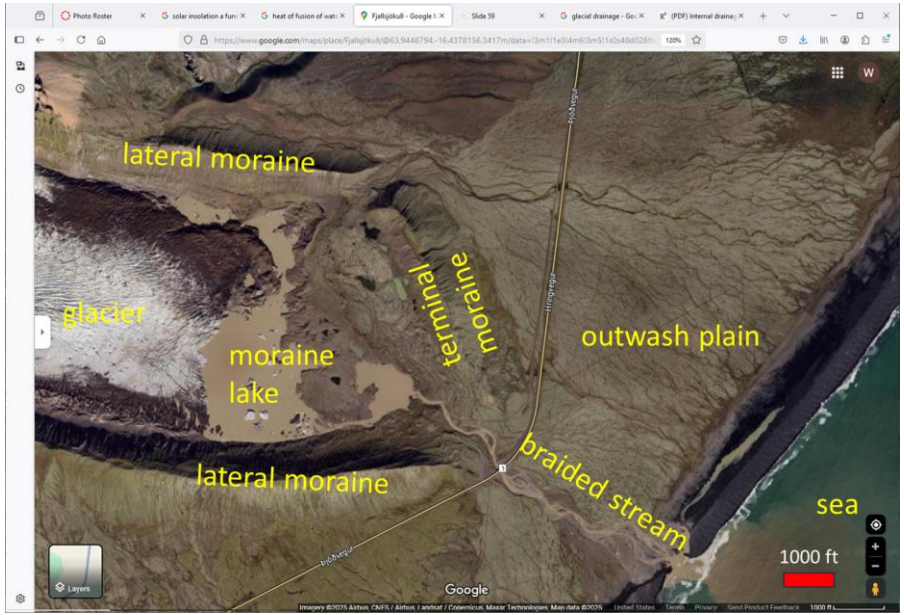
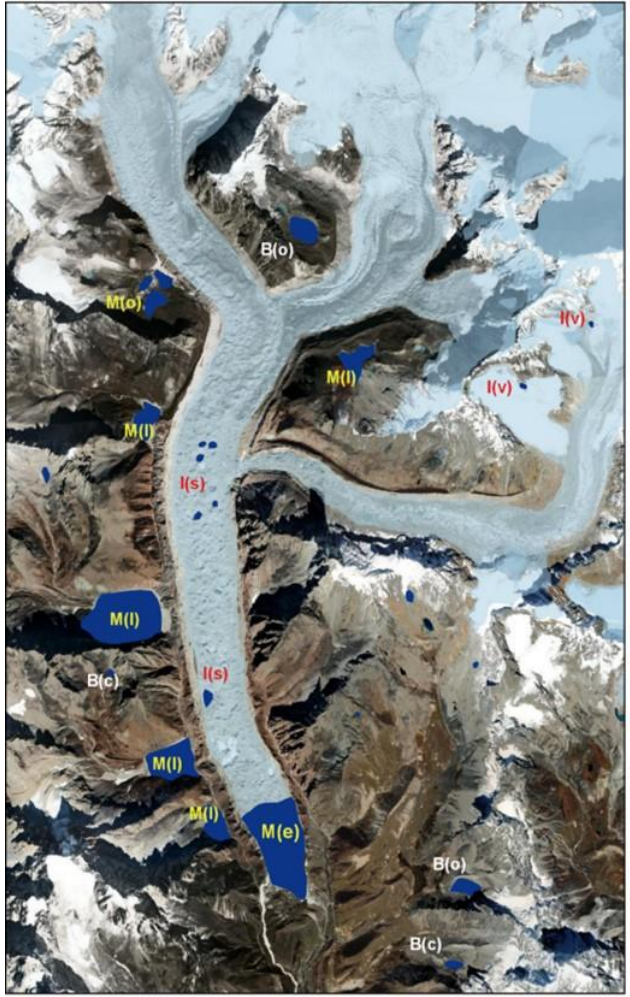
Group Project 04: Moraine Lakes

Glacial Geomorphology | February 13, 2025

Moraine Lakes

- A **moraine lake** is a lake dammed by a moraine following retreat of a glacier.





