

EXPEDITION AREA – AXEL HEIBERG ISLAND CANADIAN ARCTIC ARCHIPELAGO 1:100000

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Coverage, Surveying, and Plotting Information

The Expedition Area map covers a 2500 km² region of western Axel Heiberg Island, NU, and is centered on Thompson Glacier, which dominates the Expedition Fiord area. It is the smallest scale map created in the Expedition Region map series (circ. 1960) and provides a valuable overview of the major topographic features and glaciers in the area. Along the southern margin the map extends from the head of Expedition Fiord in the west, to Strand Glacier in the east. In the north, the map covers approximately 100 km² of the southern part of the Müller Ice Cap, with an inset showing the region of White Crown Mountain, the tallest peak on the island. Survey stations on the Müller Ice Cap (e.g. Upper Ice Station I and II) and on White Glacier (Beaver Camp and Lower Ice station) are indicated, as are many prominent peaks and the Colour Lake Base Station.

Contour intervals: 100 m
Field work: summers 1959-1960

This map accompanies the Preliminary Report 1961-1962, Axel Heiberg Island, by F. Müller and others.

The southern portion of the map is based on Thompson Glacier Region map 1:50,000, produced by the Photogrammetry Research Section, N.R.C., Canada. Northern part compiled from field observations and air photo interpretation by Dr. F. Müller

Draughting by Miss J. Harrison

Map Reference

McGill University, 1963, Expedition Area, Axel Heiberg Island, Canadian Arctic Archipelago. Map at 1:100 000 scale. Accompanies Müller, F., et al., 1963, Preliminary Report, 1961-1962, Axel Heiberg Island Research Reports, McGill University, Montreal.

Site Description

The Expedition Fiord area has been the focus of scientific studies since the first reconnaissance expedition led by Fritz Müller in 1959. While glaciological investigations were the primary focus, baseline studies in meteorology, geology, geophysics, and botany were also conducted in the area (Müller et al., 1961; Müller et al., 1963). Glaciology was the primary focus in the first few decades (1960-1980), and intensive research on White Glacier led to the discovery of polythermal conditions beneath what was thought to be a cold, polar glacier (Blatter, 1981), and the detection of short-term velocity fluctuations linked to subglacial hydrology (Iken, 1974). A study of ice-dammed marginal lakes was conducted by Maag (1969) and the push moraine in front of Thompson Glacier was studied in detail by Kälin (1971). Glaciological studies have continued in the region (e.g. Cogley and Adams, 2000; Cogley et al., 2011) with a focus on the mass balance programs of White Glacier and Baby Glacier.

Blatter, H., 1987, On the thermal regime of an arctic valley glacier: a study of White Glacier, Axel Heiberg Island, N.W.T., Canada, Journal of Glaciology, 33, 200-211.

Cogley, J.G., W.P. Adams and M.A. Ecclestone, 2011, Half a century of measurements of glaciers on Axel Heiberg Island, Nunavut, Canada, Arctic, 64(3), 371-375.

Cogley, J.G., and W.P. Adams, 2000, Photographic resources for monitoring glacier fluctuations on Axel Heiberg Island. Arctic, 53(3), 248-259.

Iken, A., 1974, Velocity Fluctuations of an Arctic Valley Glacier, A Study of the White Glacier, Axel Heiberg Island, Canadian Arctic Archipelago, Axel Heiberg Island Research Reports, Glaciology No. 5, McGill University, Montreal, Quebec, Canada. 115p.

Kälin, M., 1971, The active push moraine of the Thompson Glacier, Axel Heiberg Island, Canadian Arctic Archipelago. Glaciology No. 4, Axel Heiberg Island Research Reports. McGill University, Montreal. 68p.

Maag, H., 1969, Ice Dammed Lakes and Marginal Glacial Drainage on Axel Heiberg Island, Canadian Arctic Archipelago, Axel Heiberg Island Research Reports, McGill University, Montreal, p. 147.

Müller, F. et al., 1961, Preliminary Report, 1950-1960, Axel Heiberg Island Research Reports, McGill University, Montreal. p. 47.

Müller, F. et al., 1963, Preliminary Report, 1961-1962, Axel Heiberg Island Research Reports, McGill University, Montreal. 241p.

