photo: Torngat Mountains National Park, Nunatsiavut | Nicole Gaul (2025)

Witnessing 20 years of change (2005-2025) at a small Arctic Mountain Glacier in *Tongait KakKasuangita SilakKijapvinga* (Torngat Mountains National Park), Nunatsiavut, Labrador, Canada

Nicole Gaul (she/her)
MSc Researcher, Queen's University
nicole.gaul@queensu.ca

ArcticNet 2025 | December 16, 2025, Calgary, AB | ECS51: Arctic glacier dynamics, hydrology and recent changes (#355)

The Team

Co-Authors

Nicole Gaul (1) Robert G. Way (1) Andrew Trant (2) Nicholas E. Barrand (3) Michelle Saunders (4) Katryna Barone (1,2) Nhu Le (1,2) Nathan Kennedy (5) Holly Lightfoot (6) Joseph Mallalieu (3) Samuel Lane (7) Emma McNeil (7) Kendra Winters (7) Melissa Denniston (7) Ella Jacque (7) Jessica Sheppard (7) Billie-Marie Andersen (7) Hanson Jacque (7) Kayla Wyatt (7) Yifeng Wang (1) Erin Rendell (1)

(1) Northern Environmental Geoscience Laboratory, Queen's University, Kingston, Canada
(2) Trant Ecological Legacies Lab, University of Waterloo, Waterloo, Canada
(3) School of Geography, Earth & Environmental Sciences, University of Birmingham, Birmingham, UK
(4) Department of Lands and Natural Resources, Nunatsiavut Government, Nain, Canada.
(5) Labrador Field Unit, Parks Canada, Nain, Canada.
(6) Western Newfoundland Field Unit, Parks Canada, Rocky Harbour, Canada.
(7) Inuit Youth Research Technician Program, Queen's University, Kingston, Canada

Partners & Contributors

Nakummek to everyone who has contributed time and energy towards the success of this project over the years! We certainly wouldn't be here without you all.

TMNP Cooperative Management Board, Rodd Laing, Liz Pijogge, Carla Pamak, Chaim Andersen, Gary Baikie, Jacko Merkuratsuk, Luise Hermanutz, Alain Cuerrier, Taylor Montgomery-Stinson, Laura Siegwart Collier, Darroch Whitaker, Tom Knight, David Hannah, Alex Johnson, Emma Davis, John Jacobs, Trevor Bell, Judy Rowell, Martin Lougheed, Julia Wheeler, Brittany Cranston, Sarah Chan, Dan Myers, Frédéric Dwyer-Samuel, Meredith Purcell, Paul McCarney, Anita Falls, Eli Merkuratsuk, Jordan Beer, Eric Oliver, Madison Power, AND MANY MORE!

A special thanks to our bear guards and helicopter pilots for keeping us safe in the mountains: Donna, Harry, Rodney, Eli, Herman, Donovan, Seth, Brian, Peter, Barry, Carson

