Heiberg Island (70°47′ N, 91°30′ W) as the Müller Ice Cap, in his memory.

W. Peter Adams
Dean of Graduate Studies
Trent University
Peterborough, Ontario, Canada
K9.1 788

C. Simon L. Ommanney
Head, Perennial
Snow and Ice Section
National Hydrology
Research Institute
Ottawa, Ontario, Canada
K1A 0E7

SELECTED BIBLIOGRAPHY OF THE PUBLICATIONS OF FRITZ MÜLLER FOR THE PERIOD 1954 - 1980

We have selected publications which, in addition to providing an entrée to Fritz' work in various fields, provide a good impression of the diversity of his interests and the major activities of his adult life. Selections are arranged in chronological order.

- MÜLLER, F. 1954. Frostbodenerscheinungen in NE- und N-Grönland. Dissertation, Diplom für Höheres Lehramt, Department of Geography, University of Zürich, Zürich. Manuscript. 221 p.
 - 1958. Eight months of glacier and soil research in the Everest region. The Mountain World, 1958/59. Swiss Foundation for Alpine Research. London: George Allen and Unwin Ltd. 191-208.
- 1959. Beobachtungen über Pingos, Detailunterschungen in Ostgrönland und in der Kanadischen Arktis. Ph.D. Thesis. Meddelelser om Grønland 153(3):137 p.

- MÜLLER, B.S. (ed.). 1961. Axel Heiberg Island. Preliminary Report, 1959-1960. Montréal: McGill University. 219 p. (5 articles by F. Müller.)
- MÜLLER, F. 1961. Jacobsen-McGill University Arctic Research Expedition to Axel Heiberg Island, Northwest Territories, 1959-1961: Operations in 1960. Polar Record 10(68): 518-521.
- REDPATH, B., MÜLLER, F. and SAULL, V. 1961. Seismic studies on Axel Heiberg Island. Canadian Mining and Metallurgy Bulletin 54(586): Abstract, 197.

- MÜLLER, F. 1962a. Analysis of some stratigraphic observations and radiocarbon dates from two pingos in the Mackenzie delta area, N.W.T. Arctic 15(4):279-288.

- 1962d. Glacier Mass-Budget Studies on Axel Heiberg Island, Canadian Arctic Archipelago. General Assembly of Obergurgl, International Union of Geodesy and Geophysics. International Association of Scientific Hydrology Publication No. 58:131-142.
- _____. 1963a. An arctic research expedition and its reliance on large-scale maps. Canadian Surveyor 17(2):96-112.

- 1963d. Jacobsen-McGill University Arctic Research Expedition to Axel Heiberg Island, N.W.T., 1959-1962. Operation 1962. Polar Record 11(74):598-600.
- _____1963e. Kanadische Arktis. Westermanns Lexikon der Geographie. Braunschweig: Georg Westermann. 18 p.

