# Monitoring and communicating glacier outburst flood hazards from Mendenhall Glacier

**Eran Hood & Jason Amundson**
**University of Alaska Southeast**
**ACAAP Seminar Feb. 18, 2026**

UNIVERSITY of ALASKA SOUTHEAST

# Acknowledgements


USGS science for a changing world

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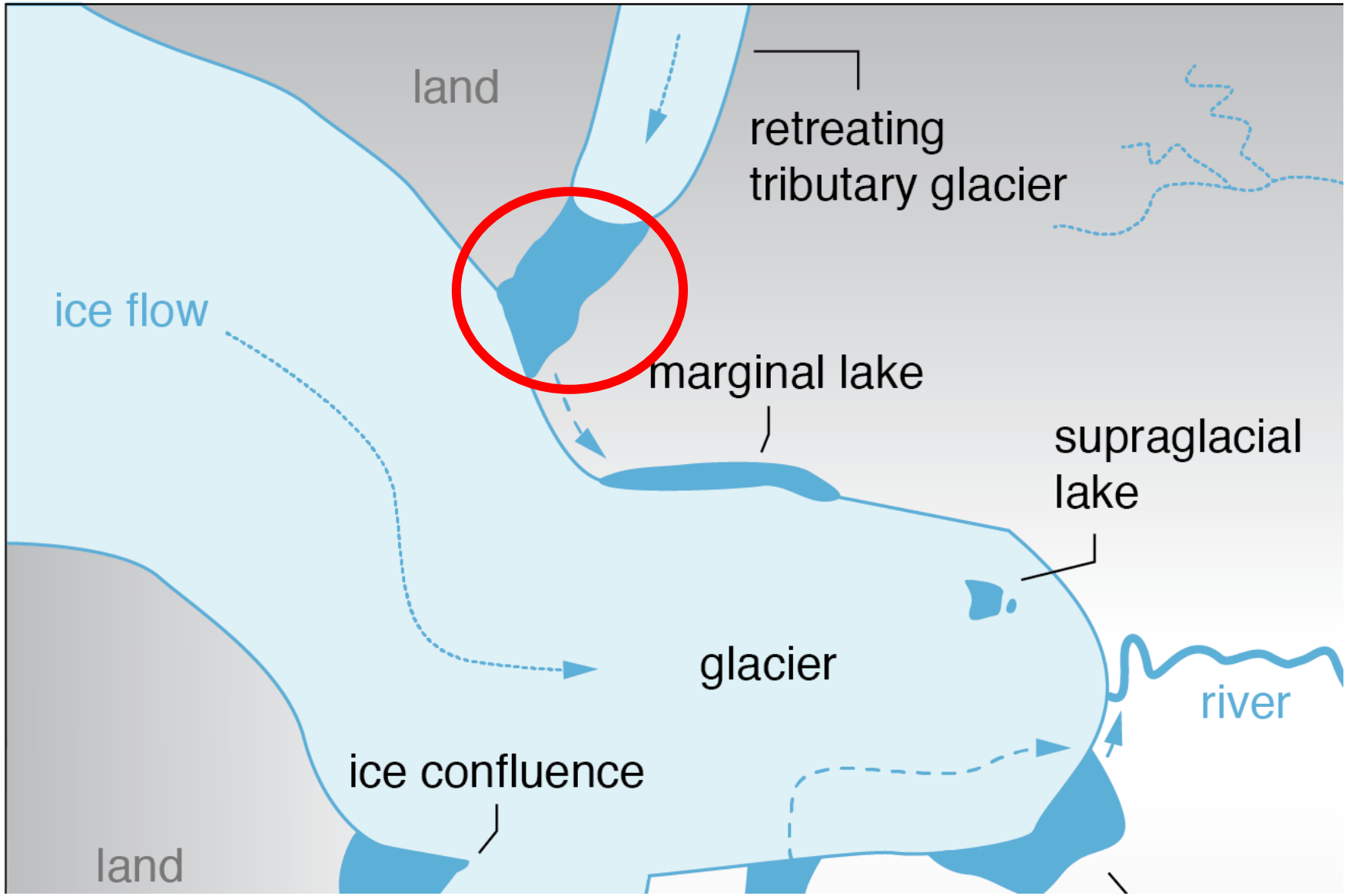
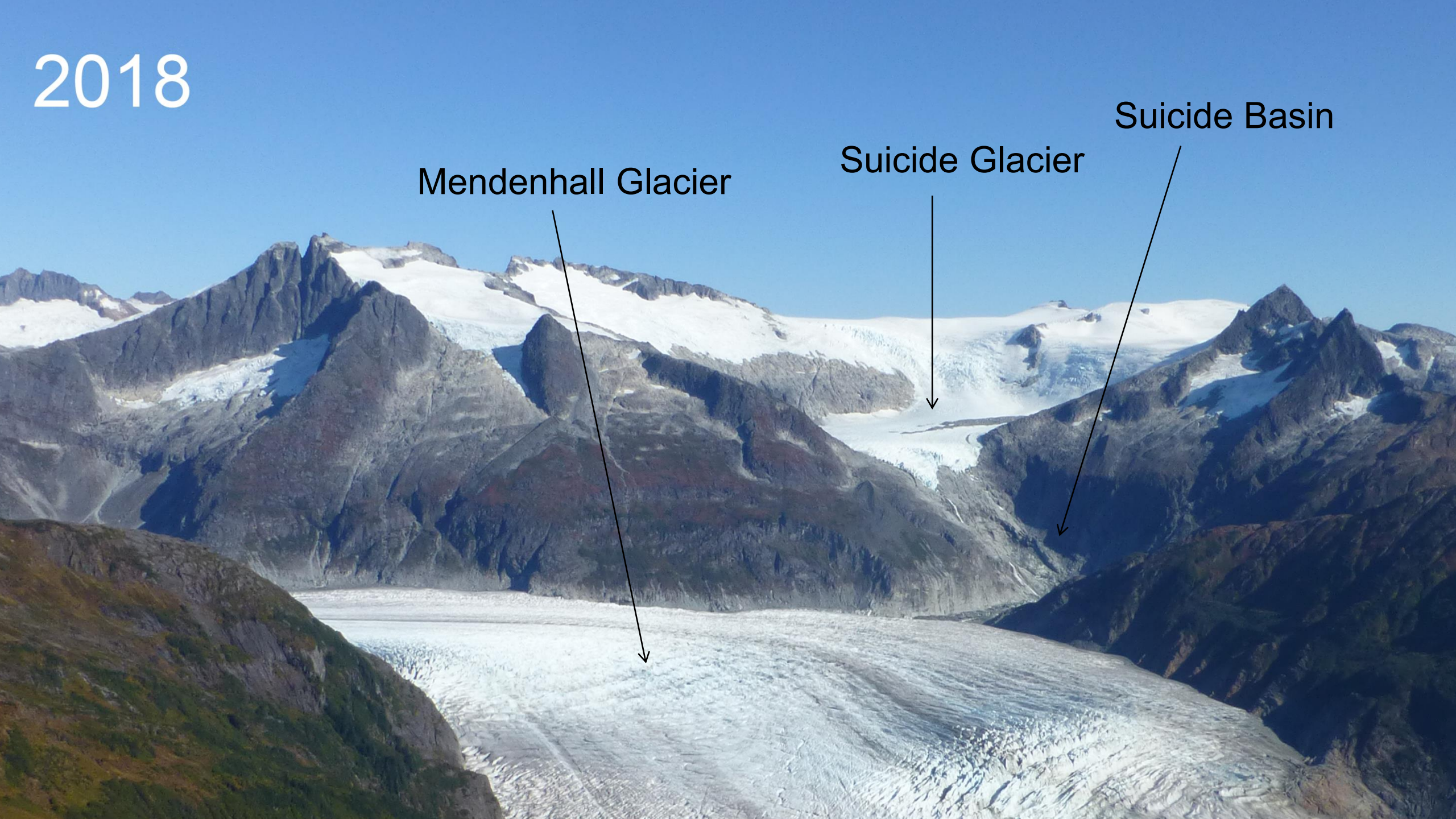
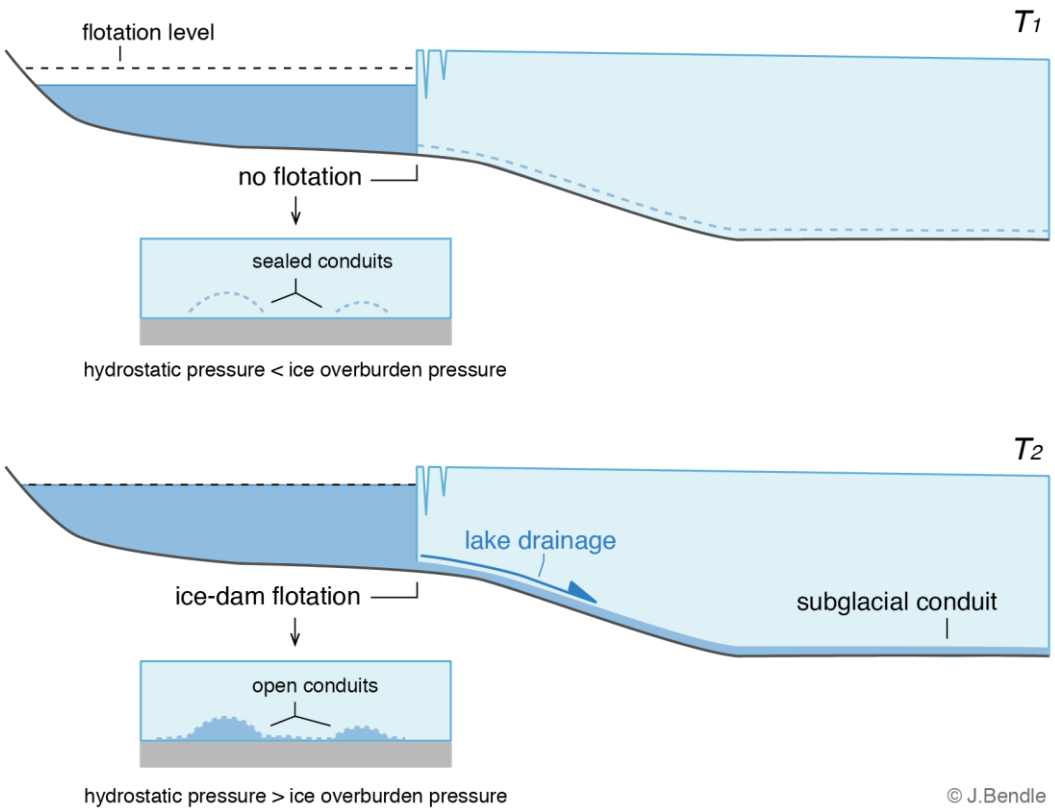
# What are glacier lake outburst floods (GLOFs)?