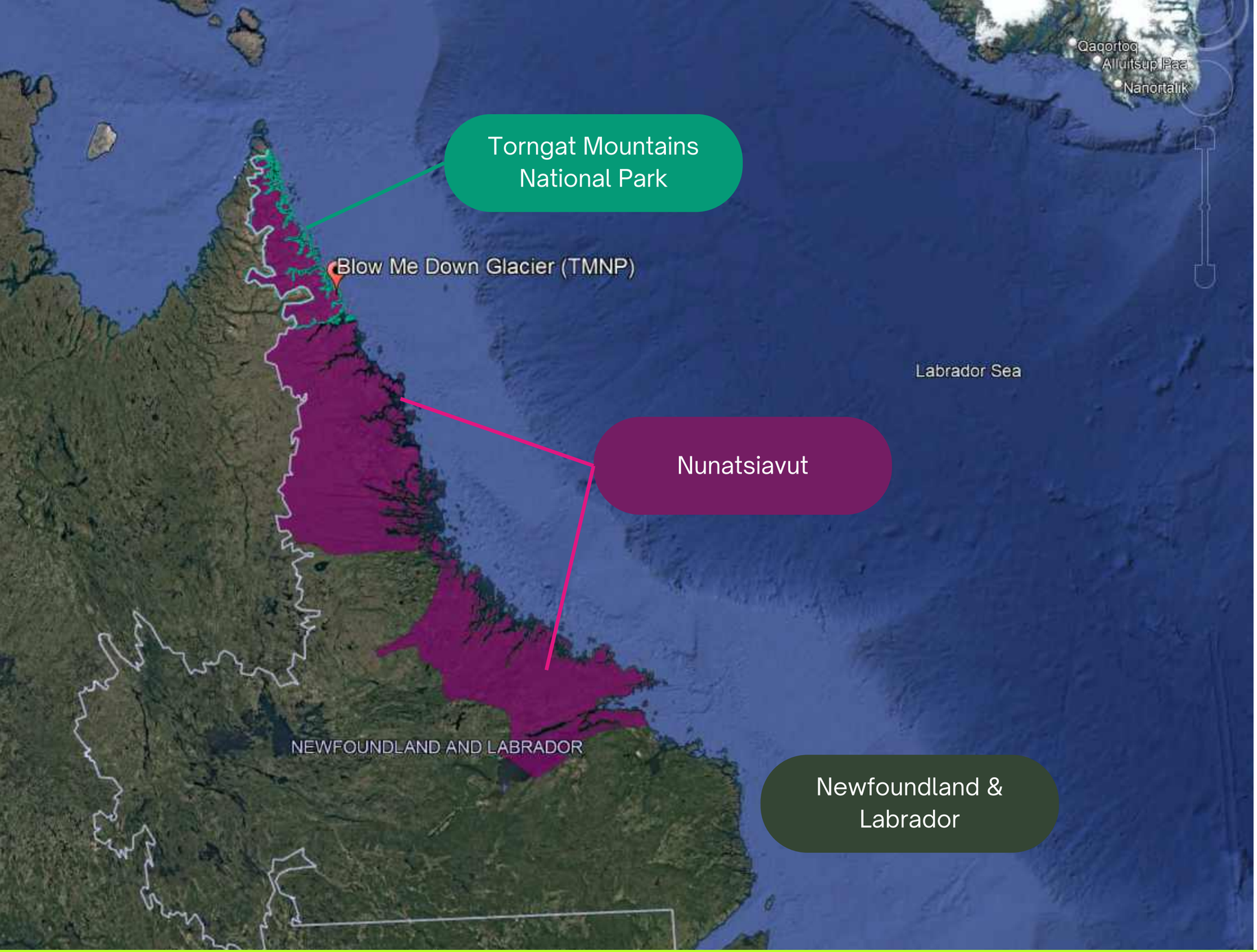
The Team

2023

2024

2025

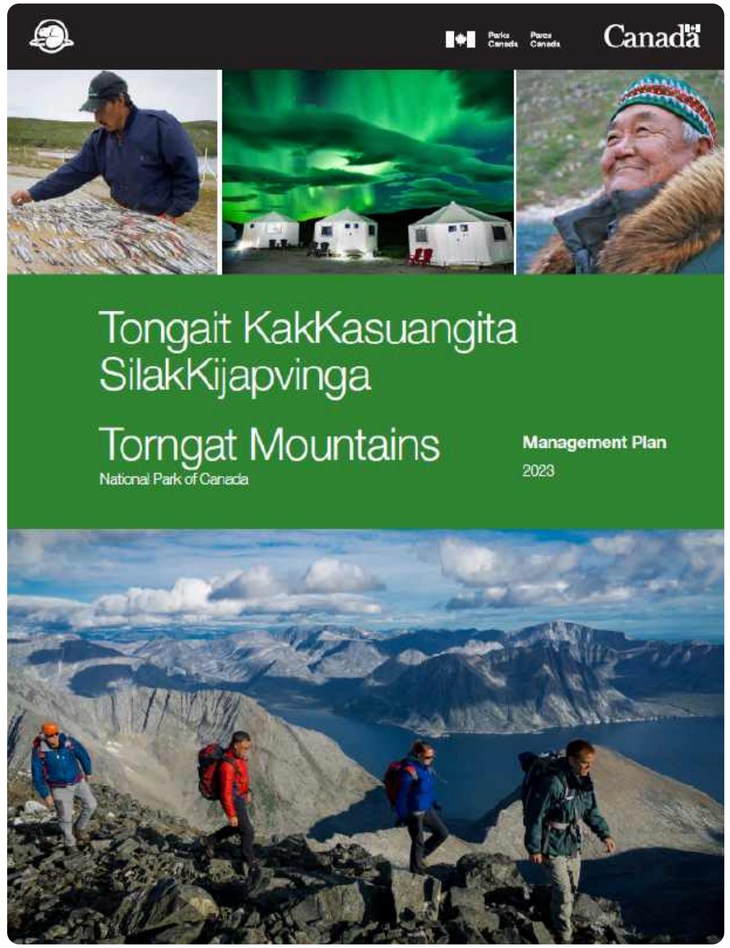
Background

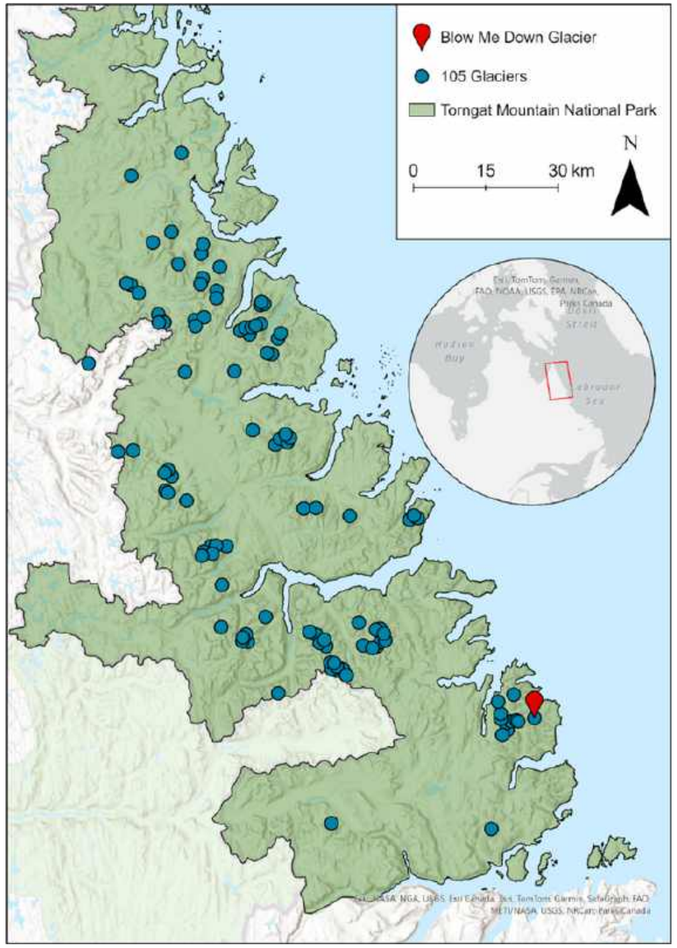


- **Inuit Nunangat**
- **Nunatsiavut**

Torngat Mountains National Park

- Homeland to ***Nunatsiavummiut*** (Labrador Inuit) and ***Nunavimmiut*** (Québec Inuit) families.
- 9,700 km² of northern Labrador Mountains
- Cooperative governance structure

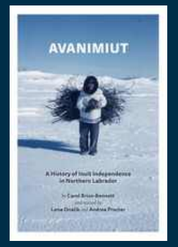




glaciology

hydrology

ecology

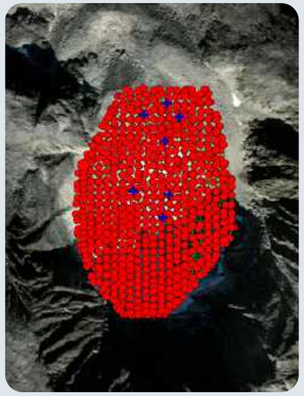


livelihoods

The Project

- Torngat Mountain watersheds are largely **glacier** and **snow-fed**.
- Important for wildlife, vegetation and cultural ecosystems.
- What is the status and resilience of these eco-glacio-hydrological systems?

Direct mass balance



Geodetic mass balance

160 MHz Ground penetrating radar

Inuit Youth Research Technicians Program (IYRTP)

glaciology

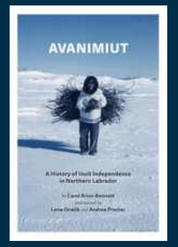
Next!

hydrology

Poster sessions

ecology

3:30pm Thursday (Glen 206)



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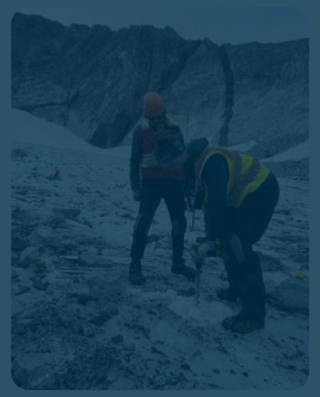
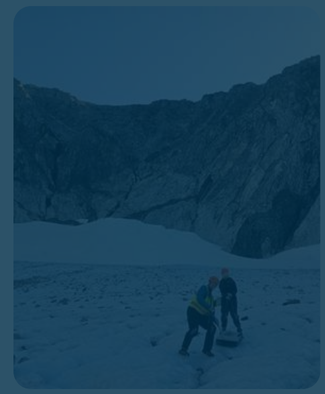


Direct mass balance

Geodetic mass balance



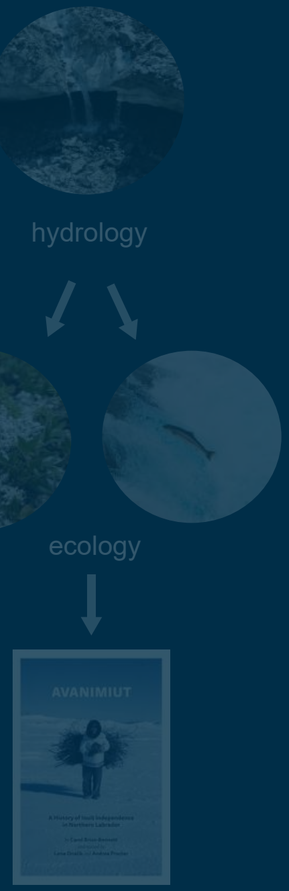
160 MHz Ground penetrating radar

Inuit Youth Research Technicians Program (IYRTP) **8:30am Thursday (Glen 205)**

glaciology

hydrology

ecology



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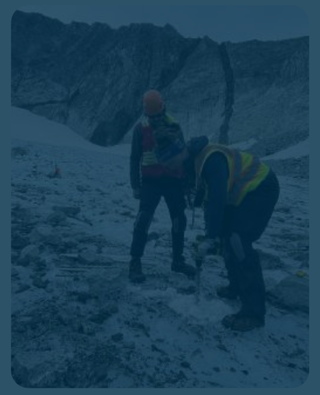
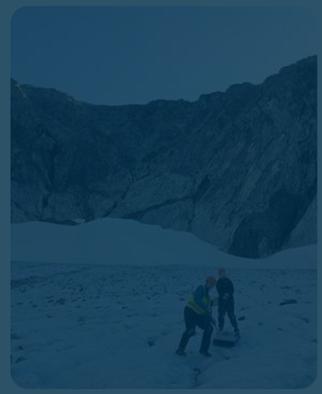


Direct mass balance

Geodetic mass balance



160 MHz Ground penetrating radar

Inuit Youth Research Technicians Program (IYRTP)

Changes to a small mountain glacier

Timescales

- Short term (4 days)
- Medium term (3 years)
- Long term (20 years)

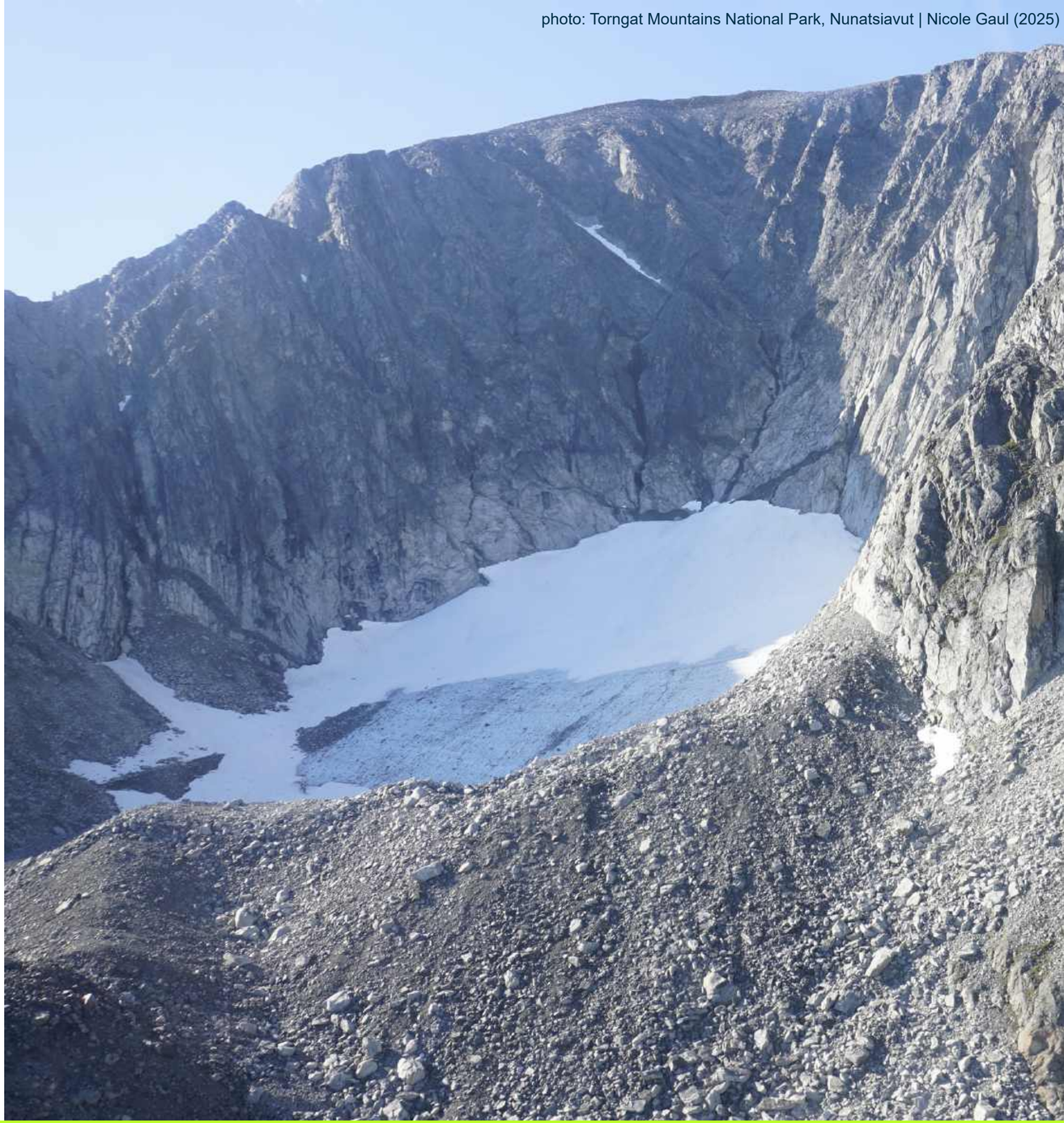
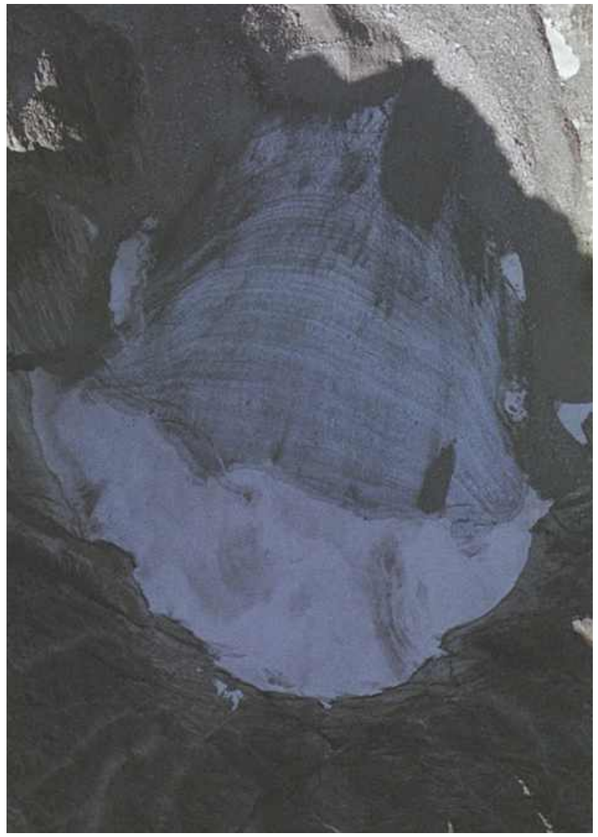