- et al. 1963. Jacobsen-McGill Arctic Research Expedition 1959-1962. Preliminary Report 1961-62 and Map Supplement. Axel Heiberg Island Research Reports. Montréal: McGill University. 241 p. and 6 maps.
- MÜLLER, F. 1964a. Evidence of Climatic Fluctuations on Axel Heiberg Island, Canadian Arctic Archipelago. Paper presented at 20th International Geographical Congress, I.G.U., London. 12 p. Abstract published in Abstracts of Papers No. 1707:80.
- _____. 1964b. Ice. In: Smith, I.N. (ed.). The Unbelievable Land. Ottawa: Queen's Printer. 69-71.
- PÉWÉ, T.L. and MÜLLER, F. 1964. Massive Ground Ice in Permafrost. Moderators' Report, Session X, Closing Session. Proceedings, Permafrost International Conference, 11-15 November 1963, Purdue University, Lafayette, Indiana. National Academy of Sciences, National Research Council Publication No. 1287:550-551.
- HAVENS, J.M., MÜLLER, F. and WILMOT, G.C. 1965. Comparative Meteorological Survey and a Short-term Heat Balance Study of the White Glacier, Canadian Arctic Archipelago, Summer 1962. Axel Heiberg Island Research Reports, Meteorology No. 4. Montréal: McGill University. 68 p.
- MÜLLER, F. 1966. Evidence of Climatic Fluctuations on Axel Heiberg Island, Canadian Arctic Archipelago. Proceedings, Symposium on the Arctic Heat Budget and Atmospheric Circulation. National Science Foundation. Santa Monica, CA: Rand Corporation. 135-156.
- and BARR, W. 1966. Postglacial isostatic movement in northeastern Devon Island, Canadian Arctic Archipelago. Arctic 19(3):263-269.
- BLACHUT, T.J. and MÜLLER, F. 1966. Some fundamental considerations on glacier mapping. Canadian Journal of Earth Sciences 3(6):747-759.
- MÜLLER, F.1967a. Automatic Weather Stations for Glacier-Climate Relationship Studies. General Assembly of Berne, International Union of Geodesy and Geophysics. International Association of Scientific Hydrology, Abstracts of Papers Vol. VI:75.
- . 1967b. Dynamic avalanche measurements. Final report in fulfillment of U.S. Army Contract No. DA27-021-AMC-33(X), Project No. IV025001A130. Avalanche Research Project McGill University, Montréal. 79 p.
- and ROSKIN-SHARLIN, N. 1967. A High Arctic Climate Study on Axel Heiberg Island, Canadian Arctic Archipelago, Summer 1961. Part I. General Meteorology, Axel Heiberg Island Research Reports, Meteorology No. 3. Montréal: McGill University. 82 p.
- MÜLLER, F. 1968a. Glaciological Observations on the Khumbu Glacier (Mount Everest Region). 21st International Geographical Congress, International Geographical Union, India. Abstracts of Papers No. 218:92.
- . 1968b. Mittelfristige Schwankungen der Oberflächengeschwindigkett des Khumbugletschers am Mount Everest. Schweizerische Bauzeitung 86(31):569-573.

- ——. 1969c. Was the Good Friday Bay Glacier on Axel Heiberg Island Surging? Canadian Journal of Earth Sciences 6(4), Part 2:891-894.
- and KEELER, C.M. 1969. Errors in short-term ablation measurements on melting ice surfaces. Journal of Glaciology 8(52):91-105.
- JONAS, J.J. and MÜLLER, F. 1969. Deformation of ice under high internal shear stresses. Canadian Journal of Earth Sciences 6(4), Part 2:963-967.
- OMMANNEY, C.S.L., GOODMAN, R.H. and MÜLLER, F. 1969. Computer analysis of a glacier inventory of Axel Heiberg Island, Canadian Arctic Archipelago. International Association of Scientific Hydrology Bulletin 14(1):19-28.
- MULLER, F. 1970. A Pilot Study for an Inventory of the Glaciers in the Eastern Himalayas. In: Perennial Snow and Ice Masses, A Guide for Compilation and Assemblage of Data for a World Inventory. UNESCO Technical Papers in Hydrology No. 1. Paris, UNESCO A.2486:47-59.
 - Ice, Symposium No. 8, Québec City. Inland Waters Branch, Department of Energy, Mines and Resources, Ottawa. Vol. 2:32-51.
- and OMMANNEY, C.S.L. 1971. The Contribution of Glacier Ice to the World Water Balance (A Status Report on the World Glacier Inventory). Proceedings of the World Water Balance Symposium, Reading, England. International Union of Geodesy and Geophysics. International Association of Scientific Hydrology Publication No. 94:6-20.
- MÜLLER, F. 1972a. Climatological Research on Axel Heiberg Island. Axel Heiberg Island Research Reports, McGill University, Montréal. International Geographical Union, Field Tour EA2, Arctic Archipelago I. 22nd International Geographical Congress. Miscellaneous Papers by Fritz Müller and Members of the Expedition. 1-3.
- (ed.). 1972b. International Geographical Union Field Tour EA2, Miscellaneous Papers. Axel Heiberg Island Research Reports, McGill University, Montréal. International Geographical Union, Field Tour EA2, Arctic Archipelago I. 22nd International Geographical Congress. Miscellaneous Papers by Fritz Müller and Members of the Expedition. 56 p.
- , CAFLISCH, T. und MÜLLER, G. 1973. Das Schweizer Gletscherinventar als ein Beitrag zum Problem der Gletscher-Klima-Beziehung. Geographica Helvetica 28(2):103-110.
- MÜLLER, F. and IKEN, A. 1973. Velocity Fluctuations and Water Regime of Arctic Valley Glaciers. Symposium on the Hydrology of Glaciers, Cambridge, England. International Union of Geodesy and Geophysics. International Association of Scientific Hydrology Publication No. 95:165-182.
- MÜLLER, F., OHMURA, A. and BRAITHWAITE, R.J. 1973. Das North Water Projekt (kanadisch-grönländische Hockarktis). Geographica Helvetica 28(2):111-117.
- MÜLLER, F. (ed.). 1974-1980. North Water Project. Progress Reports I-VI. Glaciological and Climatological Investigation of the North Water Polynya in Northern Baffin Bay. Unpublished progress reports Geographisches Institut, ETH, Zürich and McGill University, Montréal.
- ______, BLATTER, H. and KAPPENBERGER, G. 1975. Temperature measurement of ice and water surfaces in the North Water area using an airborne radiation thermometer. Journal of Glaciology 15(73):241-250.