https://www.antarcticglaciers.org/


2018
Mendenhall Glacier
Suicide Glacier
Suicide Basin

# Basin drainage

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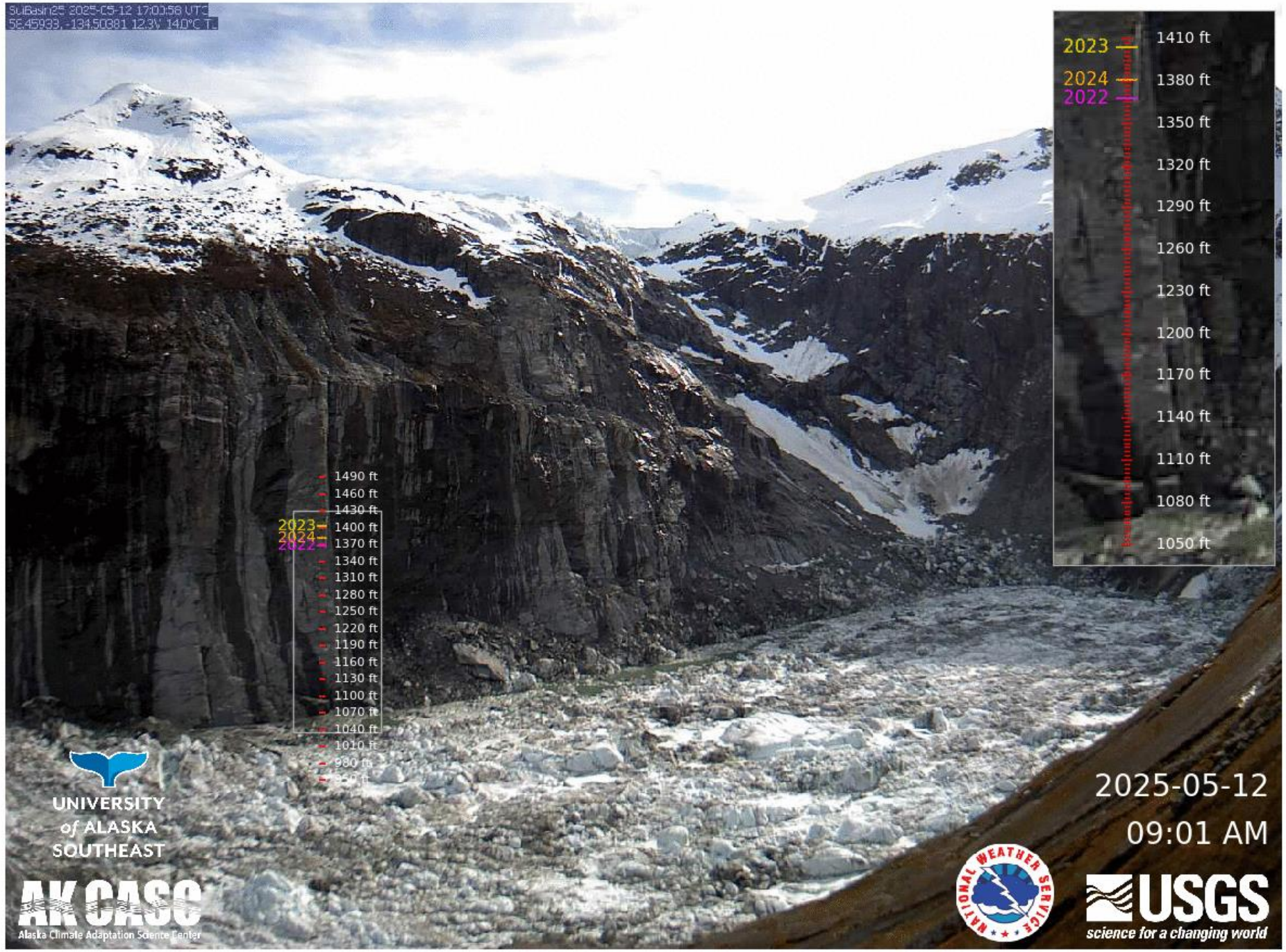
SuiBasin25 2025-05-12 17:00:56 UTC
56.45933, -134.50381 12.3V 14.0°C TL
2023
2024
2022
1410 ft
1380 ft
1350 ft
1320 ft
1290 ft
1260 ft
1230 ft
1200 ft
1170 ft
1140 ft
1110 ft
1080 ft
1050 ft
1490 ft
1460 ft
1430 ft
2023
2024
2022
1400 ft
1370 ft
1340 ft
1310 ft
1280 ft
1250 ft
1220 ft
1190 ft
1160 ft
1130 ft
1100 ft
1070 ft
1040 ft
1010 ft
980 ft
UNIVERSITY of ALASKA SOUTHEAST
AK CASC
Alaska Climate Adaptation Science Center
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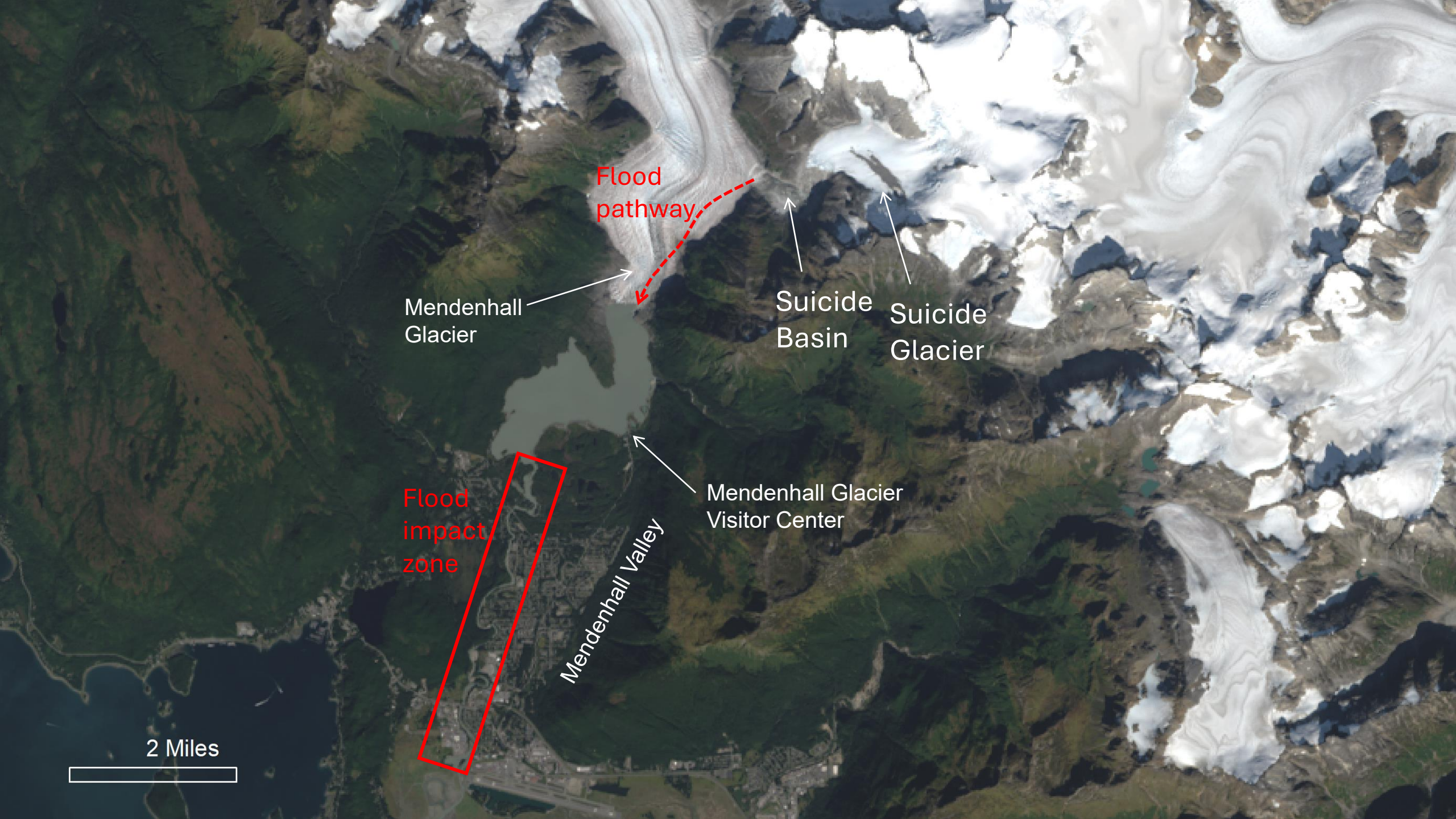
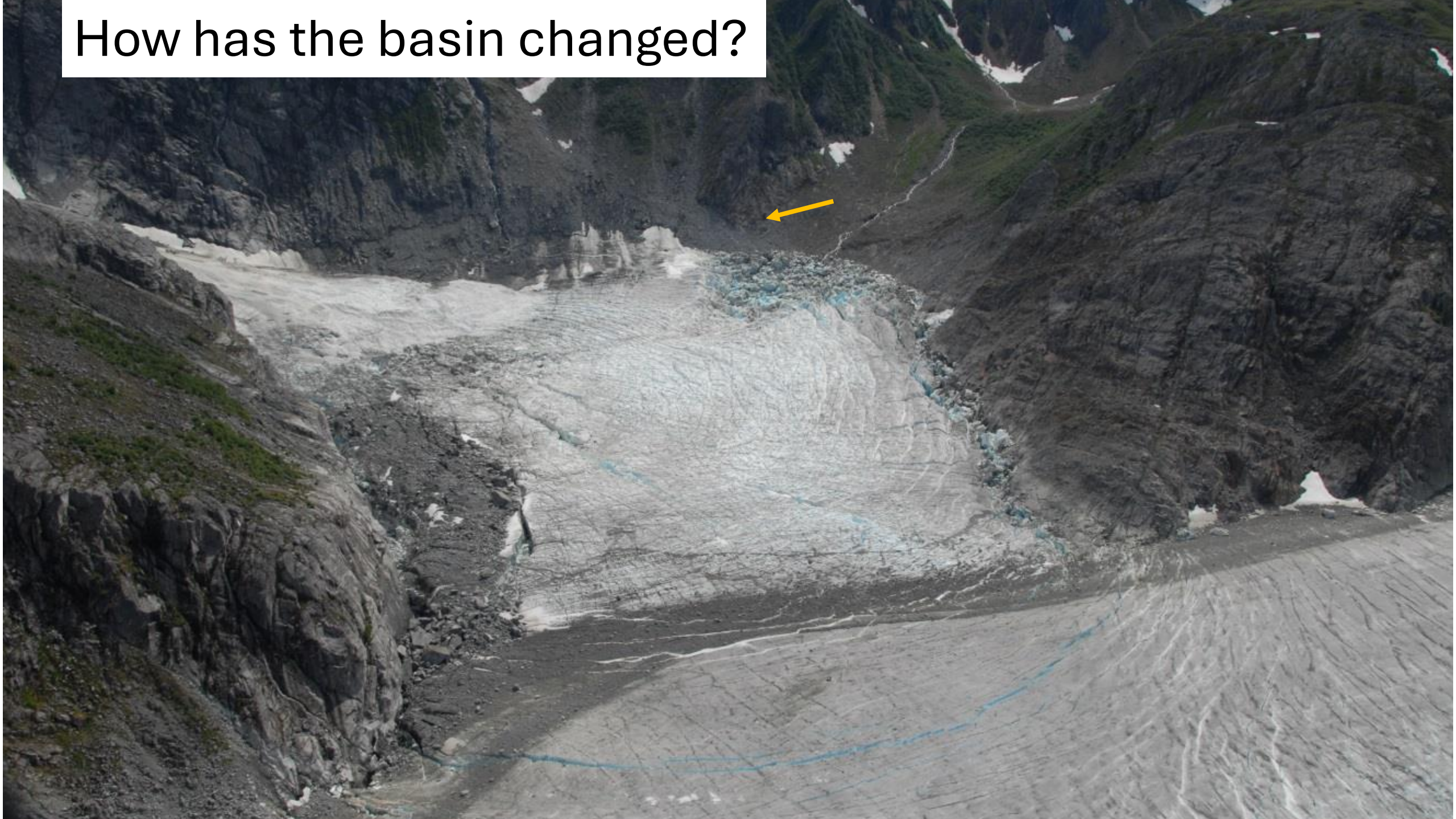
NATIONAL WEATHER SERVICE
USGS
science for a changing world


Flood pathway
Mendenhall Glacier
Suicide Basin
Suicide Glacier
Flood impact zone
Mendenhall Valley
Mendenhall Glacier Visitor Center
2 Miles

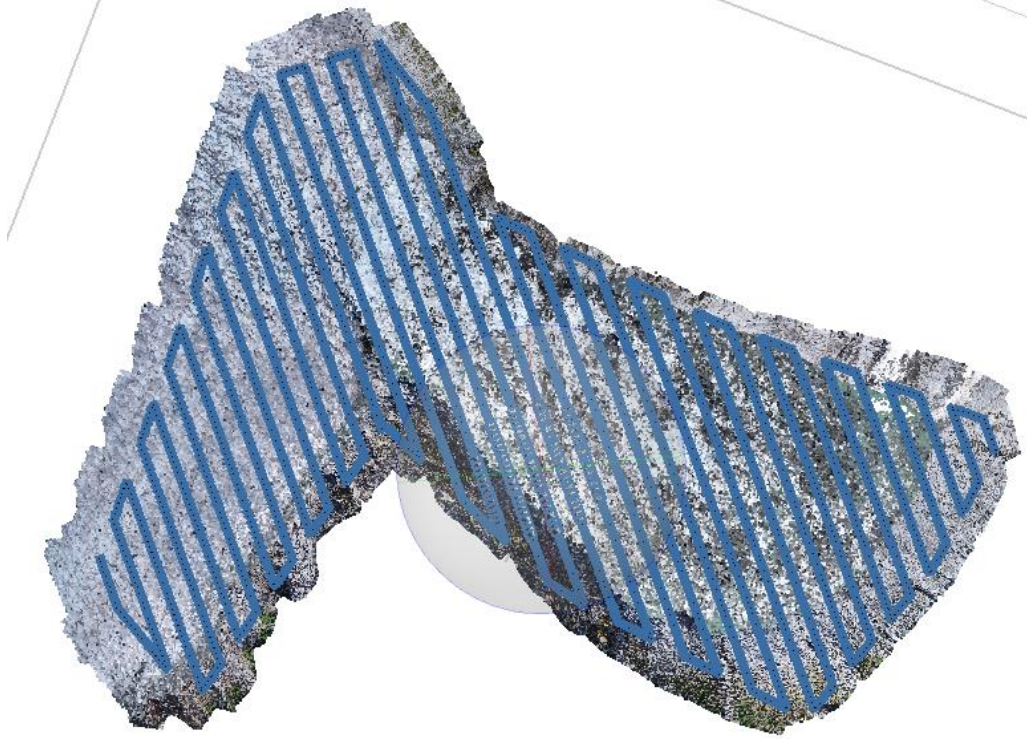
# 2023: Extensive downstream erosion


# 2024: Widespread flooding

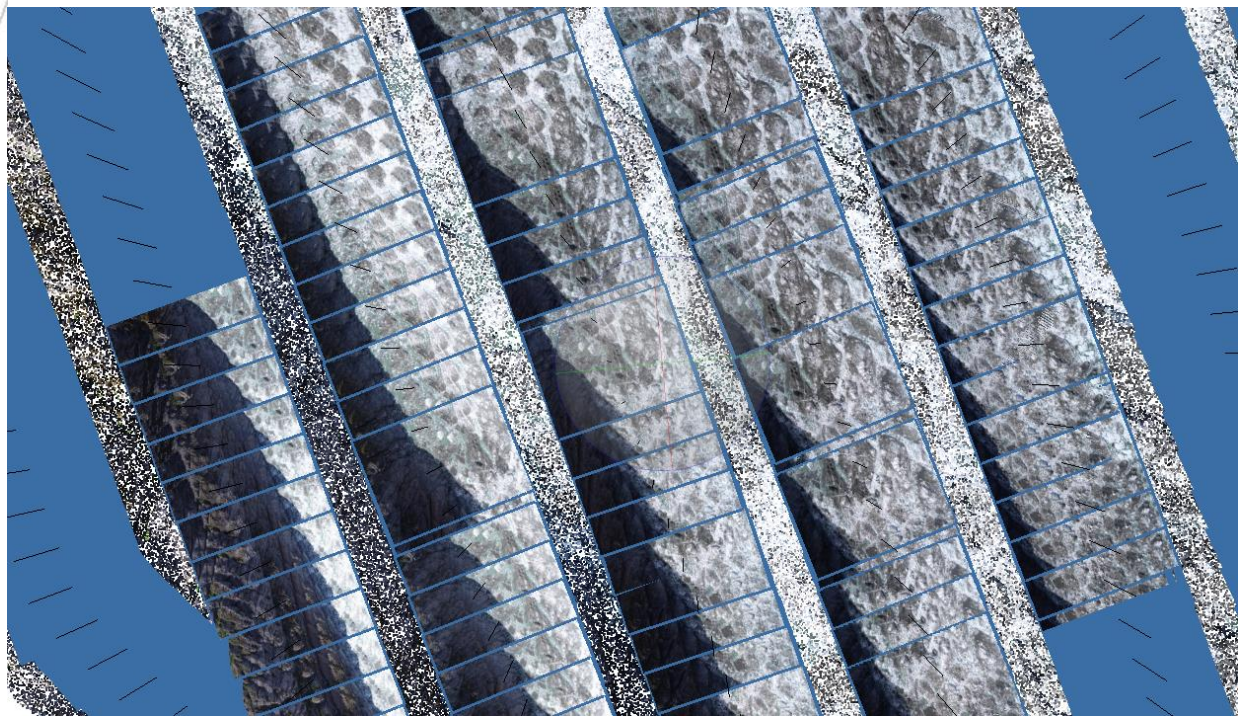
# How has the basin changed?