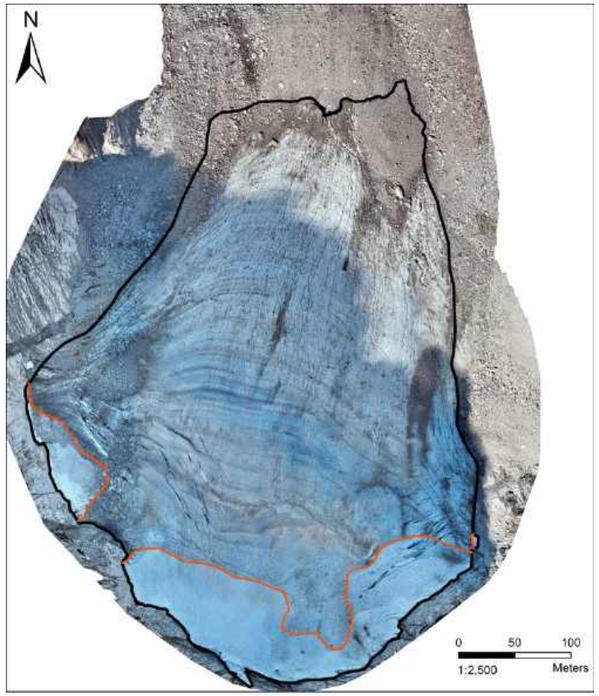
photo: Torngat Mountains National Park, Nunatsiavut | Nicole Gaul (2025)

Overview

2005



2023



Glacier Extent (2023)
Snowline (2023)

Map produced by Nicole Gaul of the Northern Environmental Geoscience Laboratory (NEGL) on Sunday, December 07, 2025.

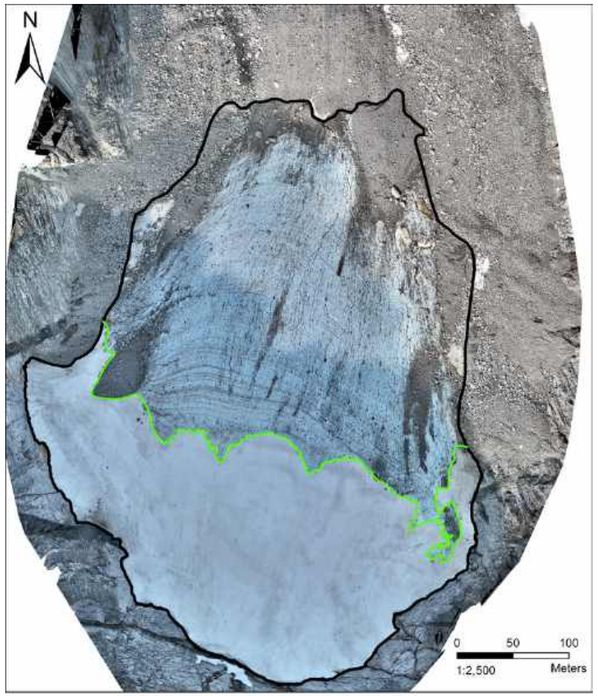
Basemap is a Pix4D orthomosaic reconstruction (RMS 2.054 m) using RPA images (n=770) collected using a DJI Mavic 3 Enterprise on July 31 and August 04, 2023 by members of the NEGL.

Map projected to WGS84 UTM Zone 20N.

2023 Extent of Unnamed glacier in Torngat Mountains National Park

DRAFT

2024



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Snowline (2024)

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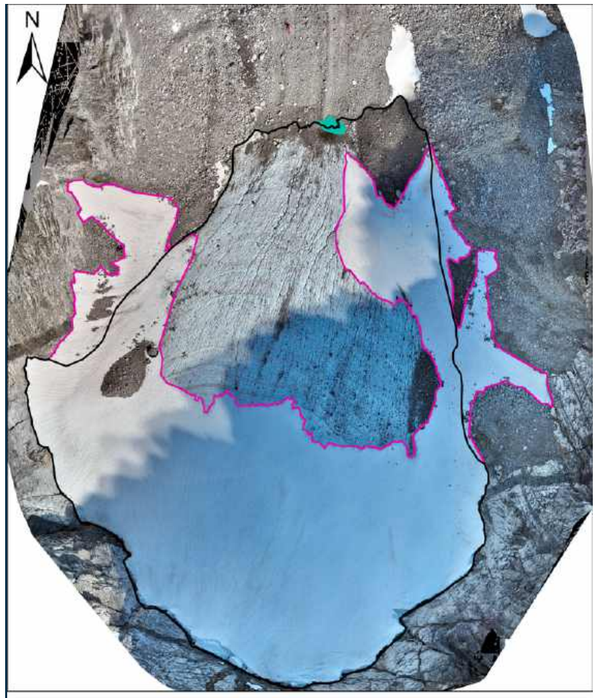
Map projected to WGS84 UTM Zone 20N.

2024 Extent of Unnamed glacier in Torngat Mountains National Park

DRAFT

2025



Glacier Extent
Snowline
Proglacial lake

0 50 100
1:2,500 Meters

Map produced by Nicole Gaul of the Northern Environmental Geoscience Laboratory (NEGL) on Thursday, December 11, 2025.

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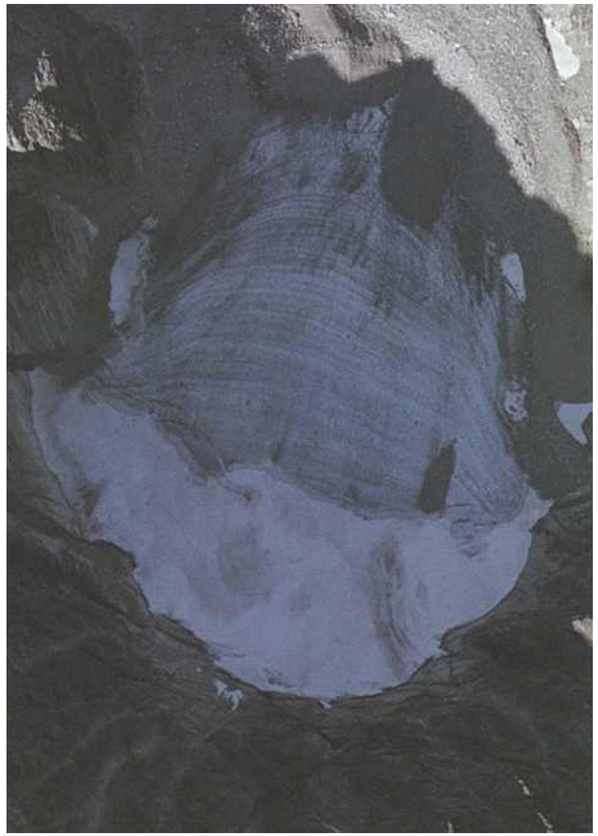
Map projected to WGS84 UTM Zone 20N.