GENERAL COMMENTS ON THE EXPEDITION FIORD MAP SERIES

Motivation

The maps covering the Expedition Fiord area of Axel Heiberg Island (1:100,000), including Baby Glacier (1:5,000), White Glacier (1:5,000 and 1:10,000), and Thompson glacier (1:5,000 and 1:50,000) were produced as part of a mapping campaign in support of the interdisciplinary research program initiated at the McGill Arctic Research Station under the leadership of Fritz Müller at McGill University (Müller, 1961; Müller, 1963a). These maps supported studies in geology, glaciology, meteorology, geophysics, zoology, permafrost geomorphology, and botany; together, they can be considered the some of the best quality maps produced for the Canadian high Arctic during the 20th century. Cogley and Jung-Rothenhäusler (2002) offer a clear and useful explanation of the region's cartographic history, the plotting methods, and the associated uncertainties. It is the primary reference for this summary.

Surveying, Photogrammetry, and Plotting

Fritz Müller and Peter Adams conducted the first surveys of the Expedition Fiord area in McGill University's reconnaissance campaign of Western Axel Heiberg Island in the summer of 1959 (Müller, 1961; Adams, 2007). The maps were produced using photogrammetry techniques alongside intensive ground surveys conducted throughout the summer of 1960 (Blachut, 1961; Haumann, 1961). The Royal Canadian Air Force carried out the air photo survey in August, 1960, and a particular effort was made to improve contrast in the glacier accumulation (snow covered) areas by surveying multiple times with the sun at different angles. As noted in the Preliminary Report: 1961-1962, "A detailed discussion of the factors pertaining to the production of these maps has been given in a series of articles in the 'Canadian Surveyor' (Blachut, 1963; Haumann, 1963; McKortel, 1963; Müller, 1963b)." Plotting of the maps was overseen by T. J. Blachut at the Photogrammetric Research Section of the National Research Council (of Canada) and the Army Survey Establishment supported printing of the maps. The digital copies of the maps provided here were scanned at the Canada Centre for Remote Sensing, Natural Resources Canada (Budkewitsch, 2002).

Coordinate System

The Expedition Fiord maps were plotted in a local plane coordinate system with a baseline defined by the coordinates of Astro 1 (Local: 30,000 m E, 60,000 m N; Geographic: 90.74280563 W, 79.41003063 N) and Astro 2 (Local: 36764.06 m E, 69598.47 m N; Geographic: 90.41190283 W, 79.49597503 N). Detailed information is missing from the earlier publications, however it has been estimated that the maps were plotted under a transverse Mercator projection (centered on Astro 1) on a Clarke 1866 ellipsoid (NAD27) (Cogley and Jung-Rothenhäusler, 2002). With these assumptions, Cogley and Jung-Rothenhäusler (2002) provide equations that will enable users to convert the local planar coordinate system to geographic coordinates.

SELECTED REFERENCES

- Adams, P. 2007, Trent, McGill, and the North: A Story of Canada's Growth as a Sovereign Polar Nation. Peterborough, Ont. Cover to Cover Publication Services, p. 221.
- Blachut, T.J., 1961, Participation of the Photogrammetric Research Section of the N.R.C. in the Jacobsen-McGill University expedition to Axel Heiberg Island in 1960, in Müller, B.S., ed., 1961, Preliminary Report of 1959-60, Jacobsen-McGill Arctic Research Expedition to Axel Heiberg Island, Queen Elizabeth Islands, 27-33. McGill University, Montreal.
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- Cogley, J.G., and F. Jung-Rothenhäusler, 2002, Digital Elevation Models of Axel Heiberg Island Glaciers, Trent Technical Note 2002-1, Department of Geography, Trent University, Peterborough, Canada. 45p.
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- Müller, B.S., ed., 1961, Preliminary Report of 1959-60, Jacobsen-McGill Arctic Research Expedition to Axel Heiberg Island, Queen Elizabeth Islands, McGill University, Montreal. 219p.
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- Müller, F., 1963b, An arctic research expedition and its reliance on large-scale maps, Canadian Surveyor, 17(2), 96-112.

Access to many of these references is available through the Glaciology at Trent website:
<http://people.trentu.ca/~gcogley/glaciology/index.htm>