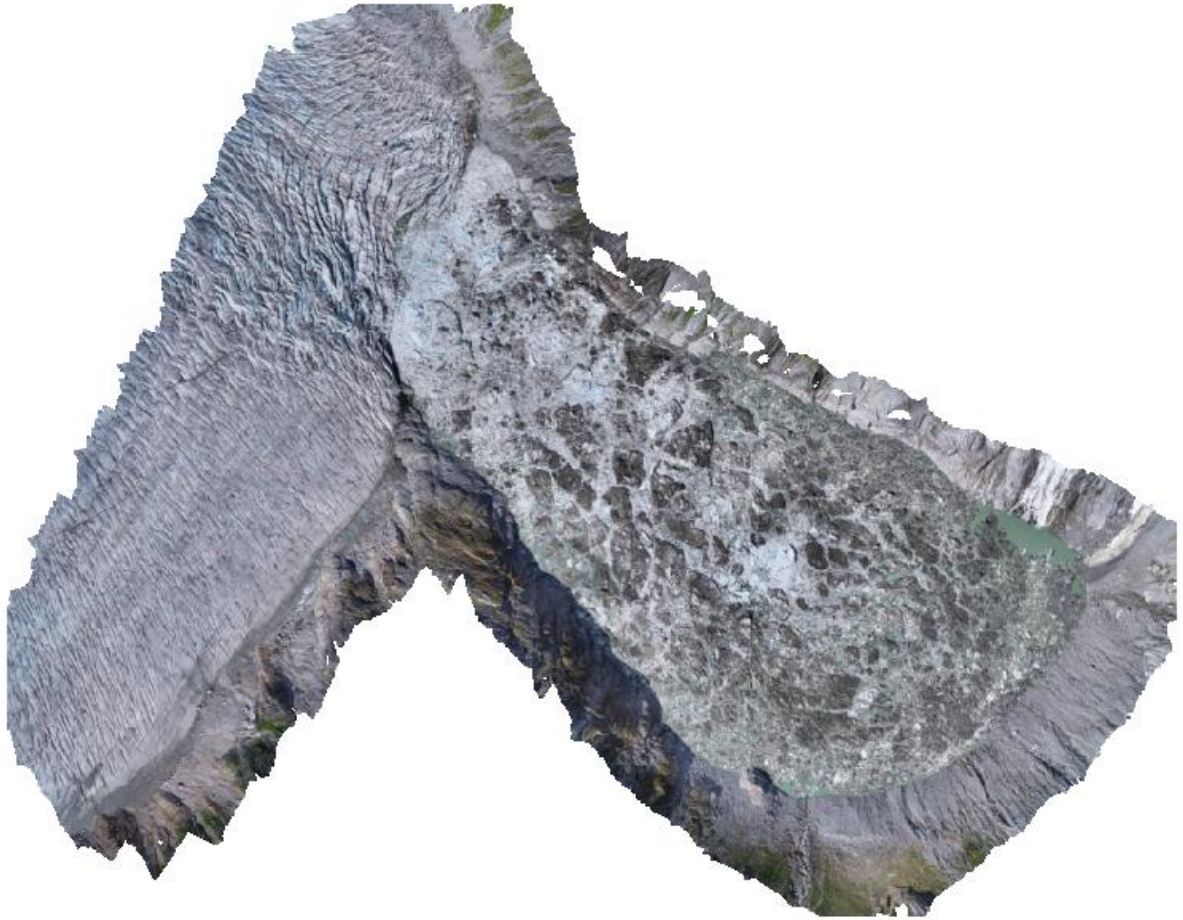

Spillway
Ice Dam

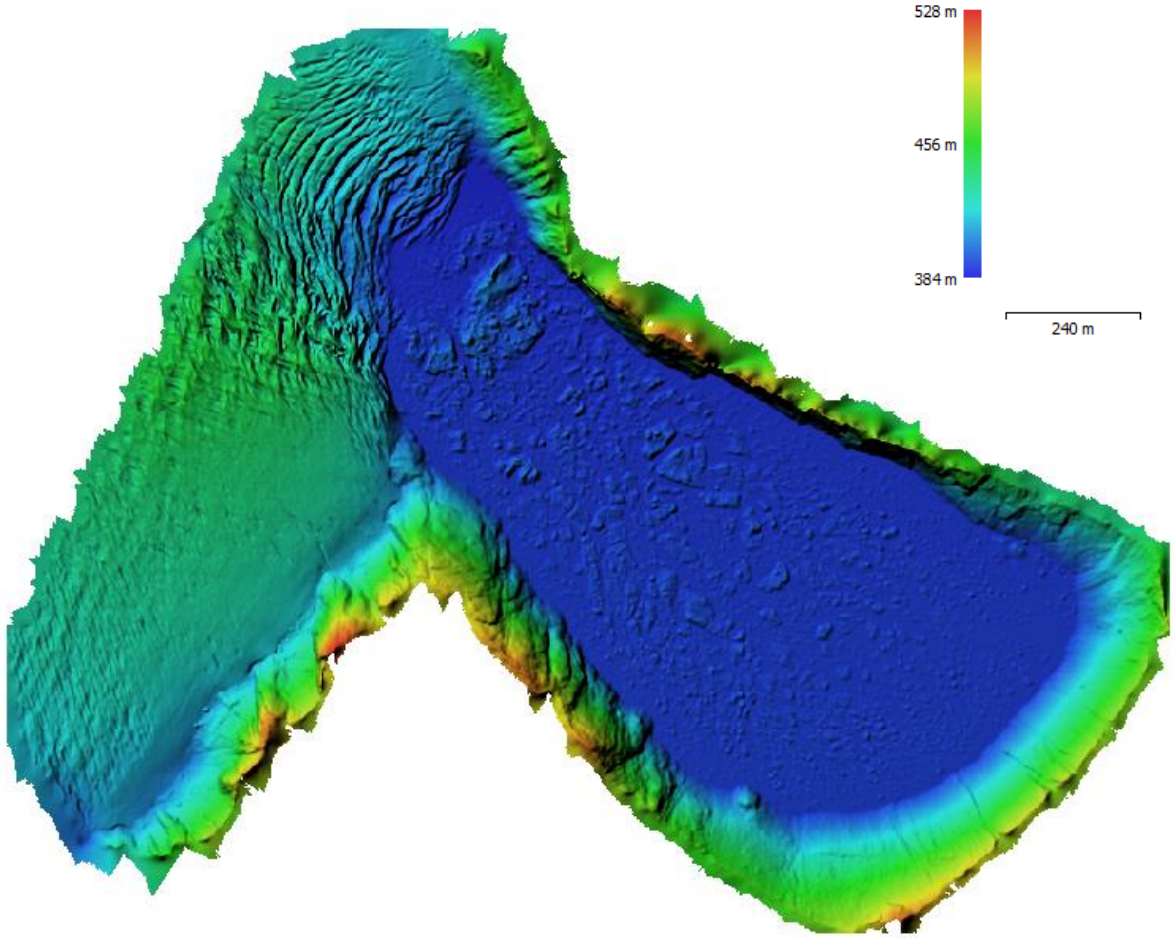


# Structure-from-motion Photogrammetry

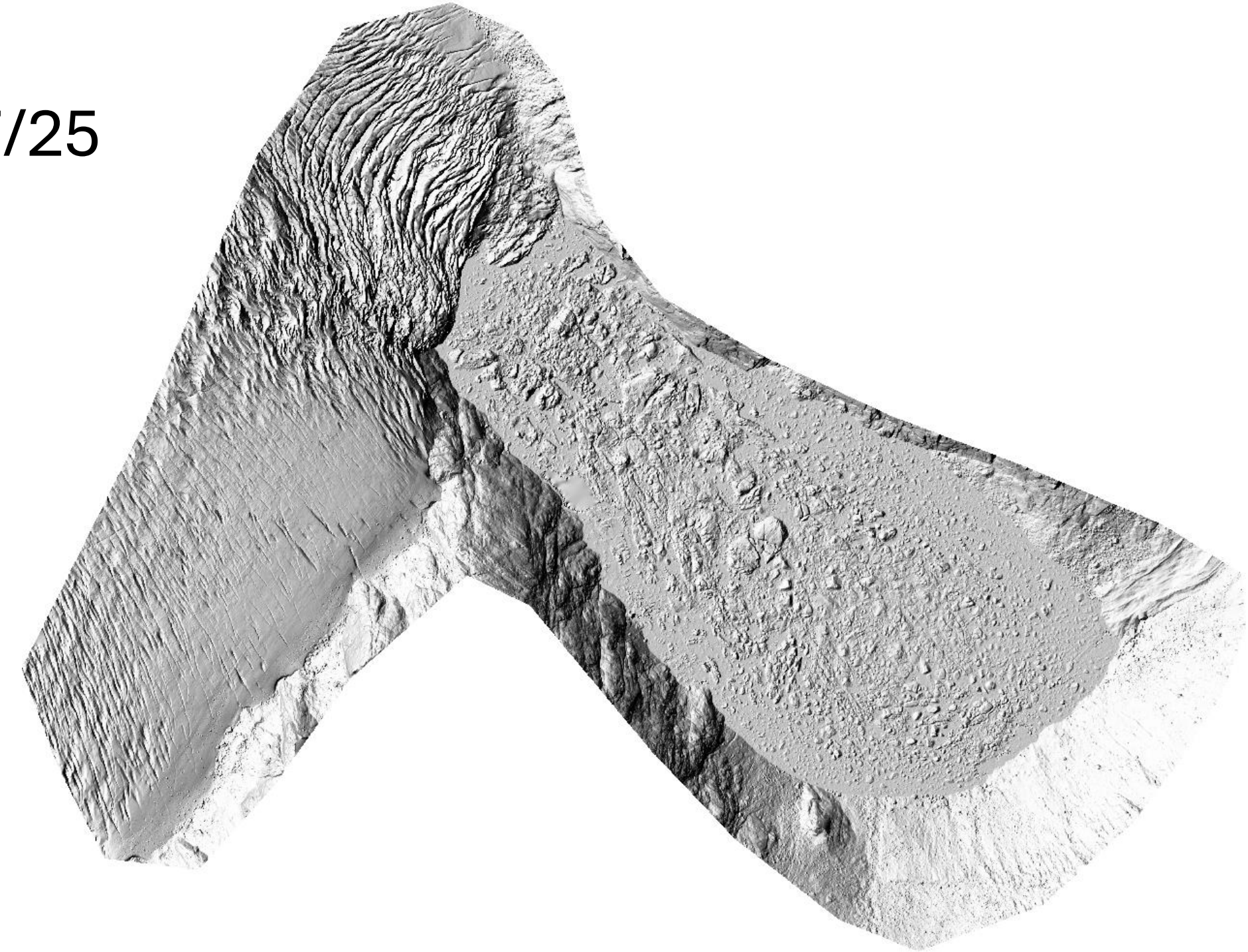


# Elevation models

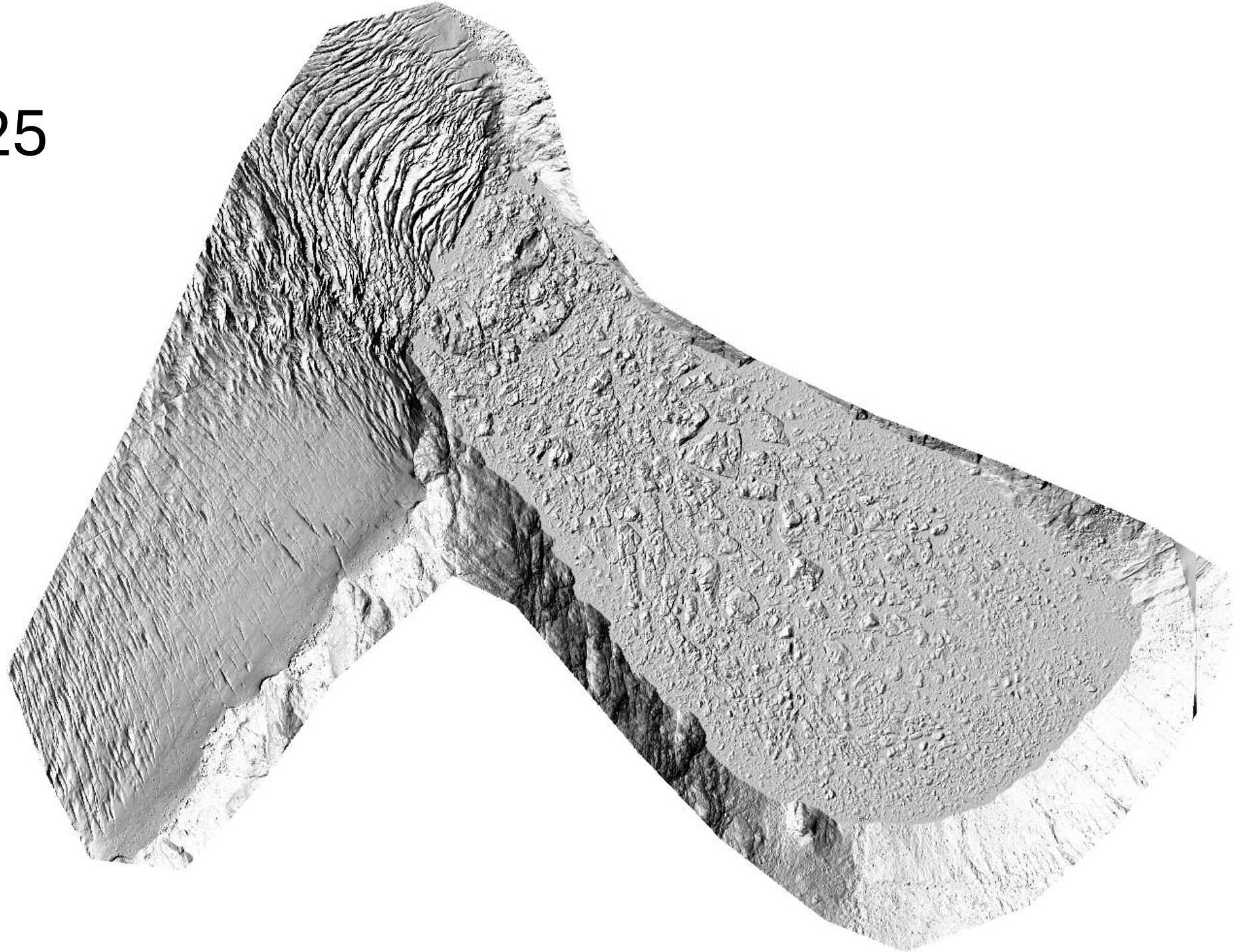




6/17/25



7/5/25



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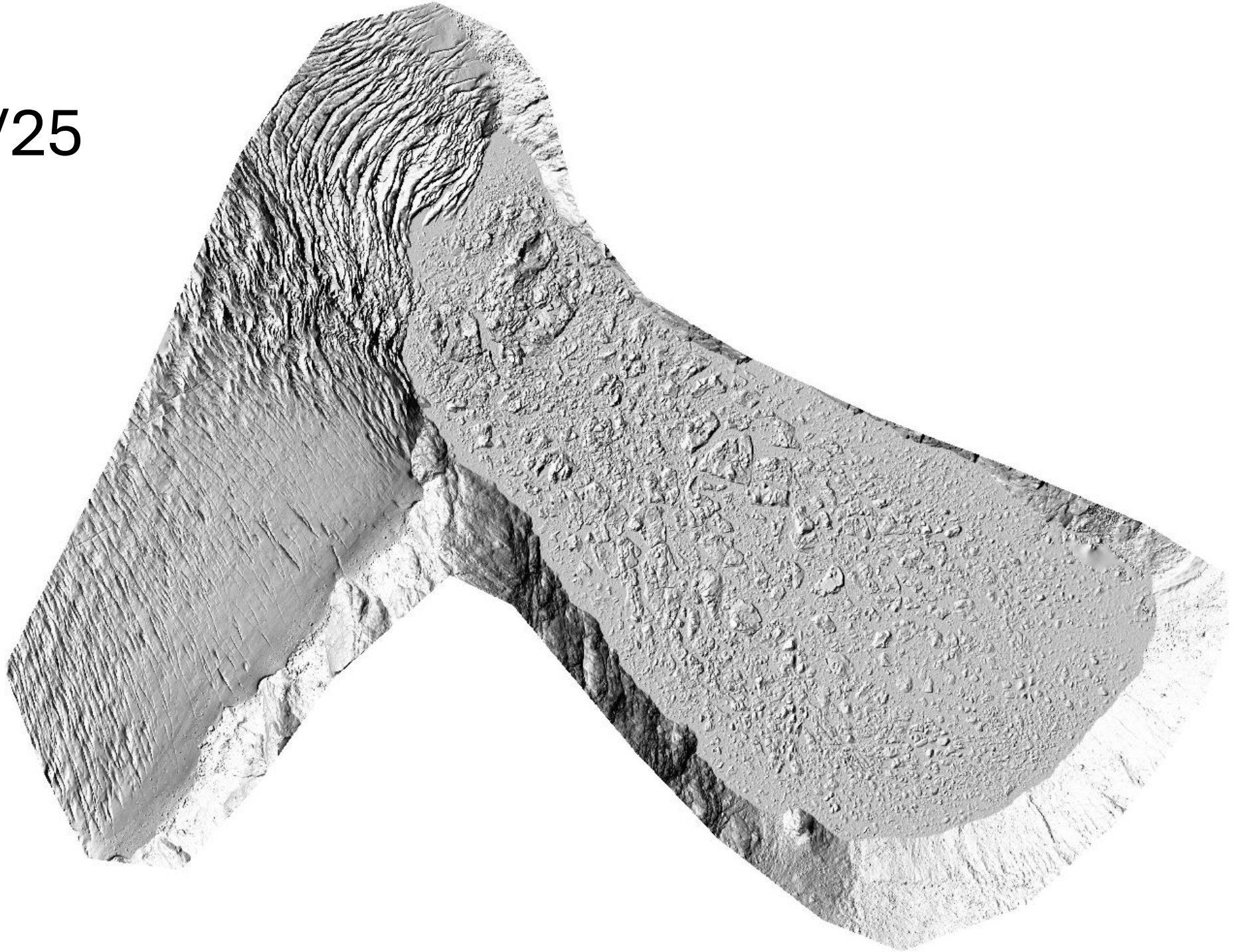