Extent of Unnamed glacier in Torngat Mountains National Park (August 10, 2025)

DRAFT

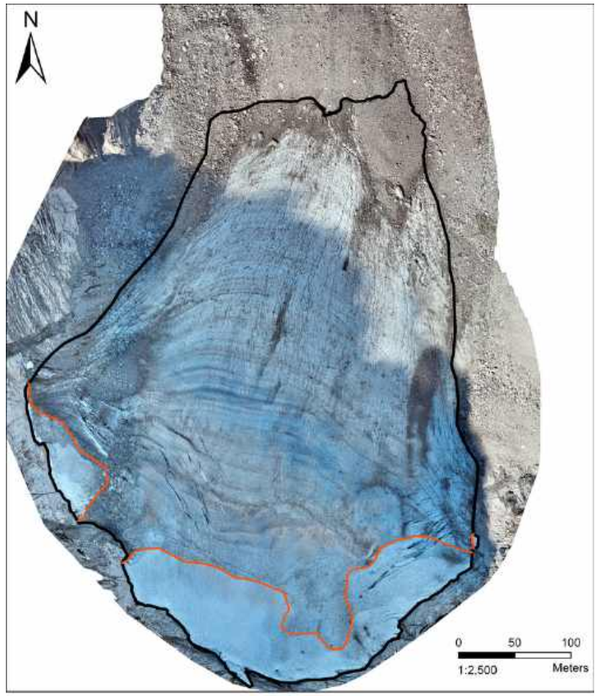
Overview

2005



Long term

2023



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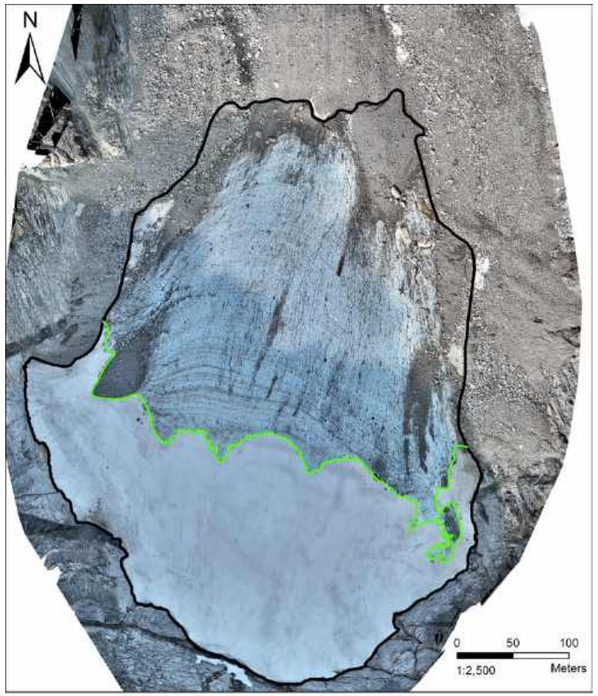
2023 Extent of Unnamed glacier in Torngat Mountains National Park

DRAFT

2024



Glacier Extent (2024)
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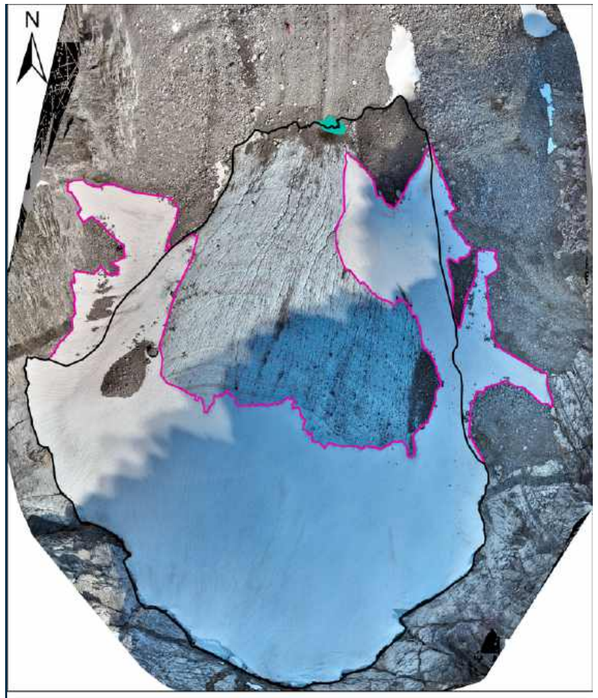
2024 Extent of Unnamed glacier in Torngat Mountains National Park

DRAFT

Medium term

2025



Glacier Extent
Snowline
Proglacial lake

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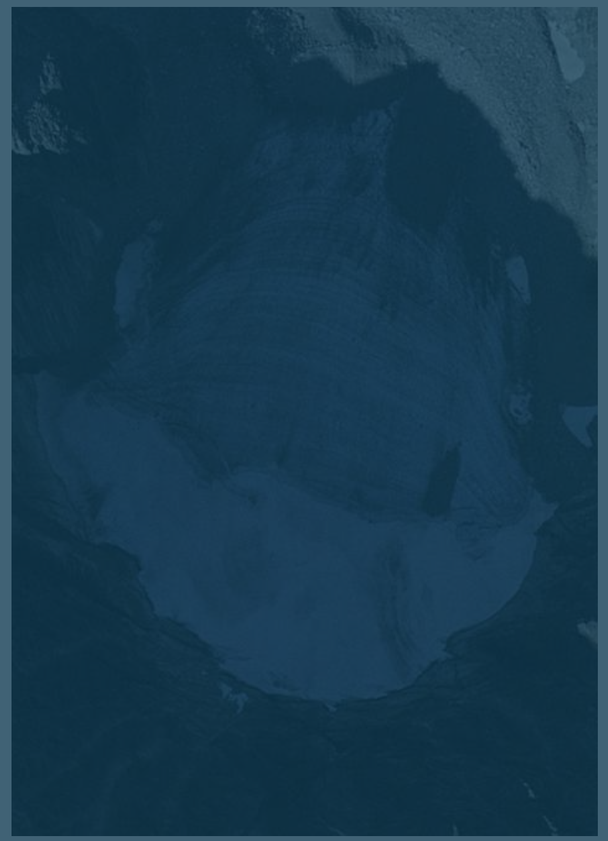
Extent of Unnamed glacier in Torngat Mountains National Park (August 10, 2025)

DRAFT

Short term

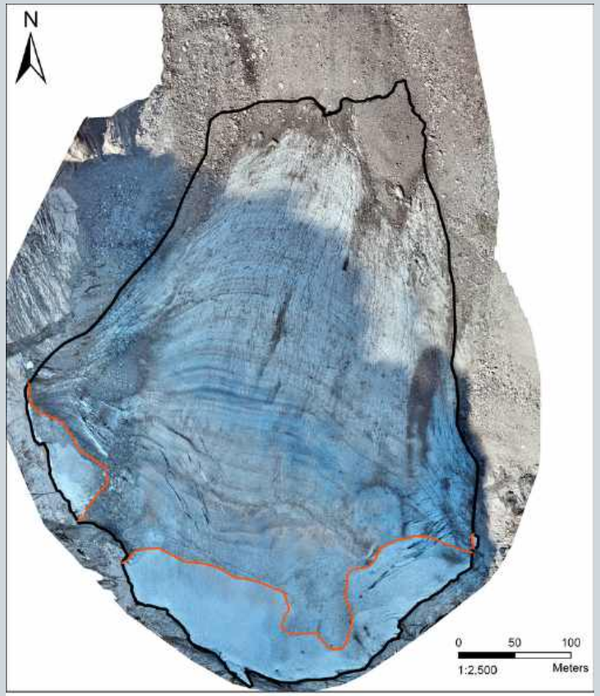
Overview

2005



Long term

2023



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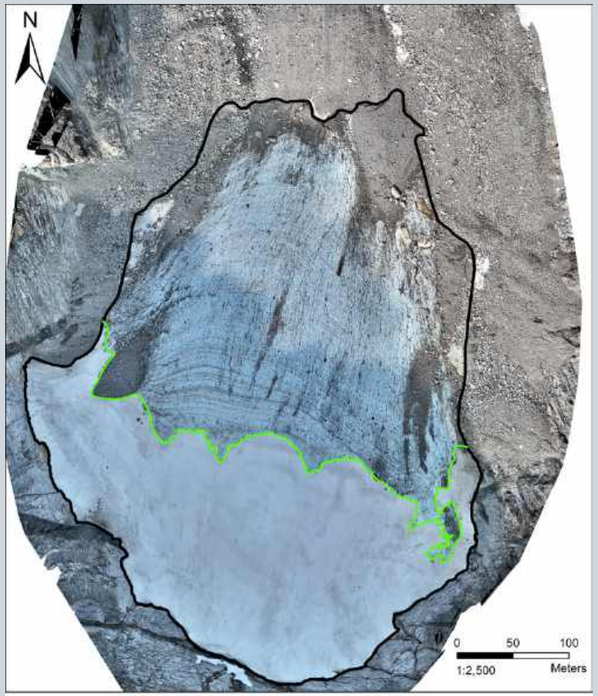
2023 Extent of Unnamed glacier in Torngat Mountains National Park

DRAFT

2024



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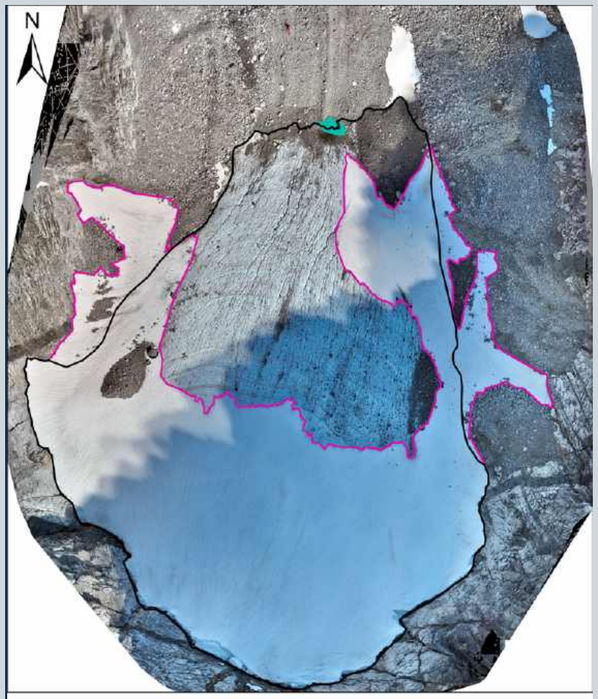
2024 Extent of Unnamed glacier in Torngat Mountains National Park