OBITUARY and ERRATUM

- MÜLLER, F. 1976a. Problems of an Arctic Polynya The North Water. In: Lvovich, M.I., Kotlyakov, V.M. and Rauner, Y.L. (eds.). International Geography '76, Section 2. Climatology, Hydrology, Glaciology. Proceedings, XXIII International Geographical Congress, Moscow. 52-55.
- _____ 1976b. On the thermal regime of a High Arctic valley glacier. Journal of Glaciology 16(74):119-133.
- CAFLISCH, T. und MÜLLER, G. 1976. Firn und Eis der Schweizer Alpen: Gletscherinventar. Geographisches Institut Publ. NR.57, ETH, Zürich. 224 p. & Fotoliste.
- MÜLLER, F., OHMURA, A. and BRAITHWAITE, R.J. 1976. On the Climatic Influence of the North Water. Proceedings, Symposium on Geography of Polar Countries, 23rd International Geographical Congress, Leningrad. 55-58.
- BRAITHWAITE, R.J. and MÜLLER, F. 1976. On the Simulation of Glacier Melt Using Temperature Data from Remote Weather Stations. In: Lvovich, M.I., Kotlyakov, V.M. and Rauner, Y.L. (eds.). International Geography '76, Section 2. Climatology, Hydrology, Glaciology. Proceedings, XXIII International Geographical Congress, Moscow. 274-276.
- ITO, H. and MÜLLER, F. 1976. Measurement of Sea Ice Forces by the Strain Rosette Method in the North Water Area. Proceedings, Third International Conference on Port and Ocean Engineering under Arctic Conditions, Fairbanks, Alaska. Vol. 1:269-284.
- OHMURA, A. and MÜLLER, F. 1976a. Heat Balance Measurement of Arctic Tundra (Axel Heiberg Island, Canadian Arctic Archipelago). In: Lvovich, M.I., Kotlyakov, V.M. and Rauner, Y.L. (eds.). International Geography '76, Section 2. Climatology, Hydrology, Glaciology. Proceedings, XXIII International Geographical Congress, Moscow. 80-84.
- MÜLLER, F. 1977a. Die polaren Landschaften. In: Winkler, E. und Kümmerly, H. (eds.). Die Erde und ihre Landschaften. Bern: Kümmerly & Frey. 15-33.
- _____. 1977b. Le Grand Nord: L'Homme et la Nature dans l'Arctique. Zürich: Atlantis Verlag. 279 p.
- (ed.). 1977c. Fluctuations of Glaciers 1970-1975 (Vol. III). A Contribution to the International Hydrological Programme. Report compiled for the Permanent Service on the Fluctuations of Glaciers of the IUGG-Fags/ICSU, International Association of Hydrological Sciences, International Commission on Snow and Ice. Paris: UNESCO. 269 p. and maps.
- , CAFLISCH, T. and MÜLLER, G. 1977. Instructions for Compilation and Assemblage of Data for a World Glacier Inventory. Temporary Technical Secretariat for World Glacier Inventory. International Commission on Snow and Ice, Department of Geography, Swiss Federal Institute of Technology (ETH), Zürich. 29 p.
- MÜLLER, F., STAUFFER, B. and SCHRIBER, G. 1977. Isotope Measurements and Firn Stratigraphy on Ice Caps Surrounding the North Water Polynya. Isotopes and Impurities in Snow and Ice Symposium, Proceedings of the Grenoble Sym-