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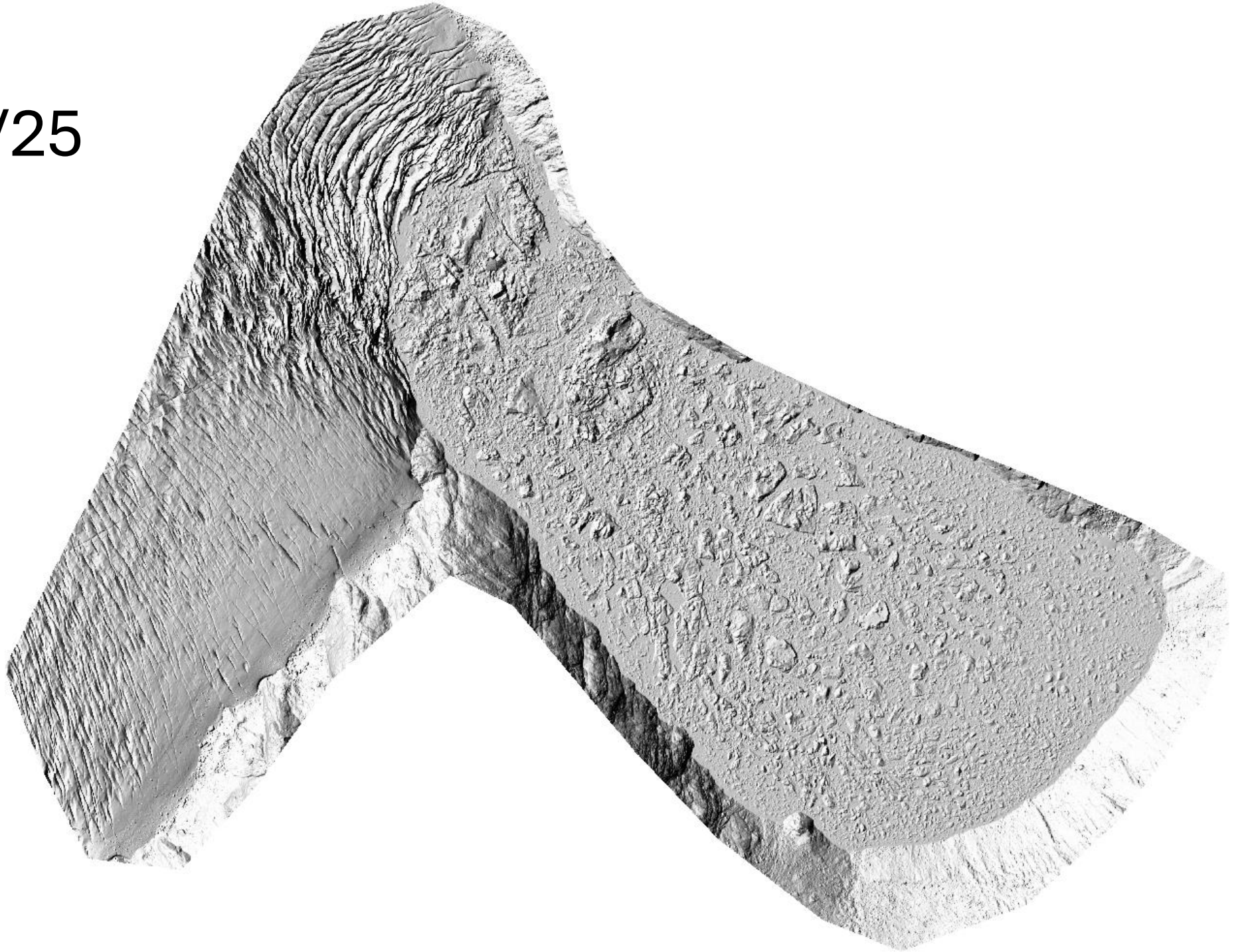
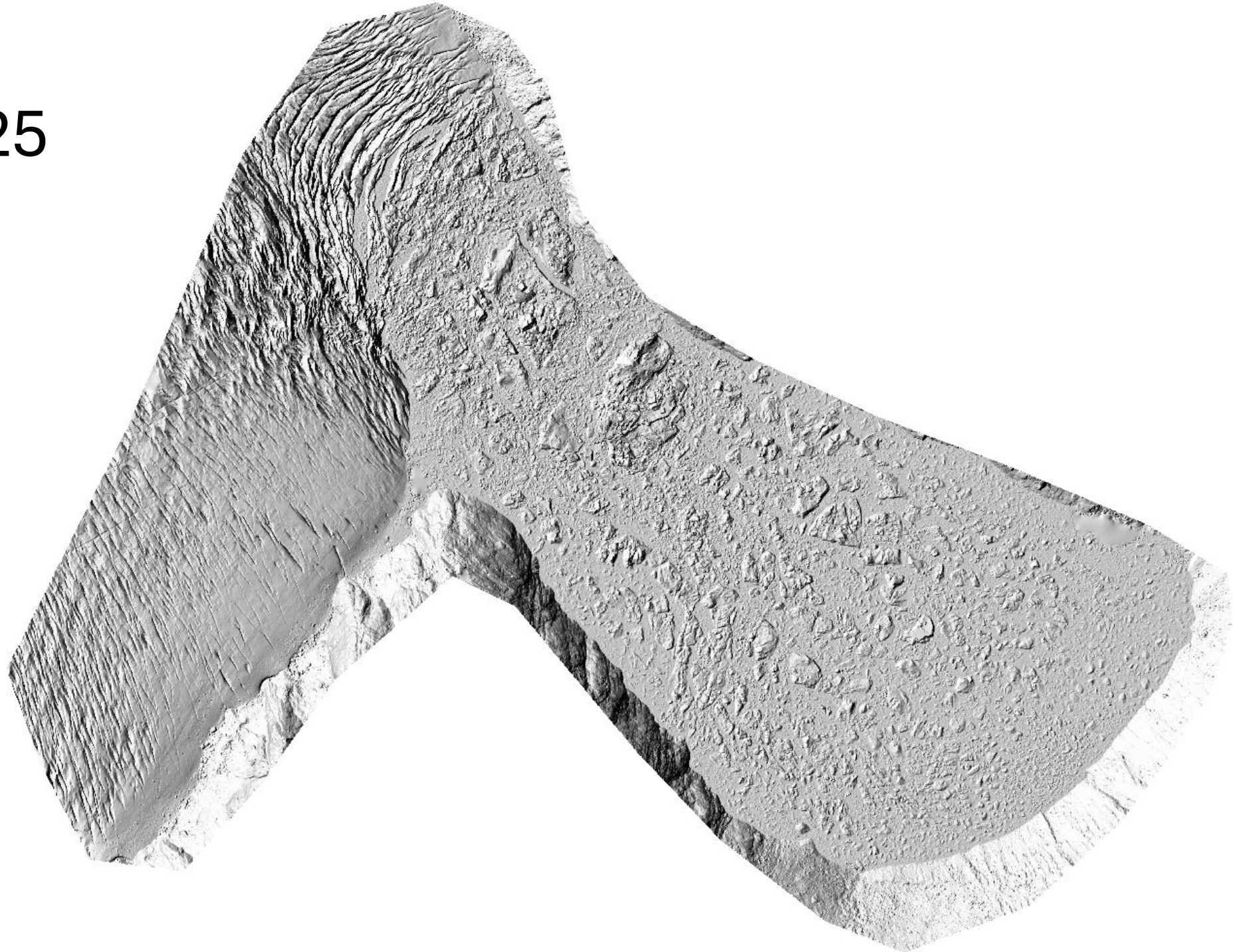
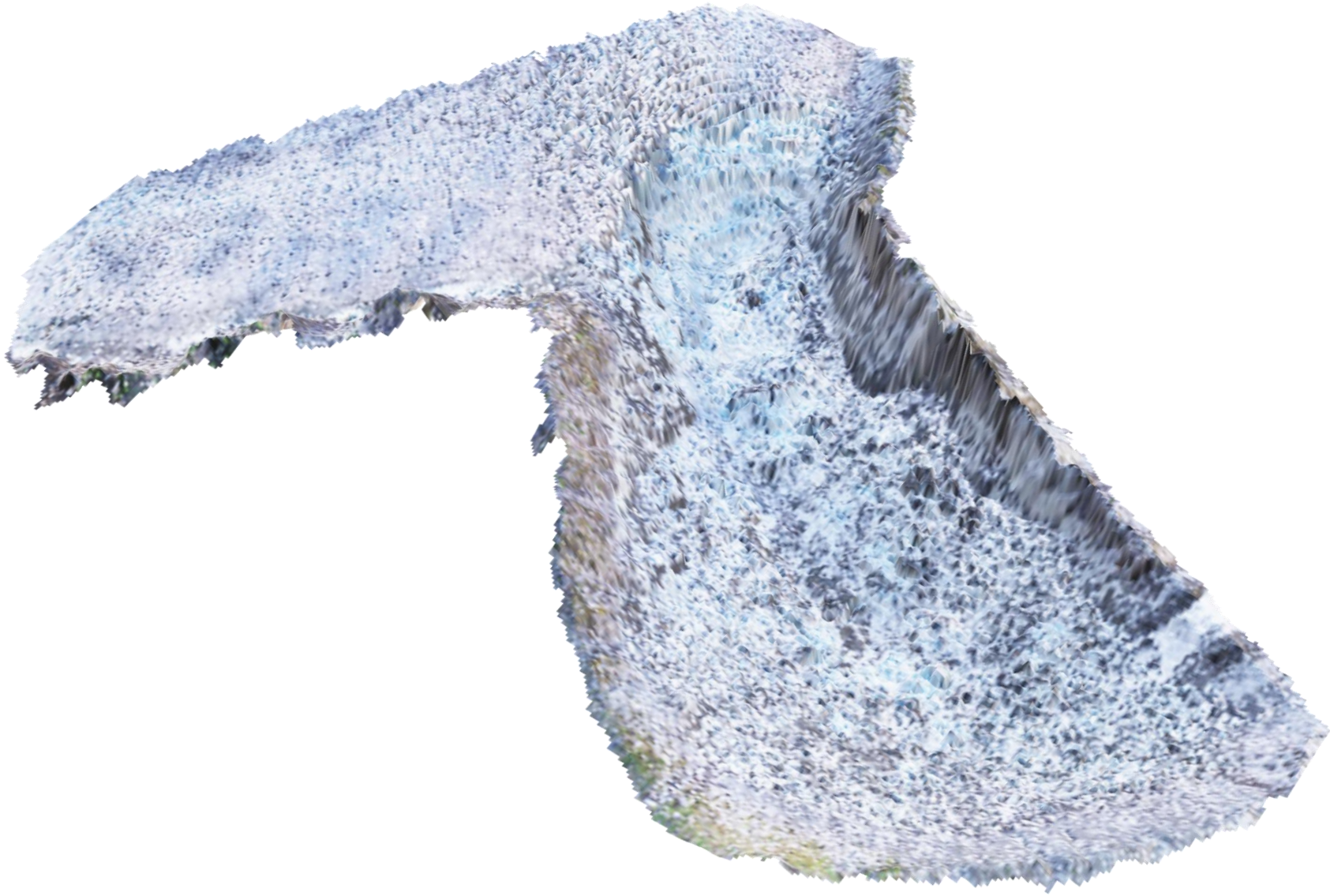