DRAFT

Medium term

2025



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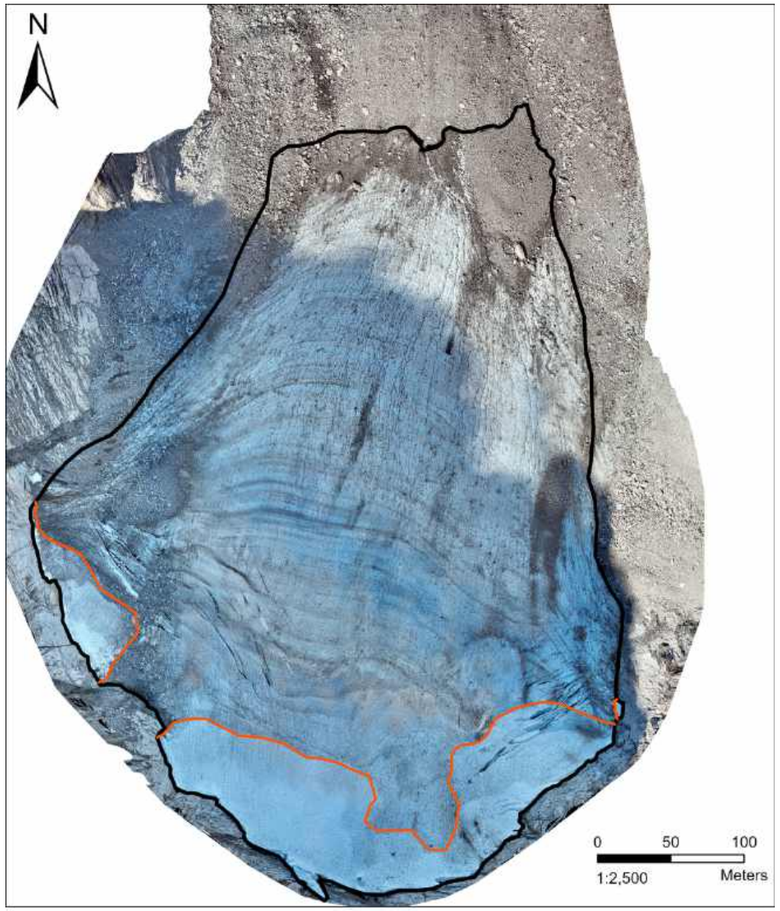
Extent of Unnamed glacier in Torngat Mountains National Park (August 10, 2025)

DRAFT

Short term

Medium term

2023 | 2024 | 2025



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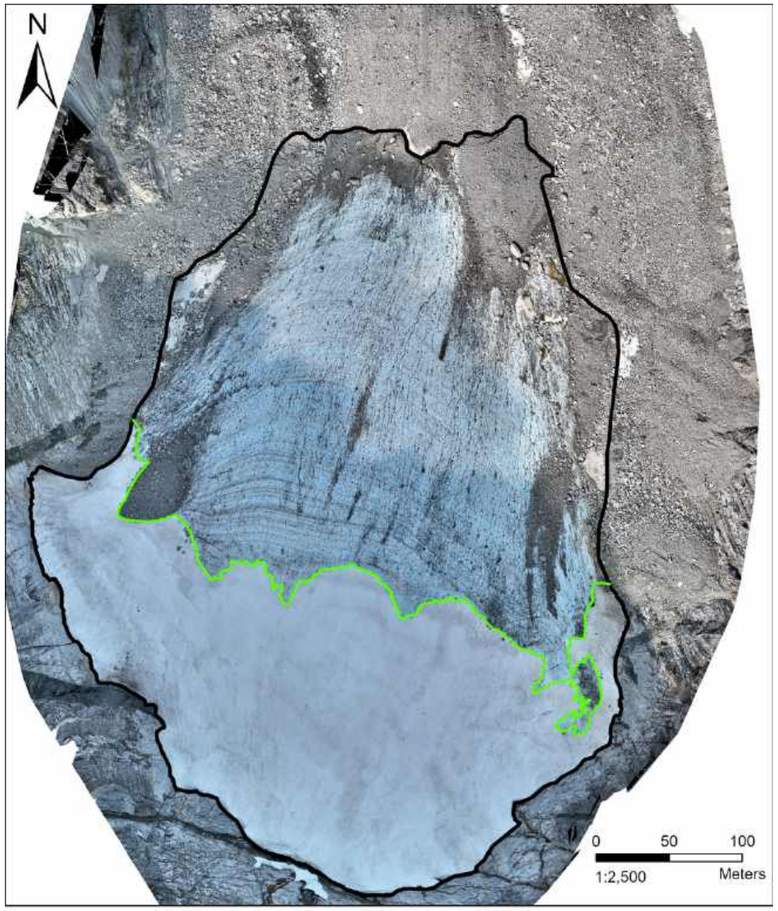

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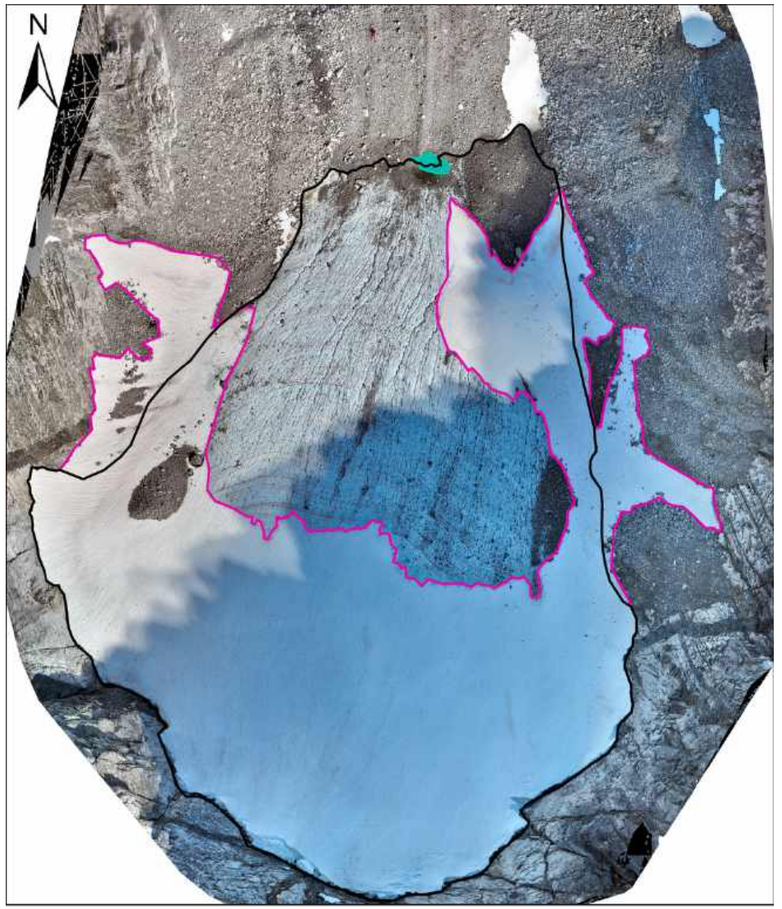

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Snowline
Proglacial lake

0 50 100
1:2,500 Meters

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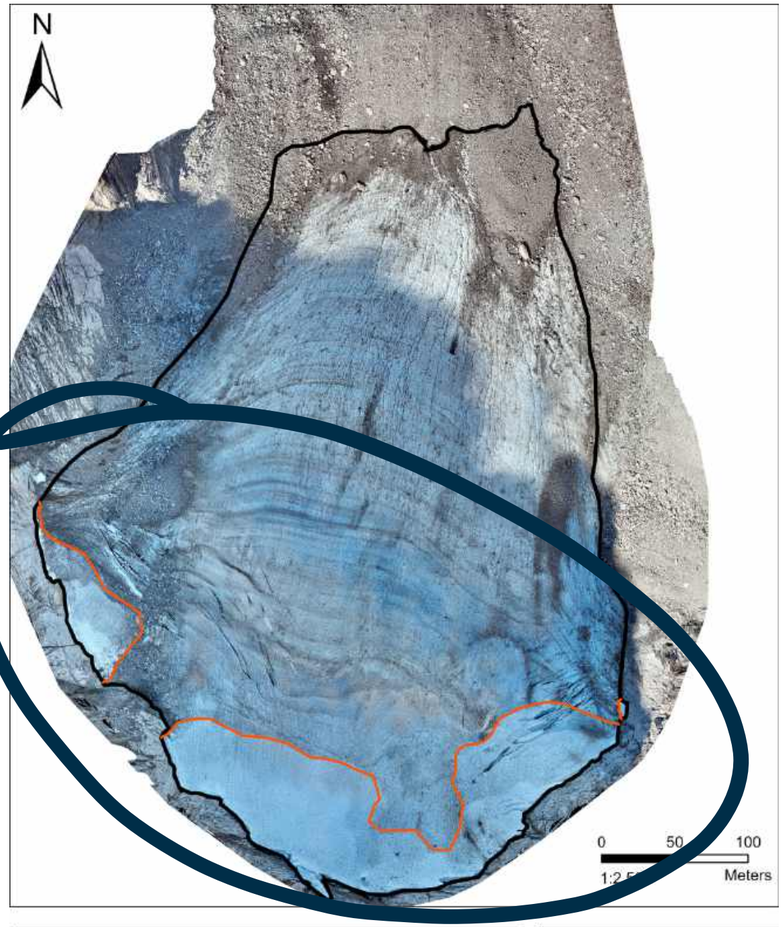
2023 | 2024 | 2025