- posium. International Association of Hydrological Sciences Publication No. 118:188-196.
- ALEAN, J. und MÜLLER, F. 1977. Zum Massenhaushalt des Baby Glacier, Axel Heiberg Island, Kanadische Hocharktis. Geographica Helvetica 32(4):203-208.
- BERGER, P. und MÜLLER, F. 1977. Massenhaushalt des Laika Glacier, Coburg Island, Kanadischer Arktischer Archipel. Geographica Helvetica 32(4):209-212.
- ITO, H. and MÜLLER, F. 1977. Horizontal movement of fast ice in the North Water area. Journal of Glaciology 19(81):547-554.
- OHMURA, A. und MÜLLER, F. 1977. Die mesoklimatische Verteilung von Luft-temperatur und Niederschlag über der hocharktischen Tundra von Axel Heiberg Island, N.W.T., Kanada. Geographica Helvetica 32(4):185-194.
- SCHRIBER, G., STAUFFER, B. and MÜLLER, F. 1977. 180/160, ²H/¹H and ³H Measurements on Precipitation and Air Moisture Samples from the North Water Area. Isotopes and Impurities in Snow and Ice Symposium, Proceedings of the Grenoble Symposium. International Association of Hydrological Sciences Publication No. 118:182-187.
- STEFFEN, K. und MÜLLER, F. 1977. Lokale Schneeverteilung auf Axel Heiberg Island, N.W.T. Empirische Methode zur Extrapolation von Schneekursdaten auf dem White Glacier. Geographica Helvetica 32(4):195-202.
- MÜLLER, F. 1978. Instructions for Compilation and Assemblage of Data for a World Glacier Inventory. Supplement: Identification/Glacier Number. Temporary Technical Secretariat for World Glacier Inventory, International Commission on Snow and Ice, Department of Geography, Swiss Federal Institute of Technology (ETH), Zürich. 25 p.
- HAMBREY, M.J. and MÜLLER, F. 1978. Structures and ice deformation in the White Glacier, Axel Heiberg Island, N.W.T., Canada. Journal of Glaciology 20(82):41-66.
- MÜLLER, F. 1980a. The glaciers of the earth and their fluctuations. Nature and Resources 16(2):5-11.
 - ——. 1980b. Present and Late Pleistocene Equilibrium Line Altitudes in the Mt. Everest Region — An Application of the Glacier Inventory. International Association of Hydrological Sciences, World Glacier Inventory Workshop, Proceedings of the Workshop at Riederalp, Switzerland. IAHS - AISH Publication No. 126:75-93.
- "BRIDEL, L. and SCHWABE, E. (eds.). 1980. Geography in Switzerland/La Géographie en Suisse. Geographica Helvetica 35(5). Special issue. Bern: Kümmerly & Frey. 176 p.
- MULLER, F. and SCHERLER, K. 1980. Introduction to the World Glacier Inventory. International Association of Hydrological Sciences, World Glacier Inventory Workshop, Proceedings of the Workshop at Riederalp, Switzerland. IAHS-AISH Publication No. 126:xiii-xx.

ERRATUM

Book review of *Dynamics of Snow and Ice Masses*, reviewed by David E. Thompson, Vol. 34, No. 1 (March 1981), P. 91. The publisher should be identified as *Academic Press*, 111 Fifth Avenue, New York, NY 10003.