8/6/25

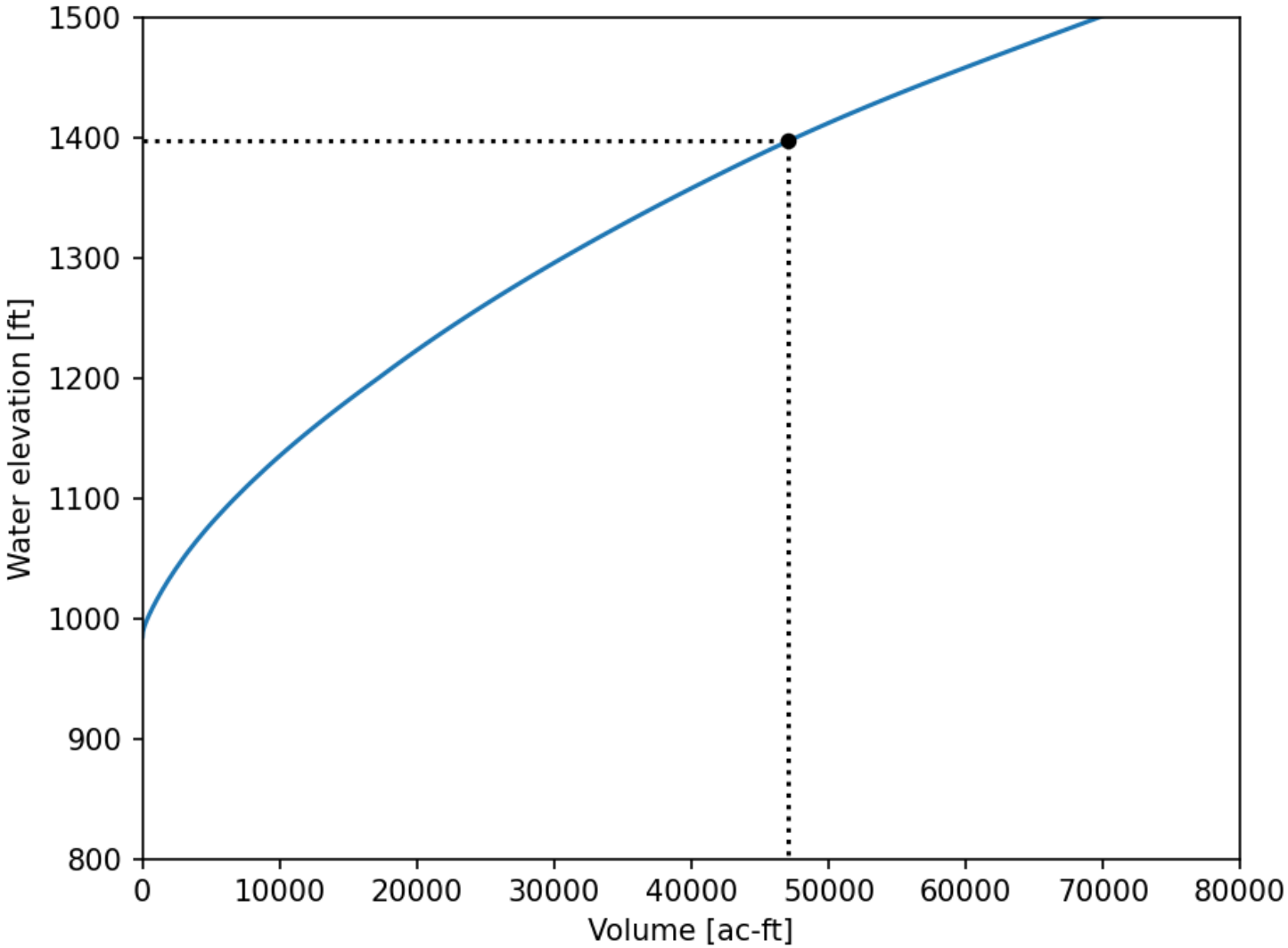


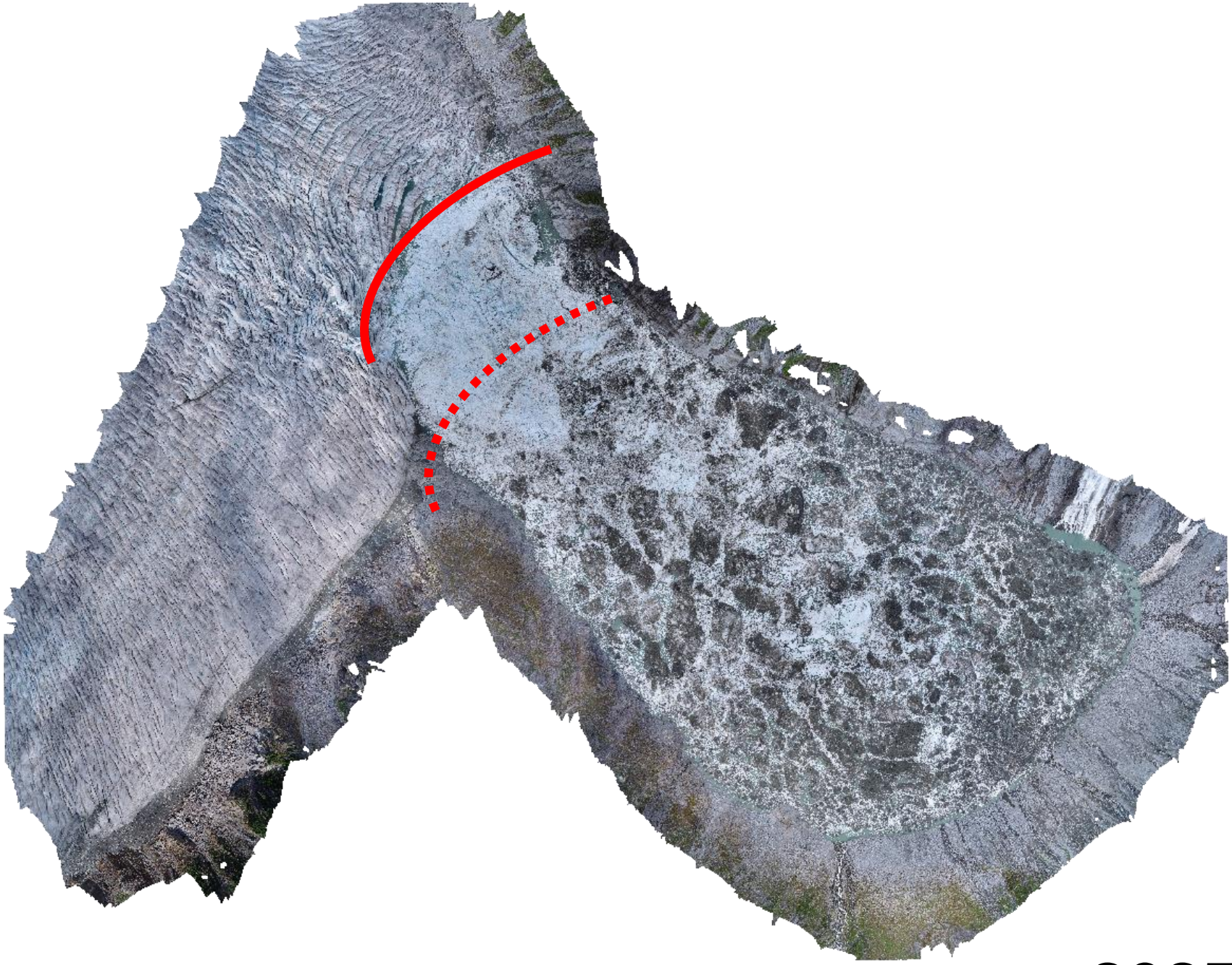
8/13/25


Ice Dam



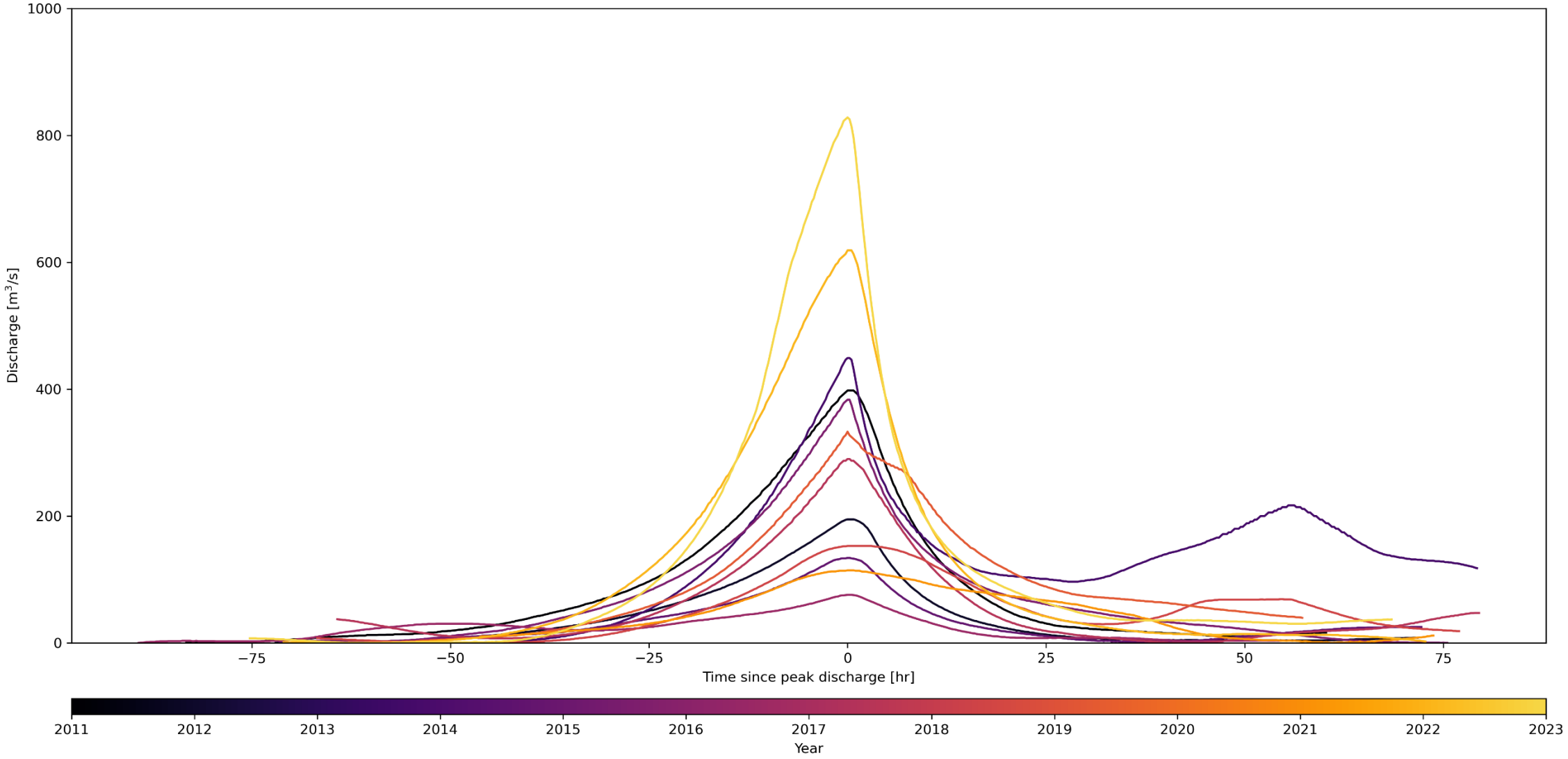
# Spillway elevation defines the max volume