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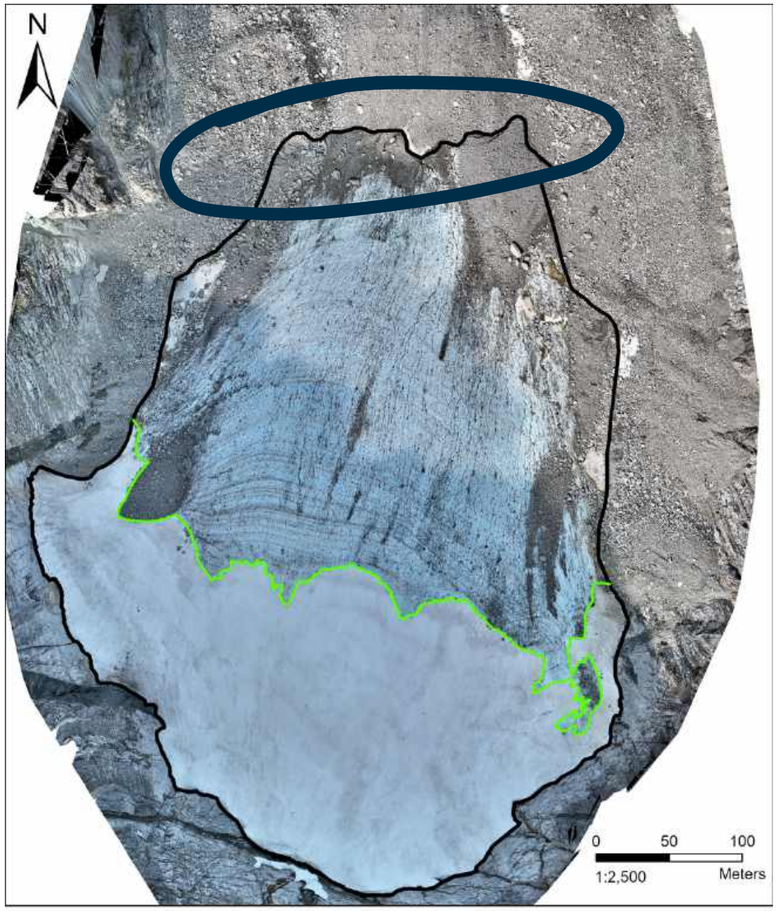

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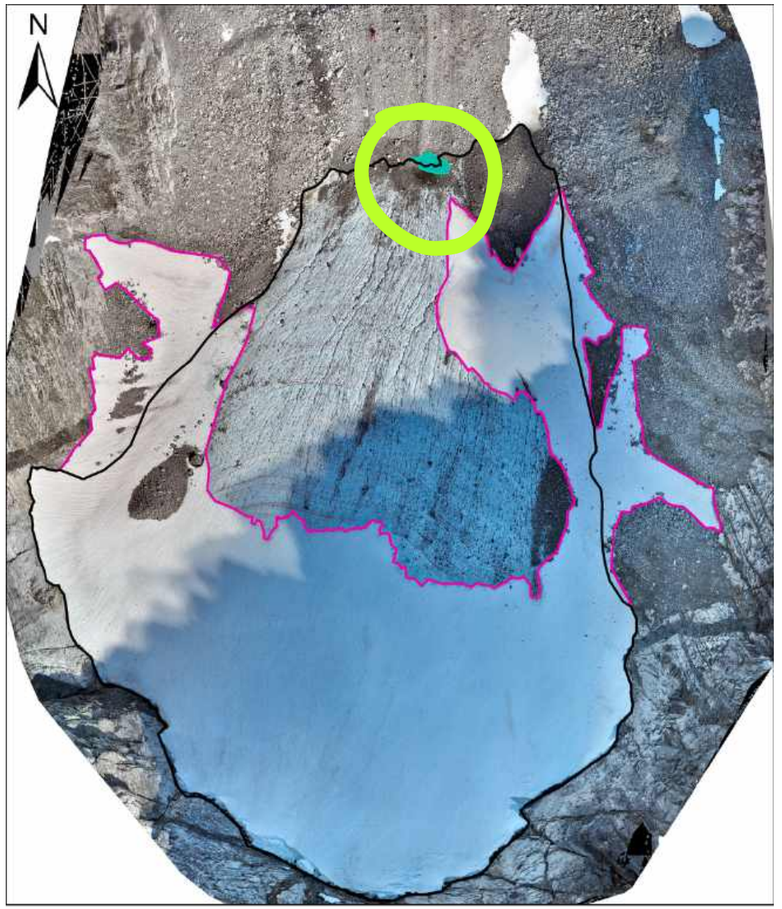

Glacier Extent
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Extent of Unnamed glacier in Torngat Mountains National Park (August 10, 2025)

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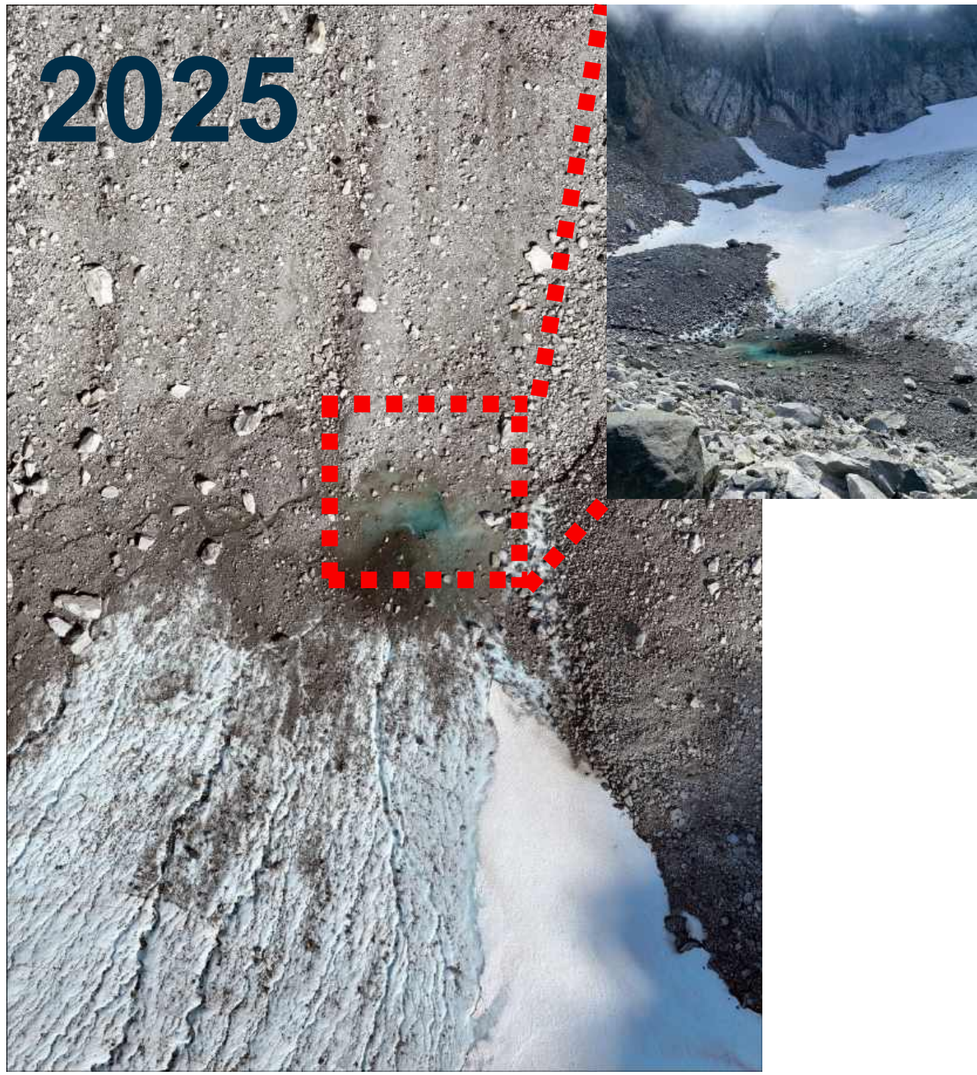
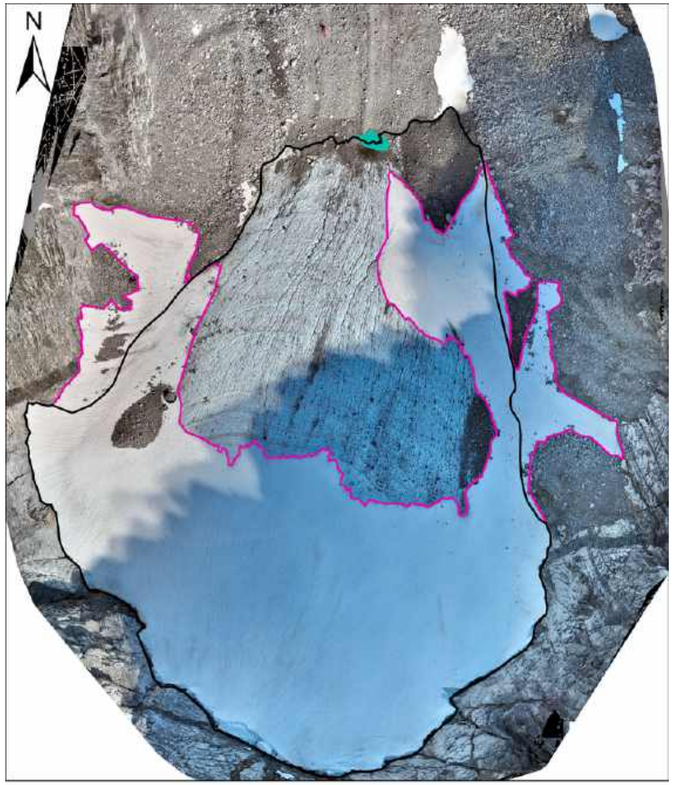
Medium term



