

BABY GLACIER – AXEL HEIBERG ISLAND

CANADIAN ARCTIC ARCHIPELAGO

1:5000

By D. Haumann and D. Honegger (1965)

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Coverage, Surveying, and Plotting Information

Covering an area approximately 7 km², this map is centered on Baby Glacier (90.9688 W, 79.4405 N), a small, niche-type glacier situated approximately 5 km inland and 3 km north of the head of Expedition Fiord, Axel Heiberg Island, NU, Canada. The map partially covers Trent Glacier (unofficially named) to the west (91.0398 W, 79.4423N) and the prominent Wolf Mountain (1190.1 m a.s.l.) and Black Crown Peak (1315.9 m a.s.l.). Features including crevasses, streams and debris cover are mapped, as are survey sites and signal cairns used during ground control collection in 1960. Probable trim lines from the Little Ice Age are indicated along the western glacier margin.

Contour intervals: 5 m on glaciers & moraines, 10 m on surrounding terrain

Field work: summer 1960

Aerial photography: August 2nd, 1960

Air Photography by the Royal Canadian Air Force

Photogrammetric plotting by D. Haumann and D. Honegger, N.R.C.

Draughting & graphical representation by D. Honegger

Produced by the Photogrammetric Research Section of the National Research Council of Canada in conjunction with the Axel Heiberg Island Expedition of McGill University.

Map Reference

National Research Council, 1965, Baby Glacier, Axel Heiberg Island, Canadian Arctic Archipelago. Map at 1:5 000 scale. Photogrammetric Research Section, National Research Council of Canada, Ottawa, in conjunction with Axel Heiberg Island Expedition, McGill University, Montreal.

Site Description

At an elevation range between 800-1100 m a.s.l., Baby Glacier falls within the regional equilibrium zone and is therefore highly sensitive to perturbations in climate fluctuations (Adams et al., 1998). It was the focus of early ablation studies (Müller, 1961) and mass balance research (Alean and Müller, 1977). Mass balance records at Baby glacier exist from 1960-1979, 1989-2005, and intermittently thereafter (Cogley et al., 1995).

Adams et al., 1998, A small glacier as an index of regional mass balance: Baby Glacier, Axel Heiberg Island, 1959-1992, Geografiska Annaler, 80A, 37-50.

Alean, J., and F. Müller, 1977, Zum Massenhaushalt des Baby Glacier, kanadische Hocharktis, Geographia Helvetica, 32, 203-207.

Cogley et al., 1995, Mass Balance of Axel Heiberg Island Glaciers, 1960-1991 - A Reassessment and Discussion, Science Report 6, National Hydrological Research Institute, Environment Canada, Saskatoon. 178p.

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 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.
- Blachut, T.J., 1963, Photogrammetric and cartographic results of the Axel Heiberg Island expedition, Canadian Surveyor, 17(2), 79-80.
- Budkewitsch, P., 2002, Scanned Maps, Expedition Fiord, Canada Centre for Remote Sensing, Natural Resources Canada, 588 Booth Street, Ottawa, ON, Canada K1A 0Y7. Four CD-ROMs.
- 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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- Haumann, D., 1963, Surveying glaciers in Axel Heiberg Island, Canadian Surveyor, 17(2), 81-93.
- McKortel, T.A., 1963, The reproduction of the Thompson Glacier map, Canadian Surveyor, 17(2), 93-95.
- 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.
- Müller, F. et al., 1963a, Preliminary Report, 1961-1962, Axel Heiberg Island Research Reports, McGill University, Montreal. 241p.
- 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>