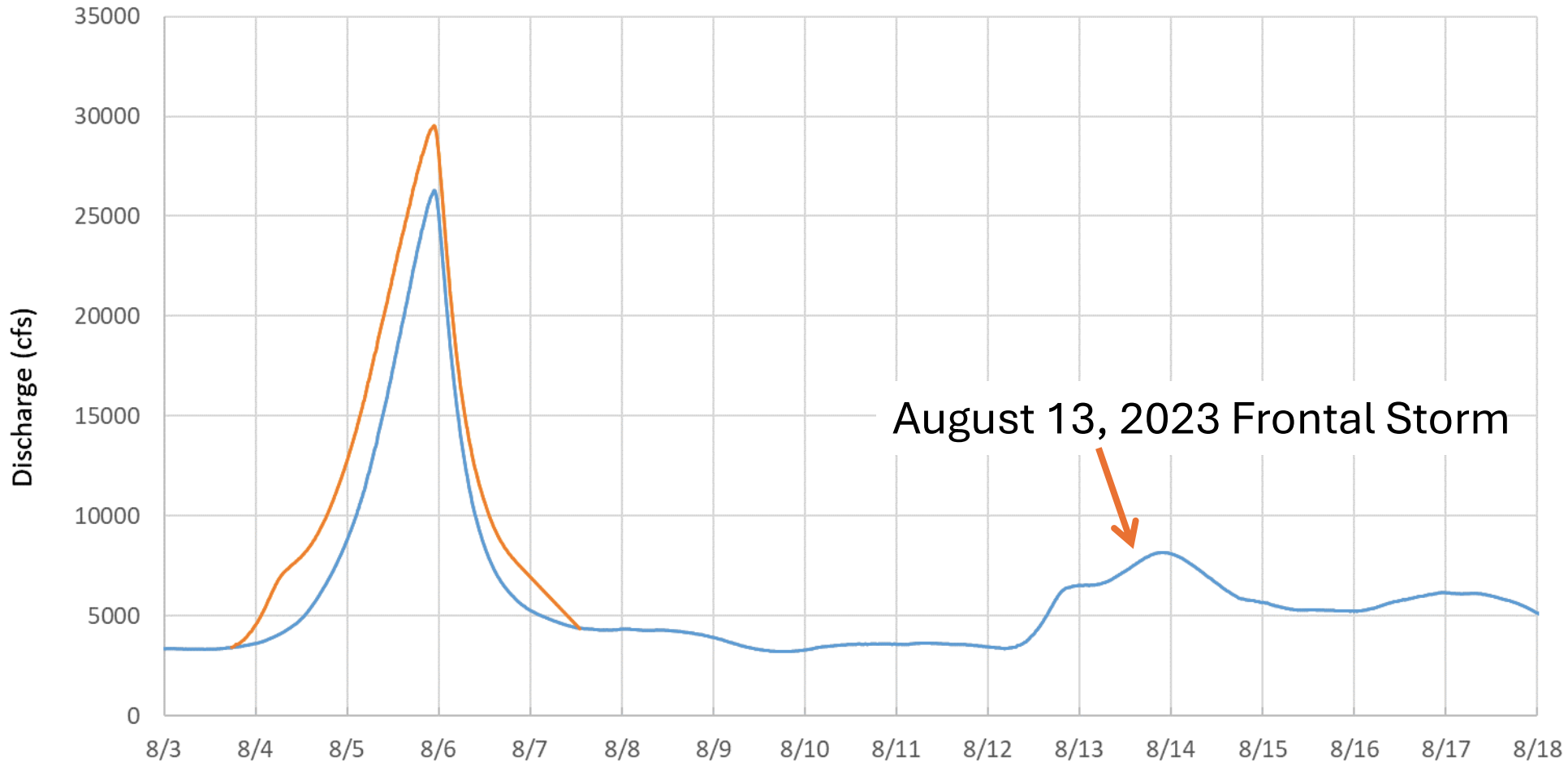


2025

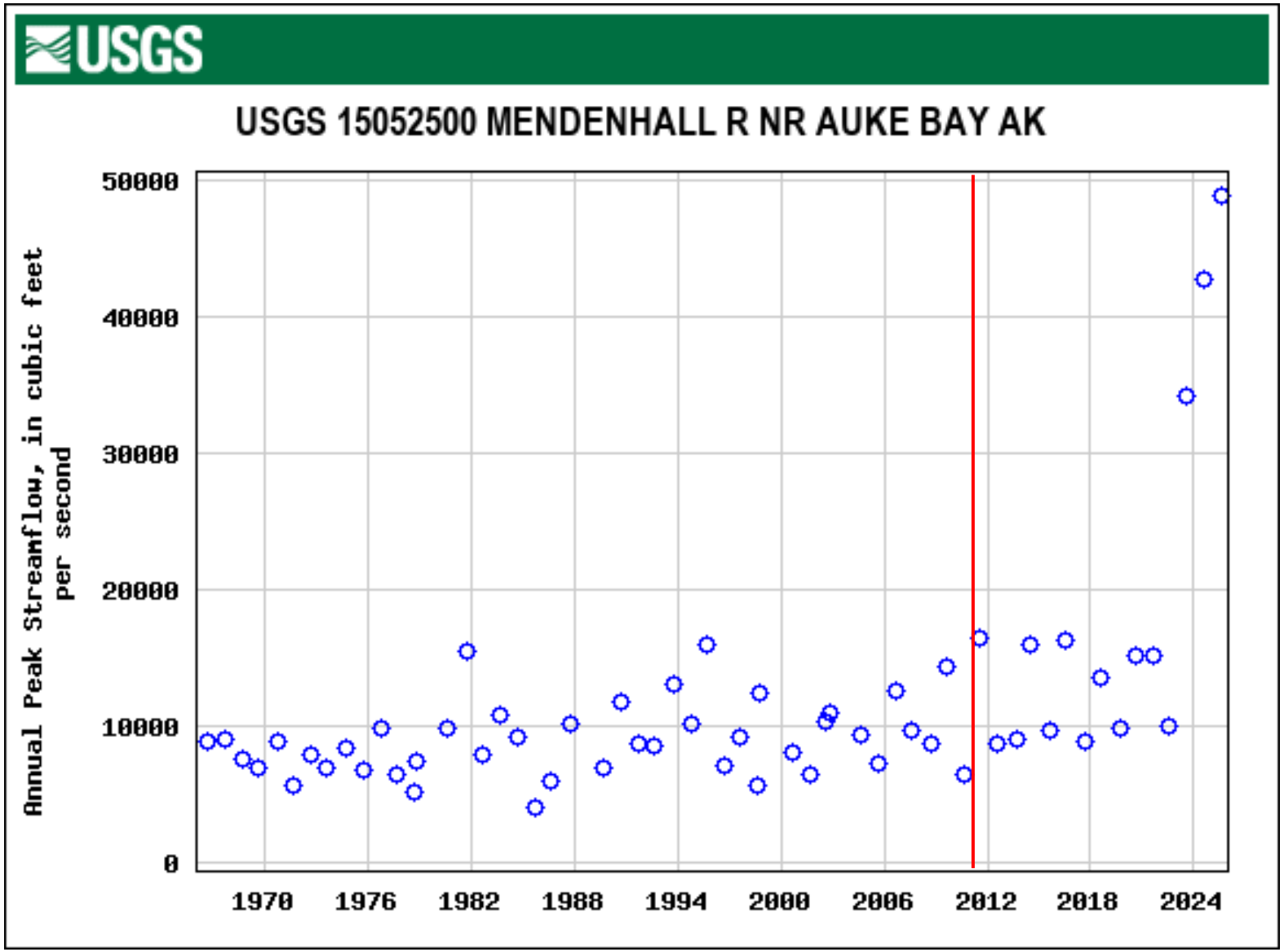
# Outburst flood hydrographs



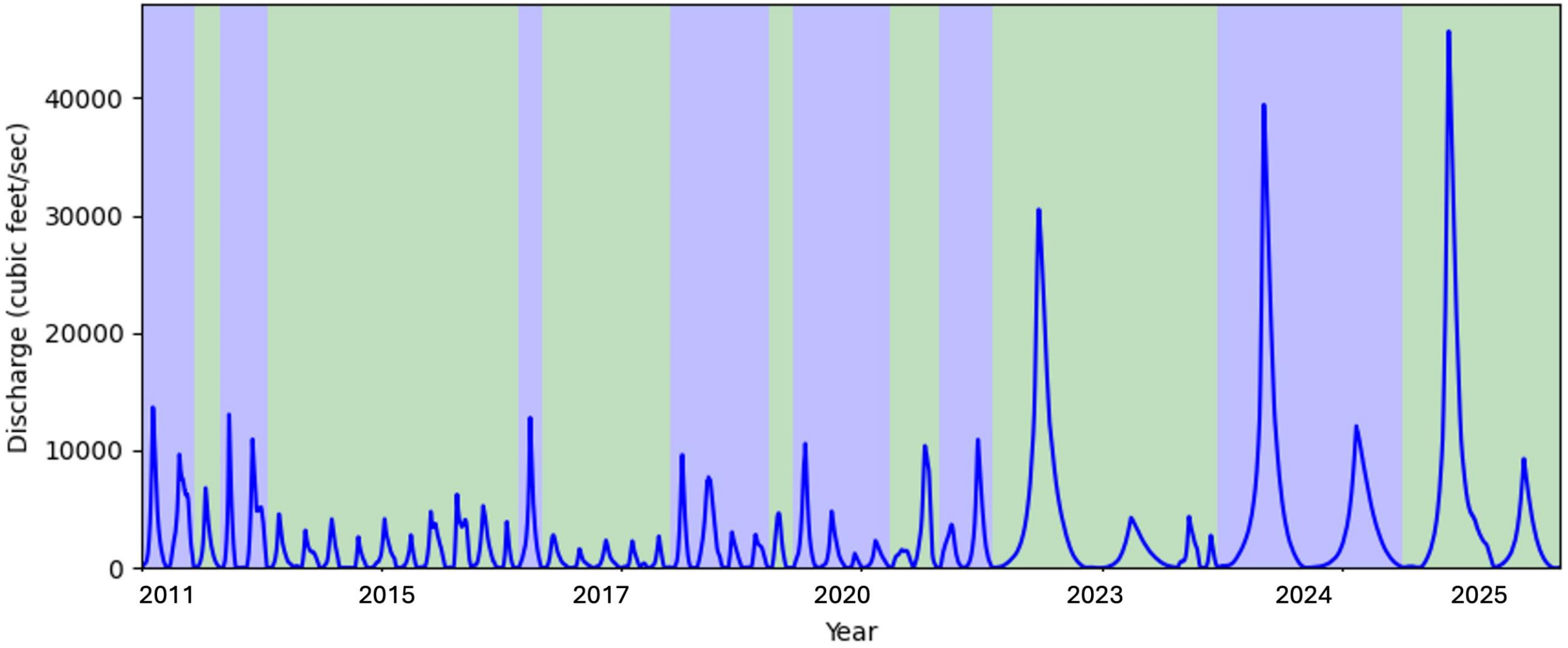
# Worse case flood scenarios

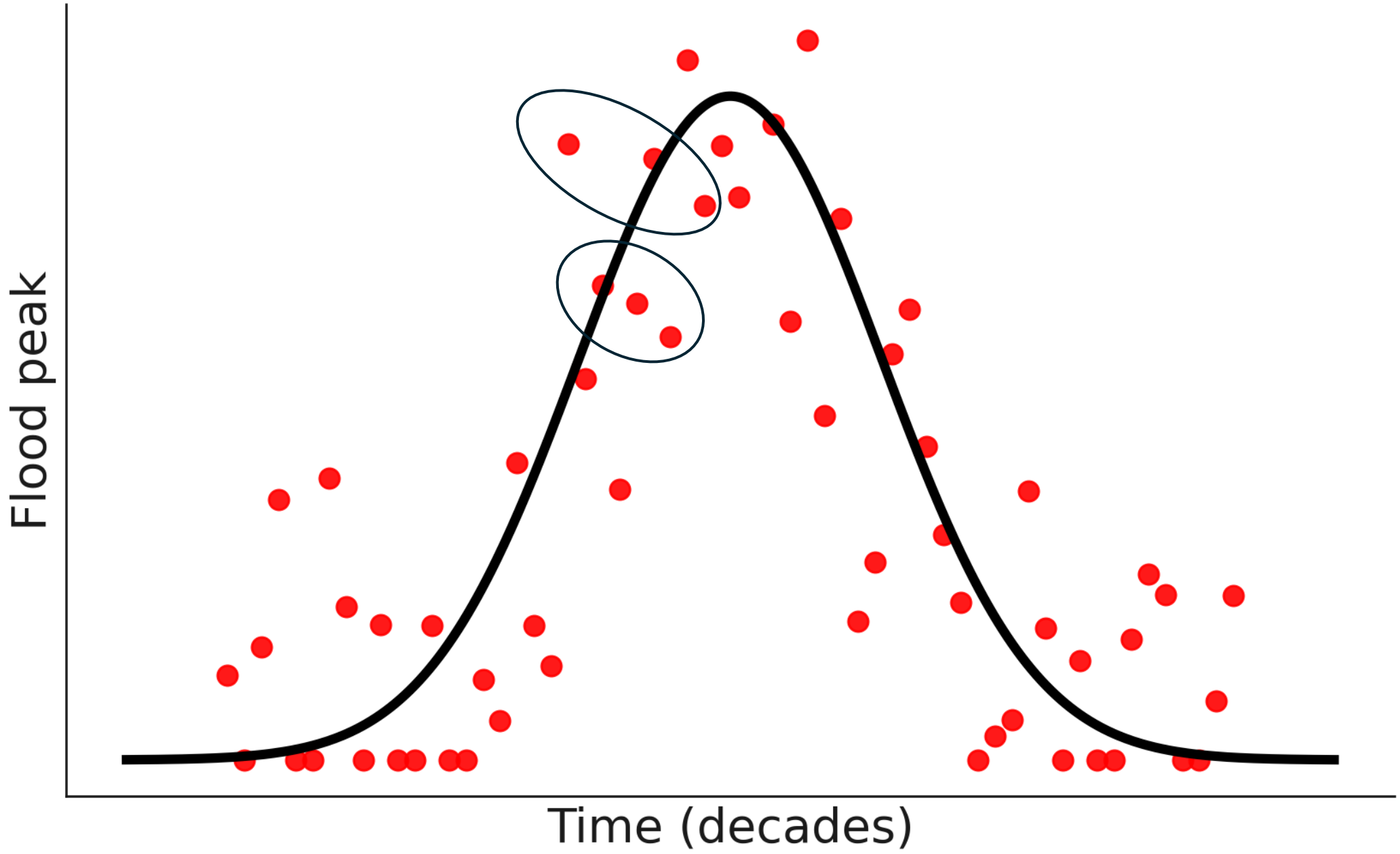


# Flood statistics

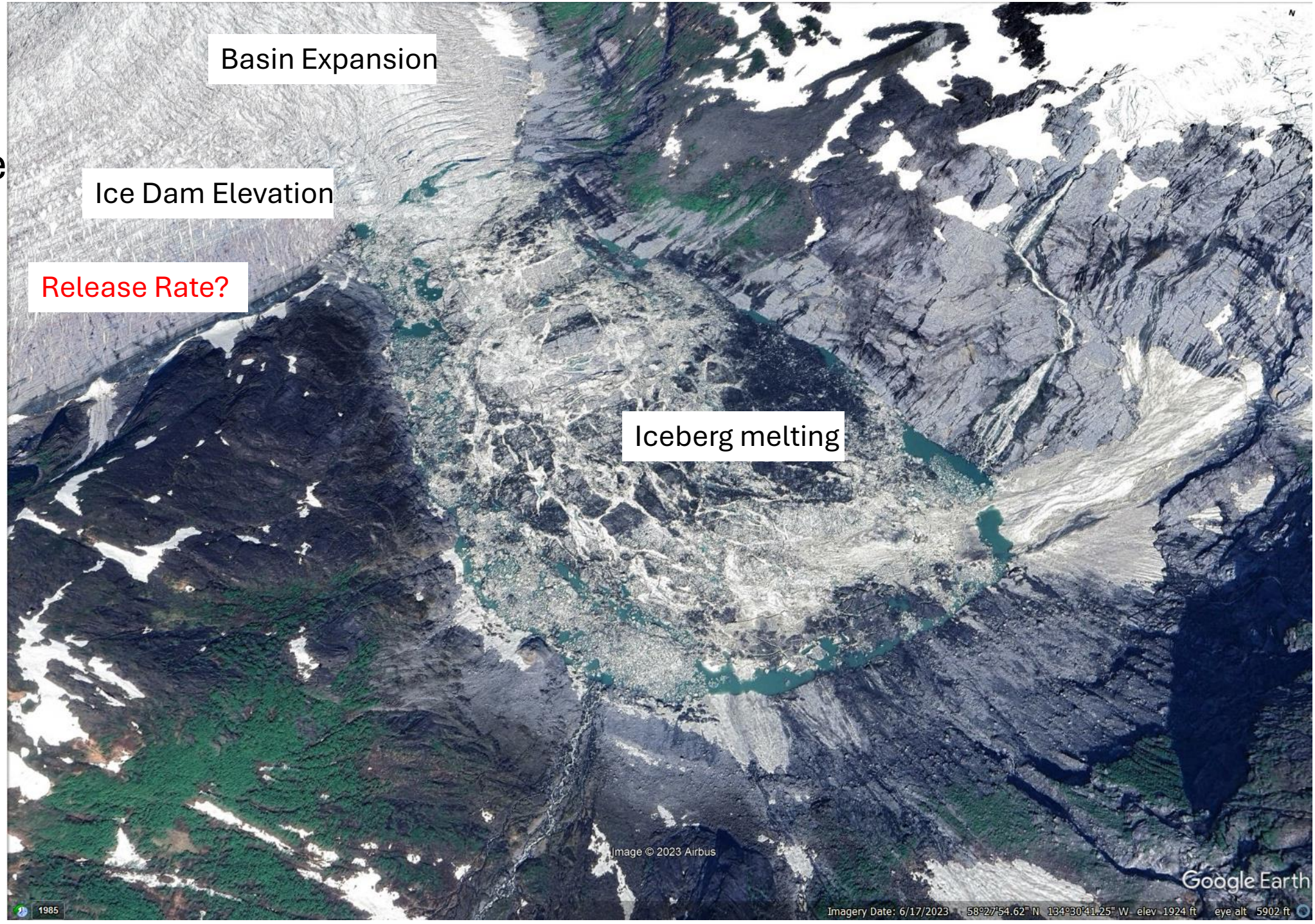


# Outburst floods 2011-2025




Flood peak
Time (decades)

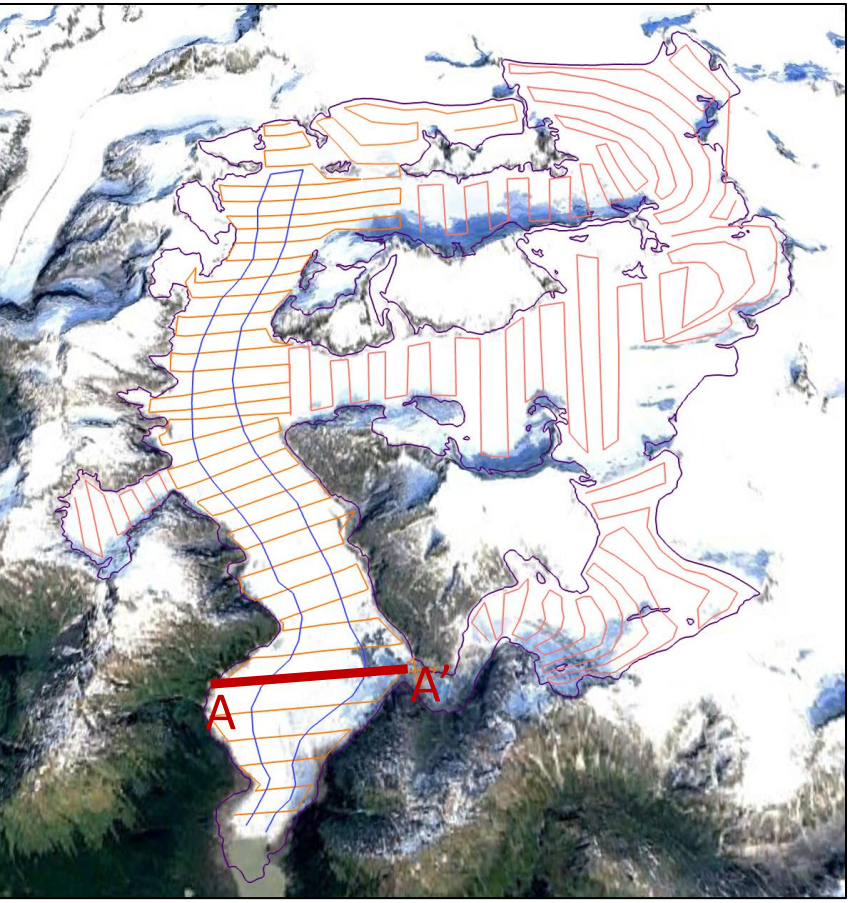
# Competing processes drive outburst flood dynamics

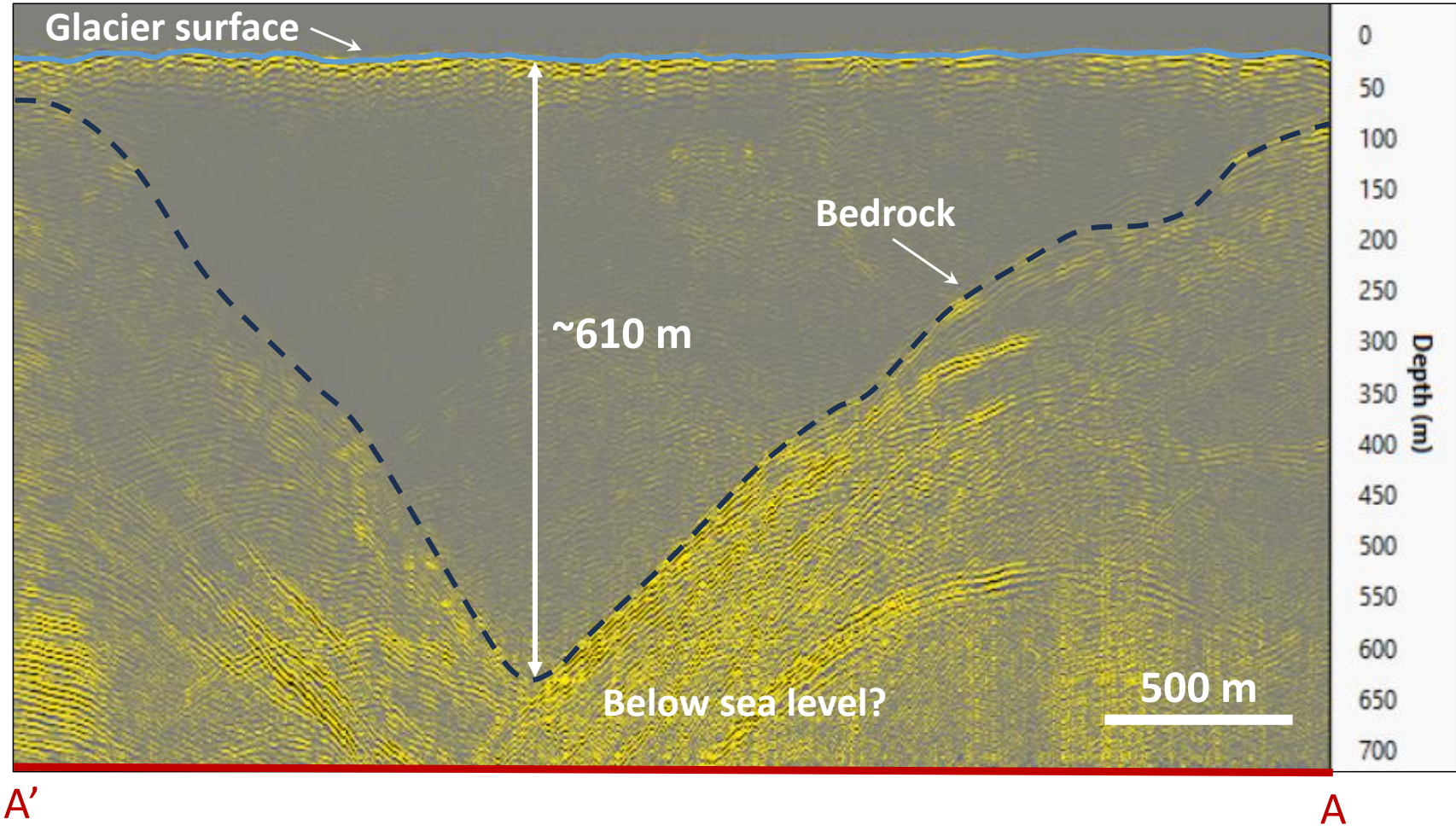


# Ice penetrating radar

Gabe Wolken, DGGS

# Flight lines and very preliminary results




Date: 2025.09.30 Frequency: 5 MHz Sampling Rate: 125 MHz Acquisition Height: ~40 m Ground Speed: ~22 kt