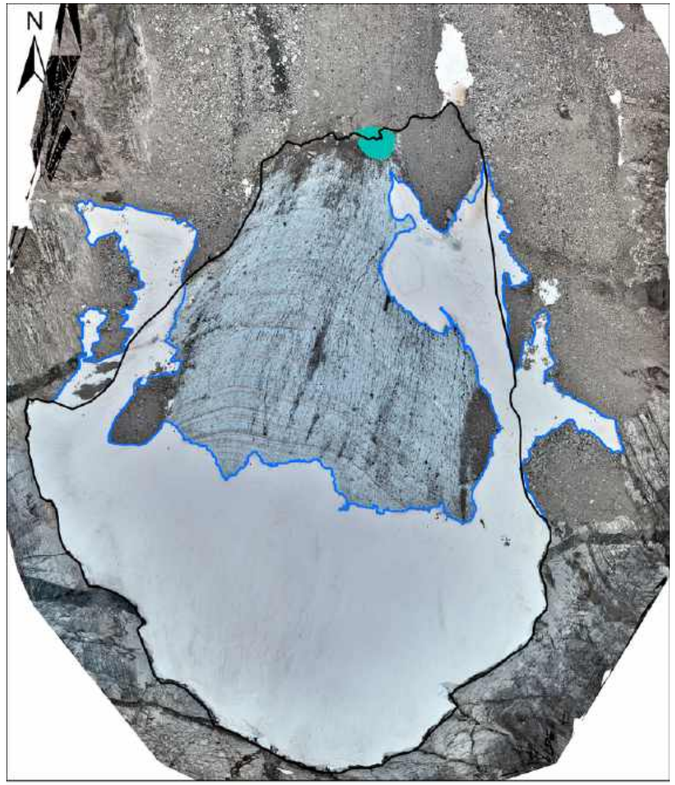
Short term

August 10 - 14, 2025

August 10



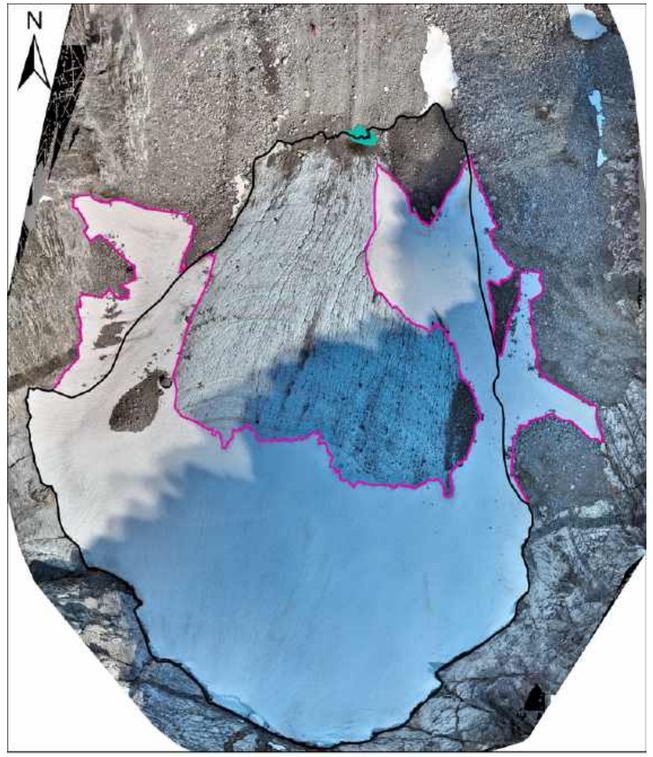
August 14



Short term

August 10 - 14, 2025

August 10



Glacier Extent
Snowline
Proglacial lake
0 50 100
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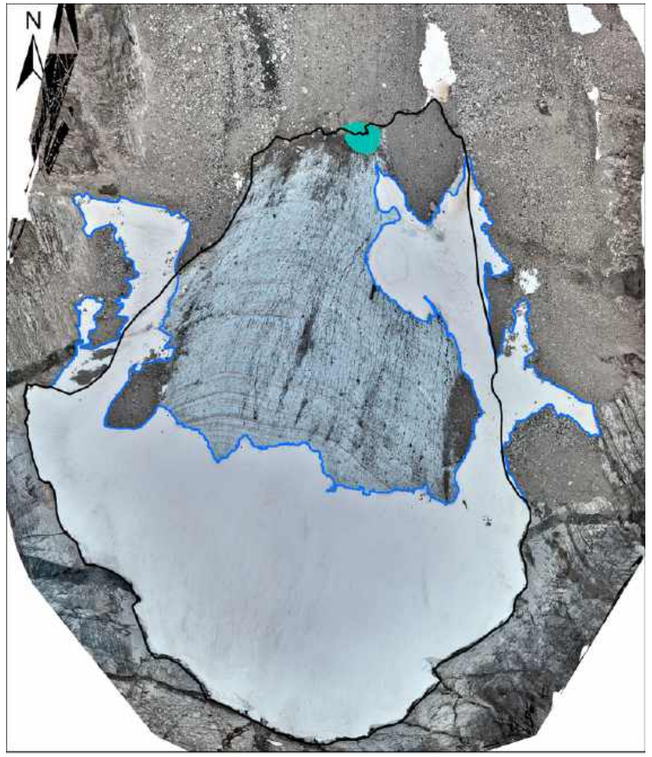
Extent of Unnamed glacier in Torngat Mountains National Park (August 10, 2025)

DRAFT

(10.4mm)

August 14



Glacier Extent
Snowline (Aug 14)
Proglacial lake
0 50 100
1:2,500 Meters

Map produced by Nicole Gaul of the Northern Environmental Geoscience Laboratory (NEGL) on Thursday, December 11, 2025.

Basemap is a Pix4D orthomosaic reconstruction (mean RMS 0.566 m) using RPA images (n=983) collected using a DJI Mavic 3 Enterprise on August 14, 2025 by members of the NEGL.

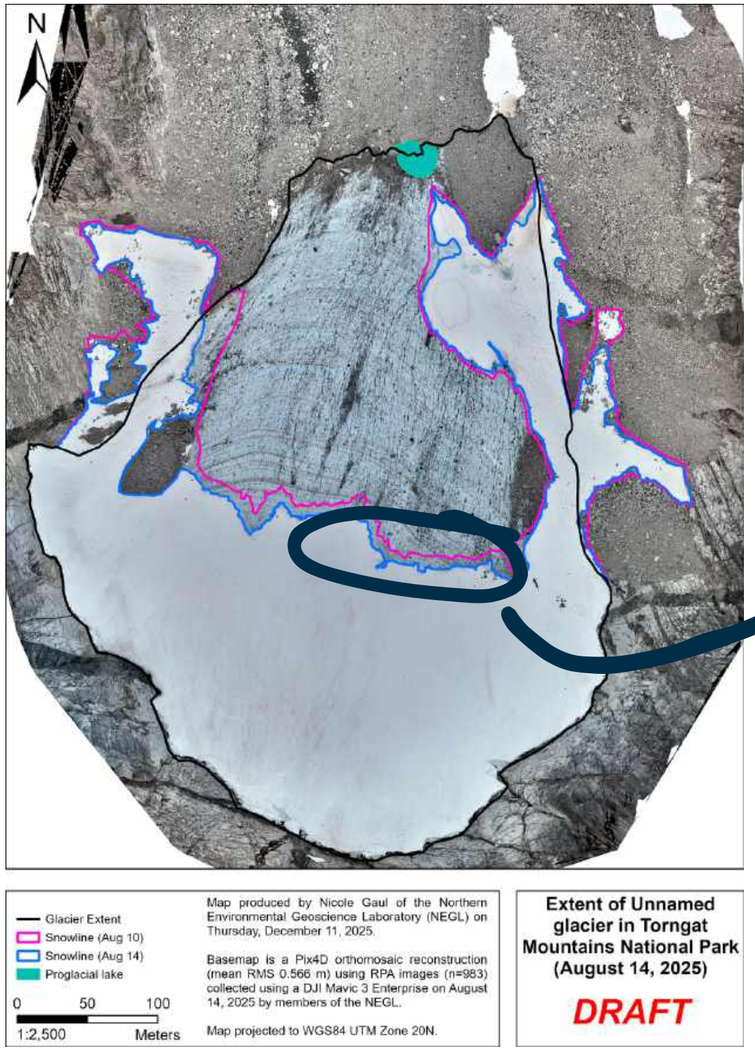
Map projected to WGS84 UTM Zone 20N.