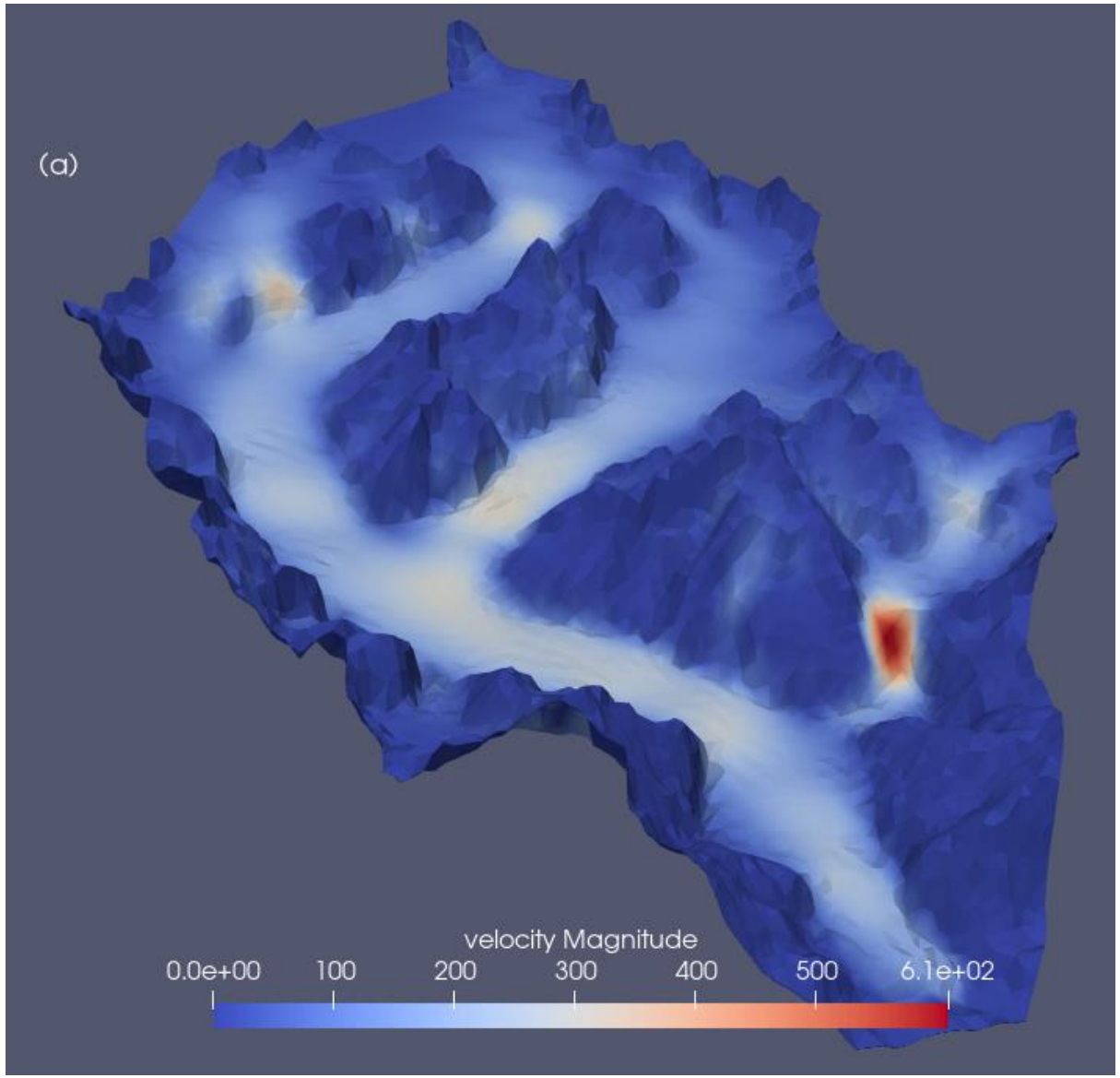
# Modeling glacier evolution

Requires:

- bed topography
- climate projections
- observations of velocity and thinning rates

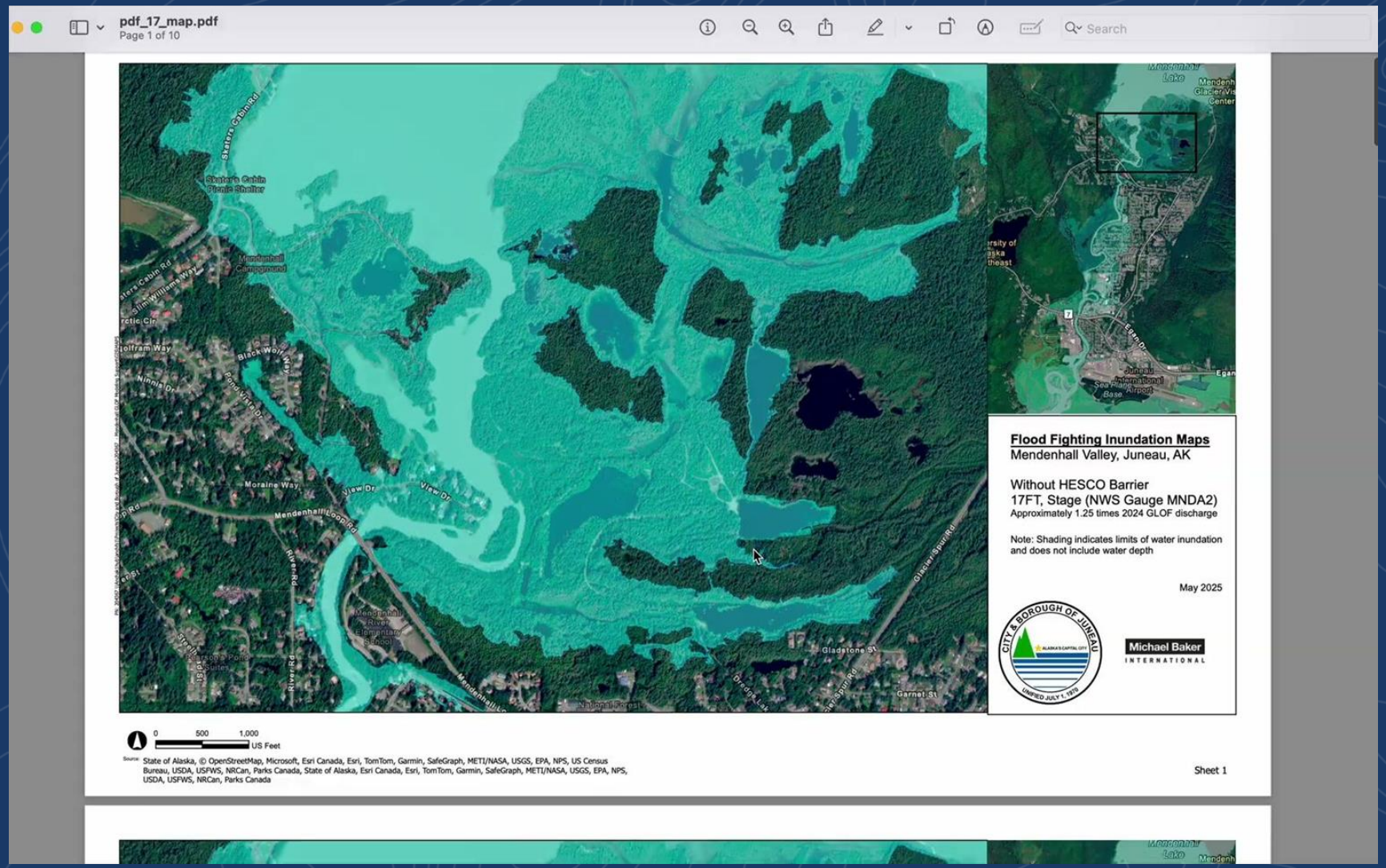
Expected products:

- lifespan of Suicide Basin
- variations in potential flood volume



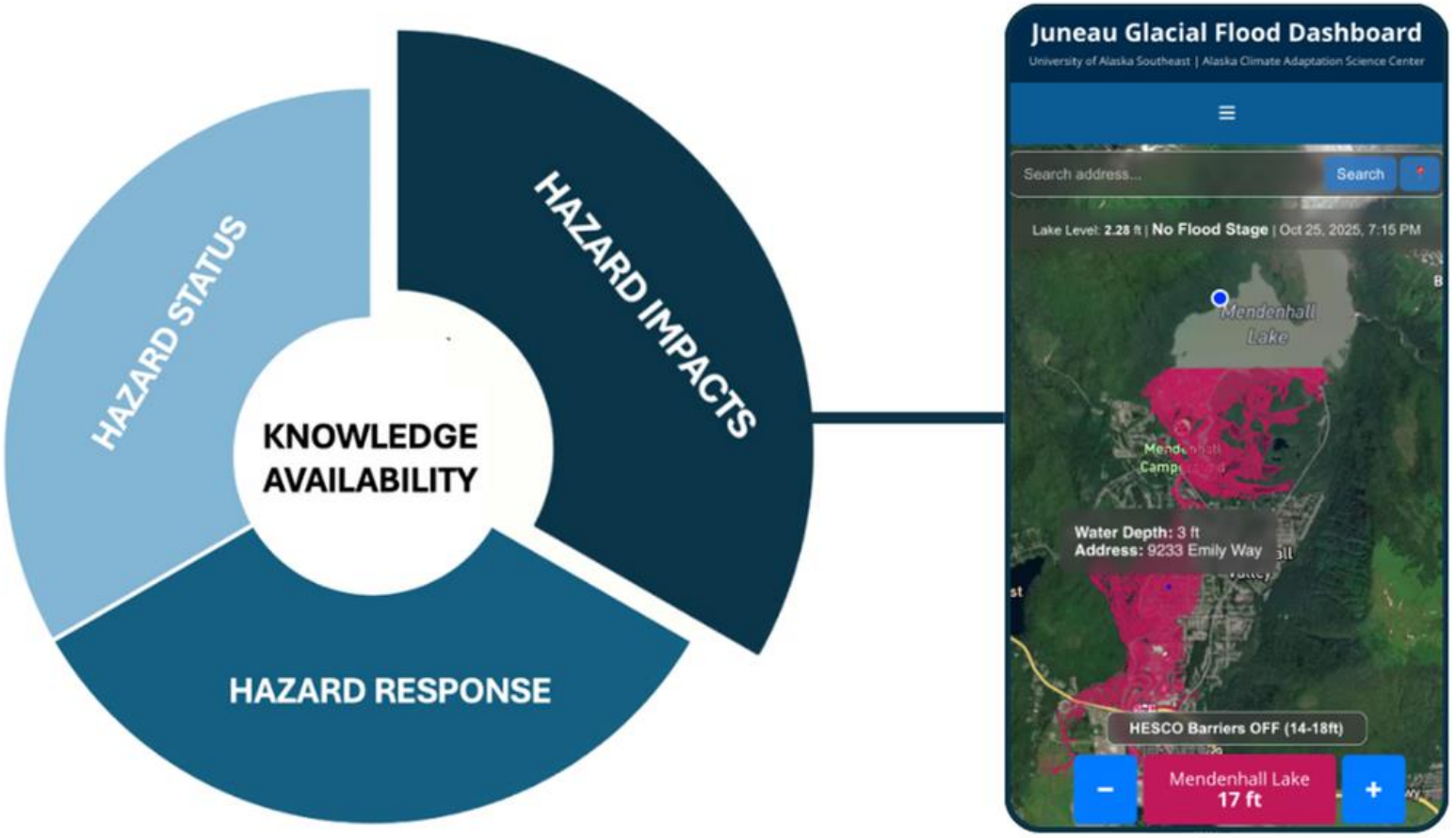
# Communicating GLOF Hazards

# PDF Flood Inundation Maps




will use PowerPoint so videos are locally stored

# Knowledge Gap

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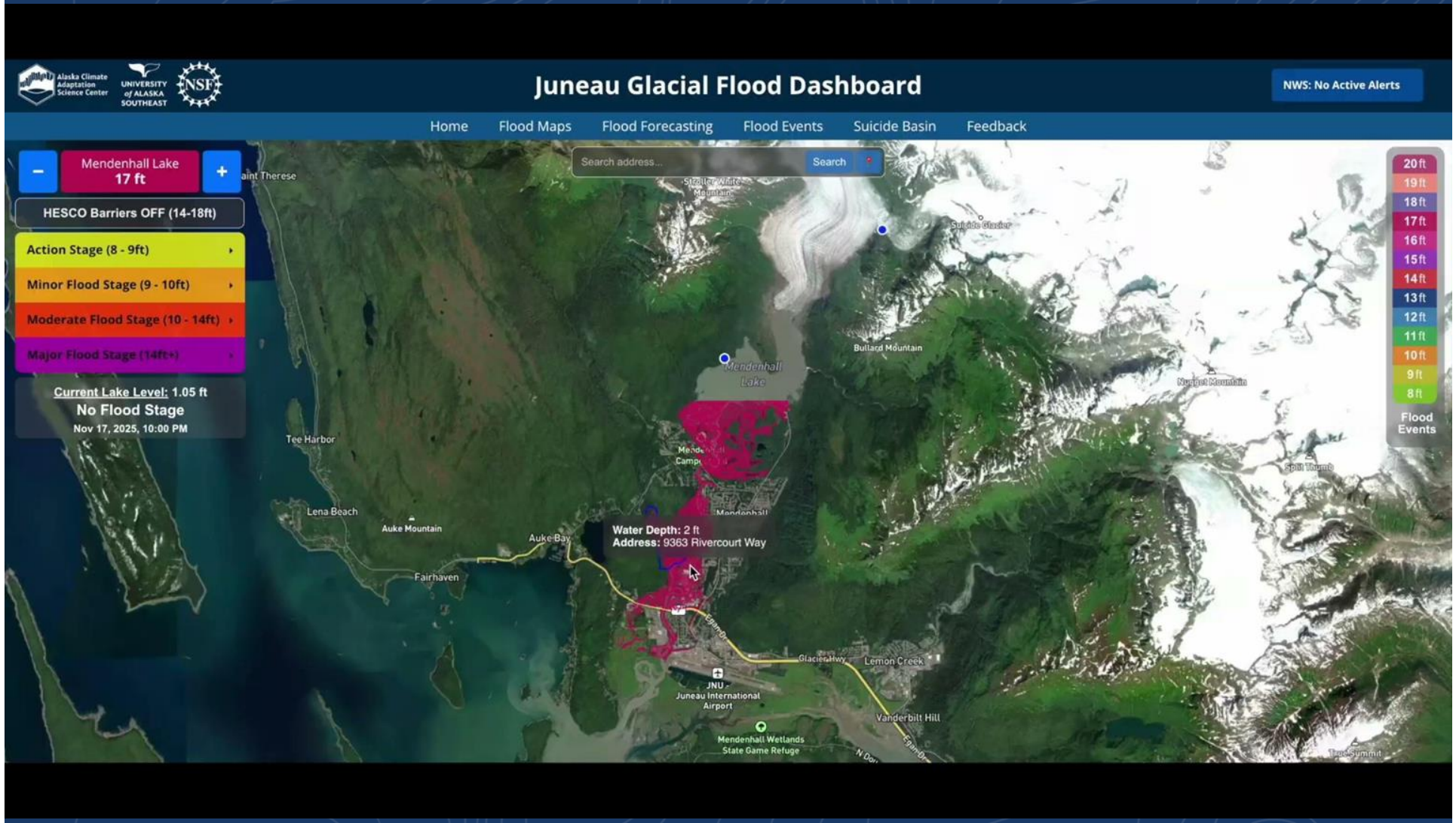
# Juneau Glacial Flood Dashboard