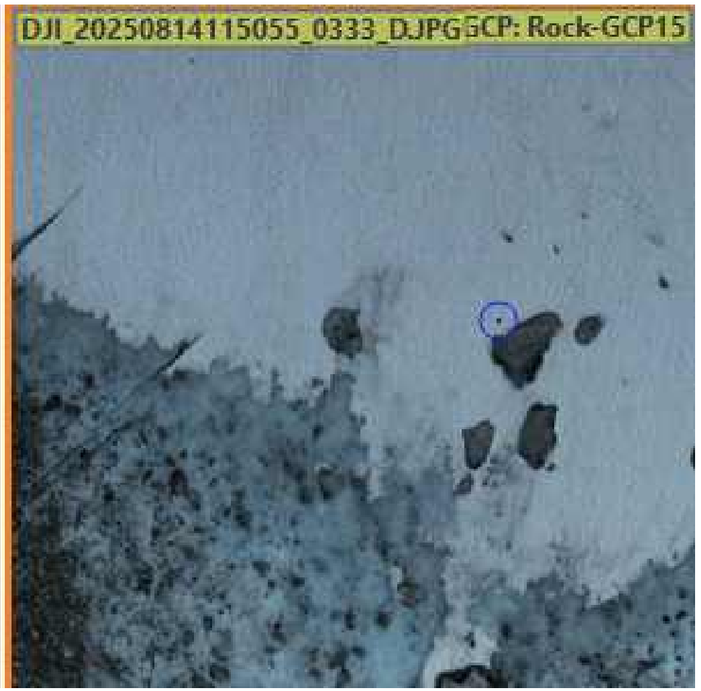
Extent of Unnamed glacier in Torngat Mountains National Park (August 14, 2025)

DRAFT

Short term

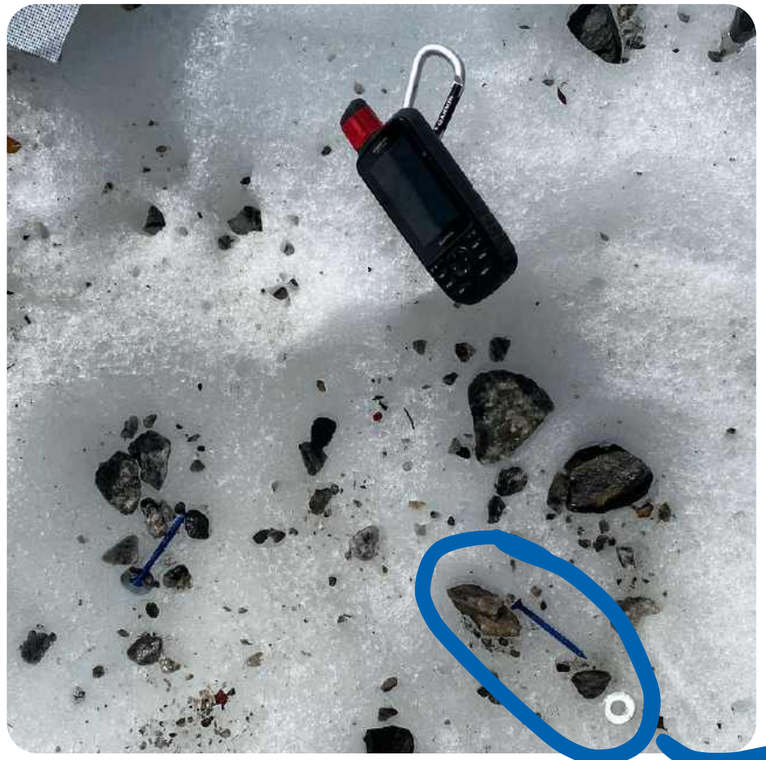
August 10 - 14, 2025

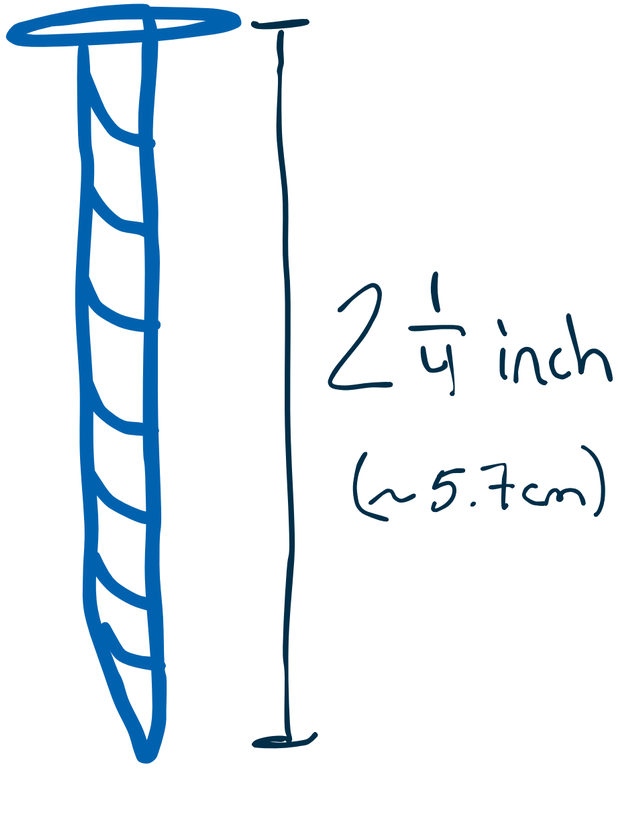




Short term

August 8 - 10, 2025





Next Steps

- Investigating changes since 2005
- Evaluating changing ice depth
- Measuring melt at ablation stake locations

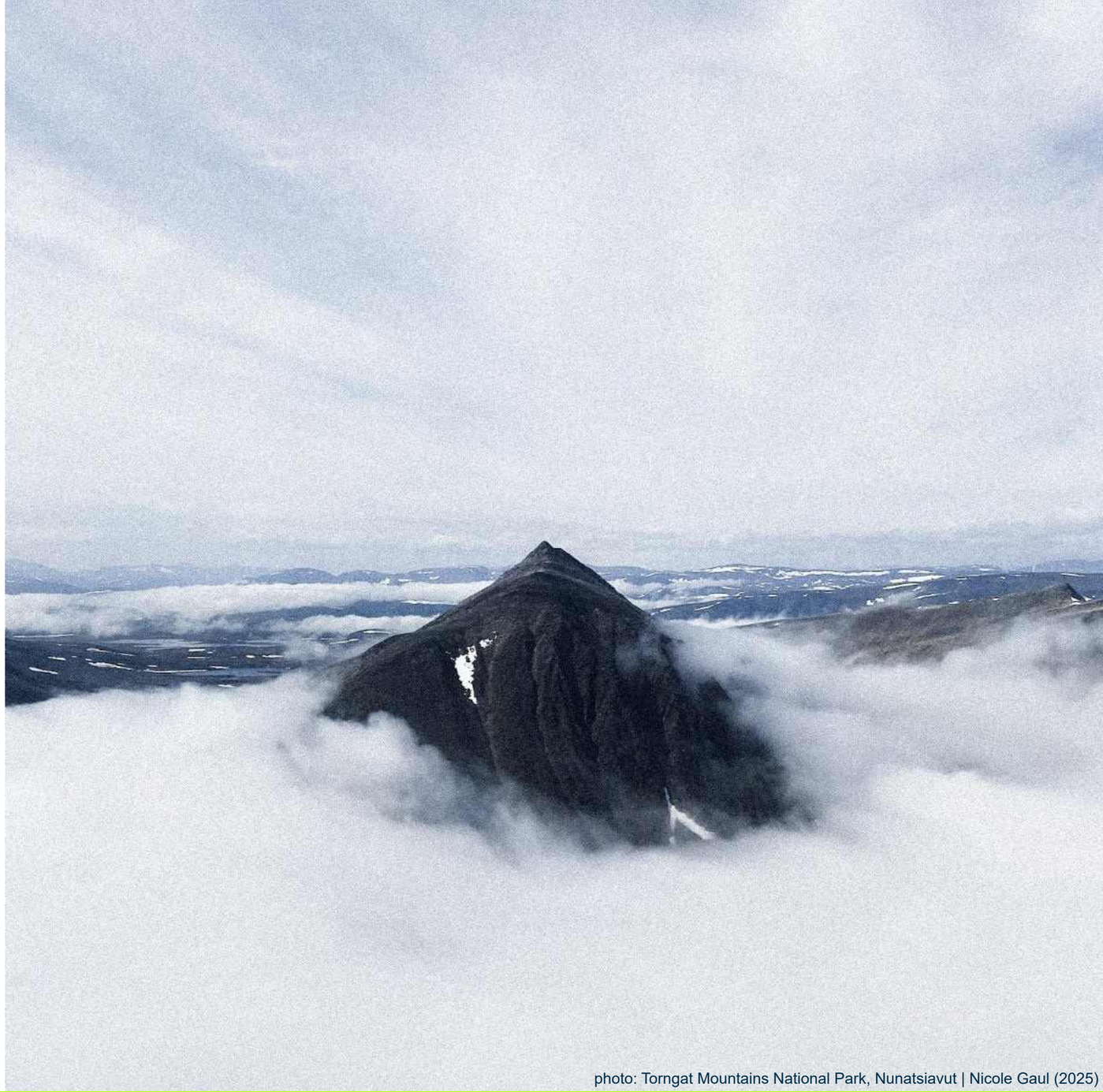


photo: Torngat Mountains National Park, Nunatsiavut | Nicole Gaul (2025)

photo: Torngat Mountains National Park, Nunatsiavut | Nicole Gaul (2025)

Thanks! Questions?

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