Sean Fagan, UAS

# Juneau Glacial Flood Dashboard

Home | Flood Maps | Flood Forecasting | Flood Events | Suicide Basin | Feedback

## Explore Flood Forecasting

**Understanding Water Levels in Suicide Basin & Mendenhall Lake**

This page provides information about real-time monitoring efforts. The USGS monitors Suicide Basin using time-lapse cameras and a laser range finder to track water levels — **though icebergs that float in front of the laser may cause levels to jump around**. Mendenhall Lake levels are also tracked continuously at a site on the west shore. Lake level is an important predictor of downstream flood impacts following an outburst from Suicide Basin.

### Suicide Basin Water Level


| 7/19/11 | 26 | 16.65 | 9/15/25 |
|---|---|---|---|
| First Flood Event Recorded | Total Flood Events Recorded | Largest Flood Peak Recorded (ft) | Most Recent Flood Event |

## Mendenhall Valley Flood Records

**Learn About Past Glacial Outburst Flood Events**

This page provides historical data on glacial lake outburst flood events that raised water levels at Mendenhall Lake to over 8ft (Action Stage). You can explore past flood events, visualize trends, and view important details such as peak water levels and flow rates in Mendenhall River.

### Mendenhall Glacial Lake Outburst Flood Events Table

Select Columns To Explore Flood Data

| Index | Release Start Date | Pre Flood Water Level at Mendenhall Lake (ft) |
|---|---|---|
| 1 | 9/14/2025 | — |
| 2 | 8/12/2025 | — |
| 3 | 10/18/24 | 3.84 |
| 4 | 8/3/24 | 5 |
| 5 | 10/7/23 | 7.26 |
| 6 | 9/2/23 | 7.01 |
| 7 | 8/3/23 | 5.48 |
| 8 | 10/24/22 | 10.33 |

## How Suicide Basin Works

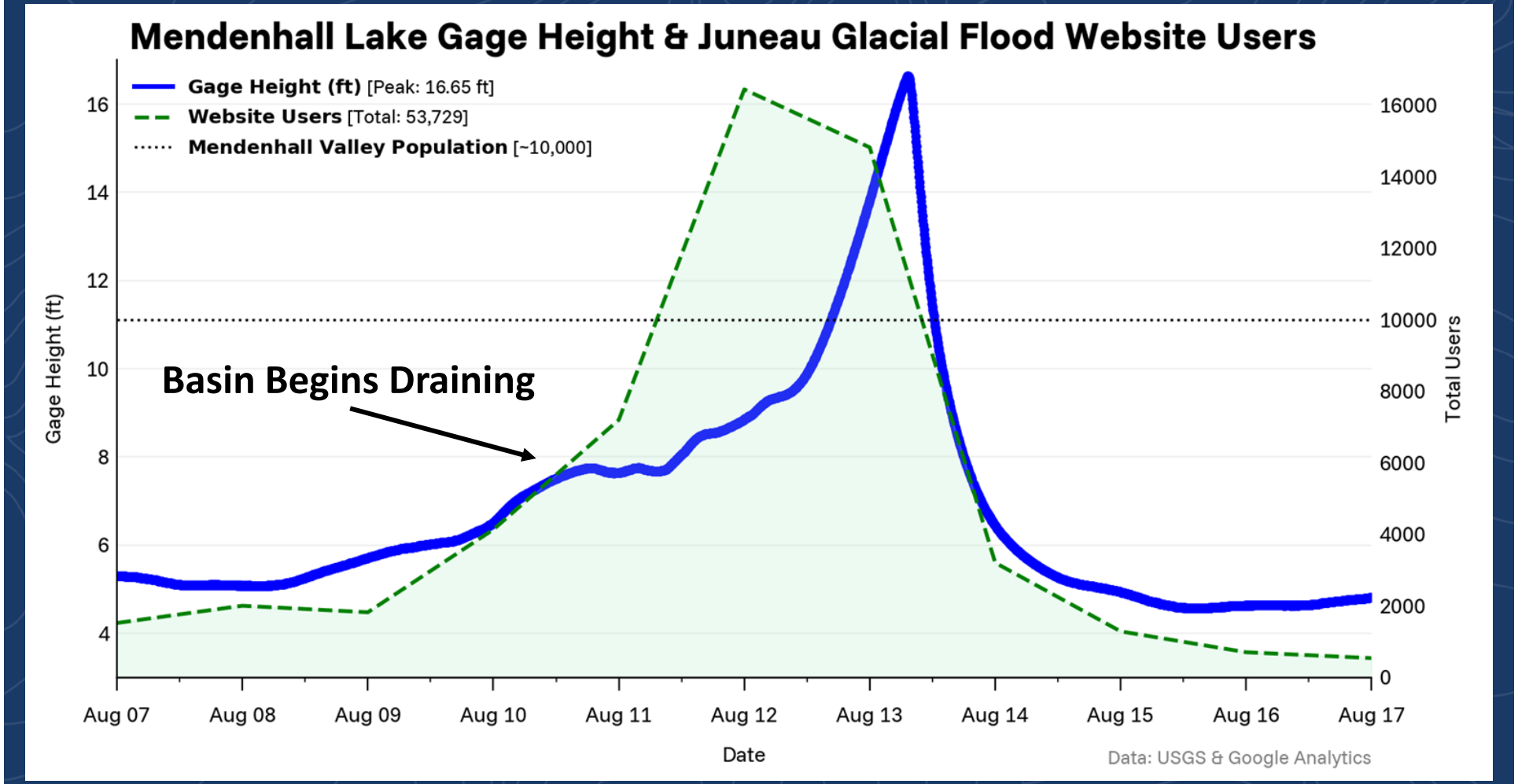
**Understand the Annual Glacial Lake Outburst Floods**

Suicide Basin is an over-deepened bedrock basin located approximately 3km up the Mendenhall Glacier in Juneau, Alaska. It was formed by the retreat of the Suicide Glacier, which left an open space alongside the Mendenhall Glacier. Suicide Basin plays a crucial role in the formation of recurring glacial lake outburst floods (GLOFs) because Mendenhall Glacier acts as a dam that allows meltwater to accumulate in the basin. When water stored in the basin escapes beneath the ice dam, billions of gallons of water can be released into Mendenhall Lake, leading to flooding downstream.

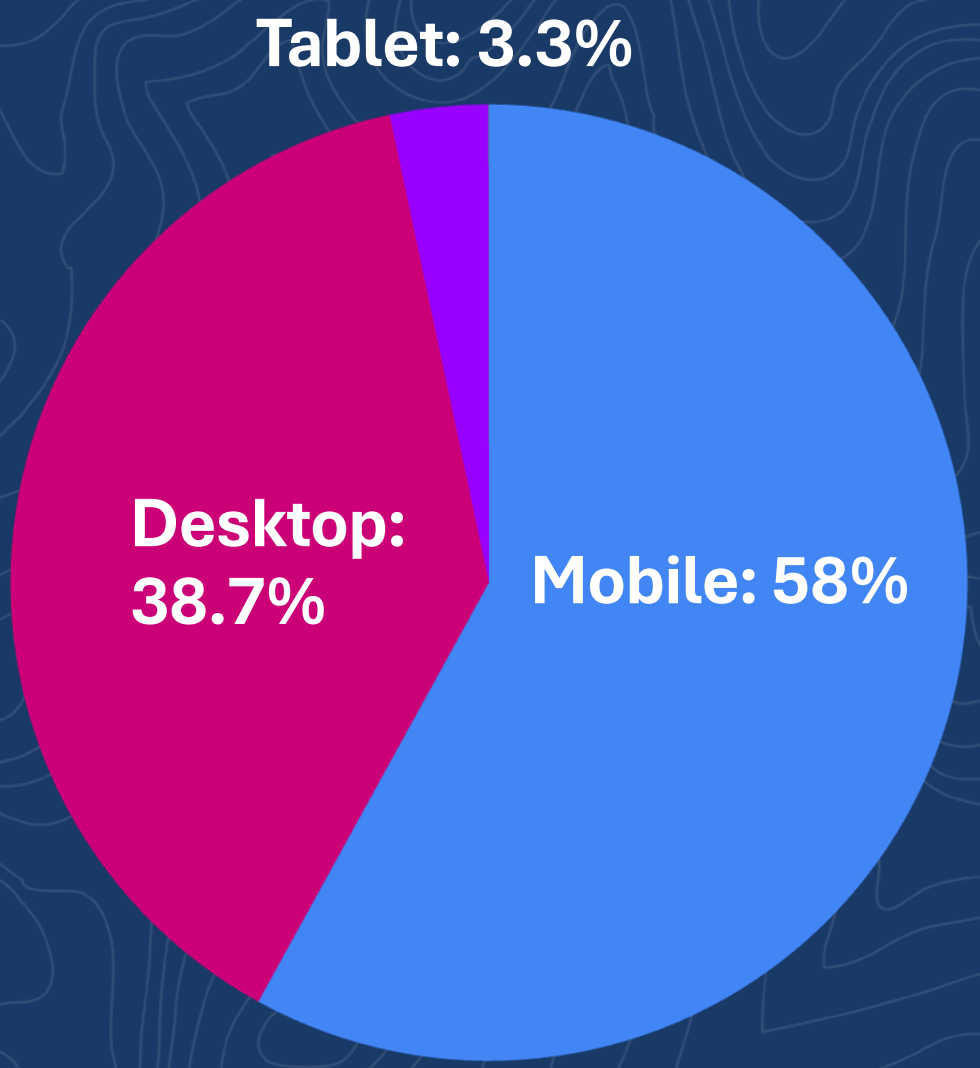
# Juneau Glacial Flood Dashboard

Home | Flood Maps | Flood Forecasting | Flood Events | Suicide Basin | Feedback

# User Engagement During 2025 GLOF



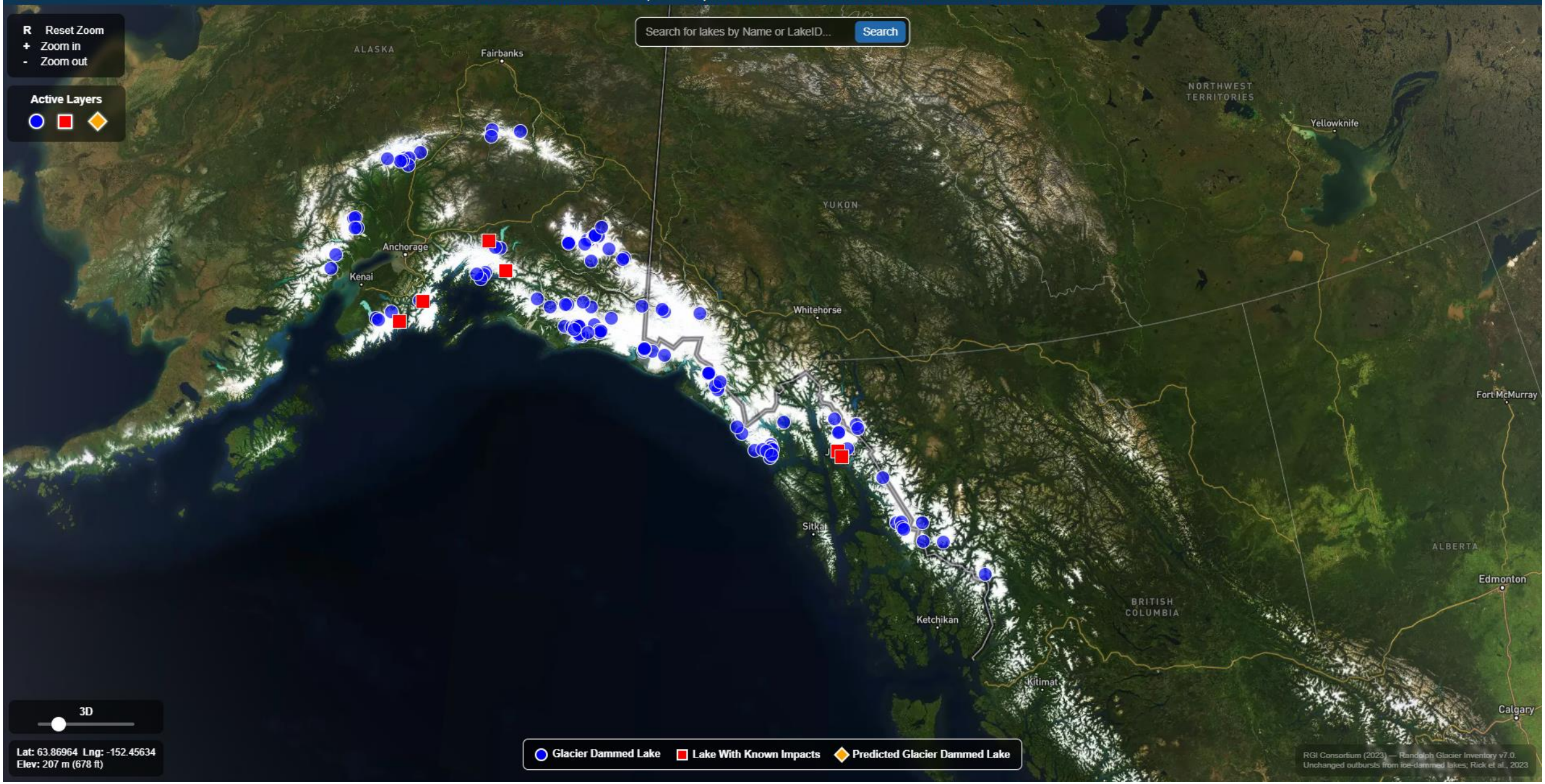
# User Engagement During 2025 GLOF



# Alaska+ Glacial Lake Flood Dashboard

Carnegie Mellon University · University of Alaska Southeast · NSF · Alaska Climate Adaptation Science Center

Home | Glacial Lake Map | Explore Data | Glacial Lake Hazards | Research Team




Questions?