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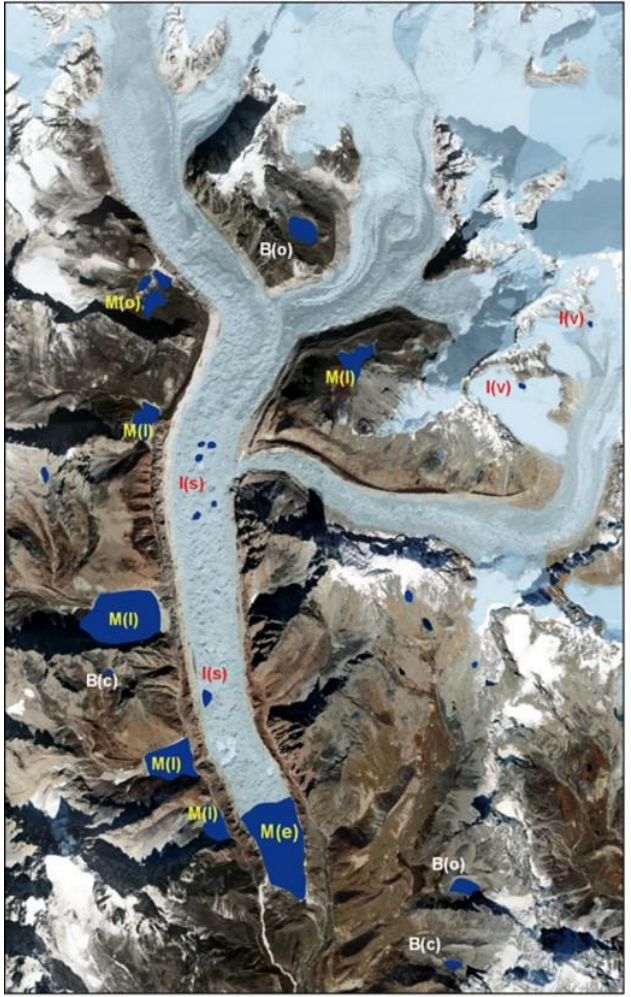
Moraine Lakes

Glacial lake type	Code	Definition
Moraine-dammed lake	**M**	**Lake dammed by moraine following glacial retreat.**
End-moraine-dammed lake	M(e)	Lake dammed by terminal moraines. Usually touches the walls of the side moraines, but the water is held back by the end moraine (dam). Lake is usually, but not necessarily, in contact with the glacier, and may have glacier ice at the lake bottom.
Lateral moraine-dammed lake	M(l)	Lake dammed by lateral moraine(s) (in the tributary valley, trunk valley, or between the lateral moraine and the valley wall, or at the junction of two moraines). Lake is held back by the outside wall of a lateral moraine, i.e., away from the former glacial path.
Other moraine-dammed lake	M(o)	Lake dammed by other moraines (includes kettle lakes and thermokarst lakes).
Ice-dammed lake	I	**Lakes dammed by glacier ice, including lakes on the surface of a glacier, lake dammed by glaciers in the tributary/trunk valley, between the glacier margin and valley wall, or at the junction of two glaciers.**
Supraglacial lake	I(s)	Bodies of water (pond or lake) on the surface of a glacier. This is the most common type of ice-dammed lake in the Nepal Himalaya.
Dammed by tributary glacier	I(v)	Lake dammed by glacier ice with no lateral moraines. Can be at the side of a glacier between the glacier margin and valley wall.
Bedrock-dammed lake	**B**	**Bodies of water that form as a result of an earlier glacial erosion process which accumulate in depressions after the glacier has retreated or melted away.**
Cirque lake	B(c)	A small pond occupying a cirque.
Other glacier erosion lake	B(o)	Bodies of water occupying depressions formed by the glacial erosion process. These are usually located on the mid-slope of hills, but not necessarily in a cirque.
Other glacial Lakes	**O**	**Lakes formed in a glaciated valley and fed by glacial, snow, and permafrost melt, but damming material not directly part of the glacial process, e.g. debris flow, alluvial, or landslide blocked lakes.**



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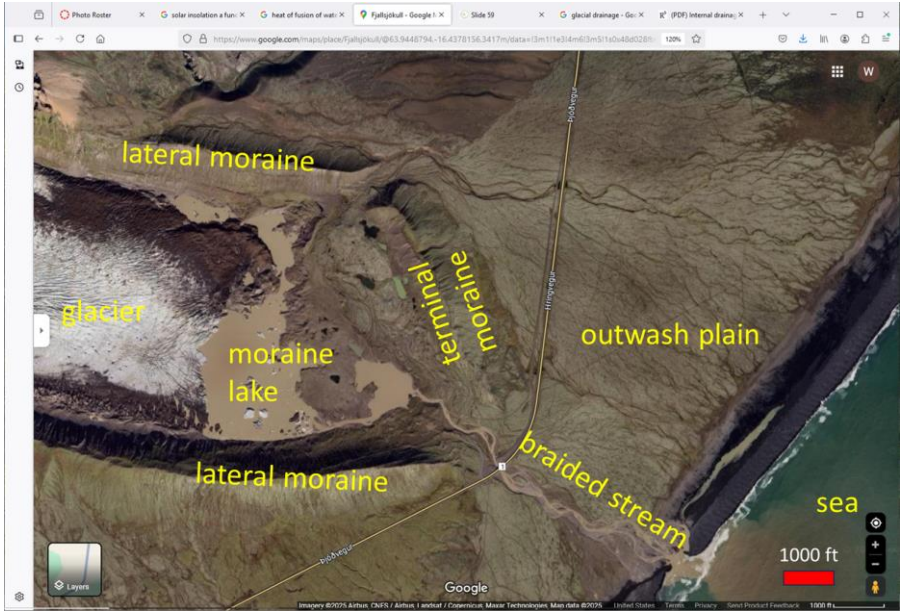
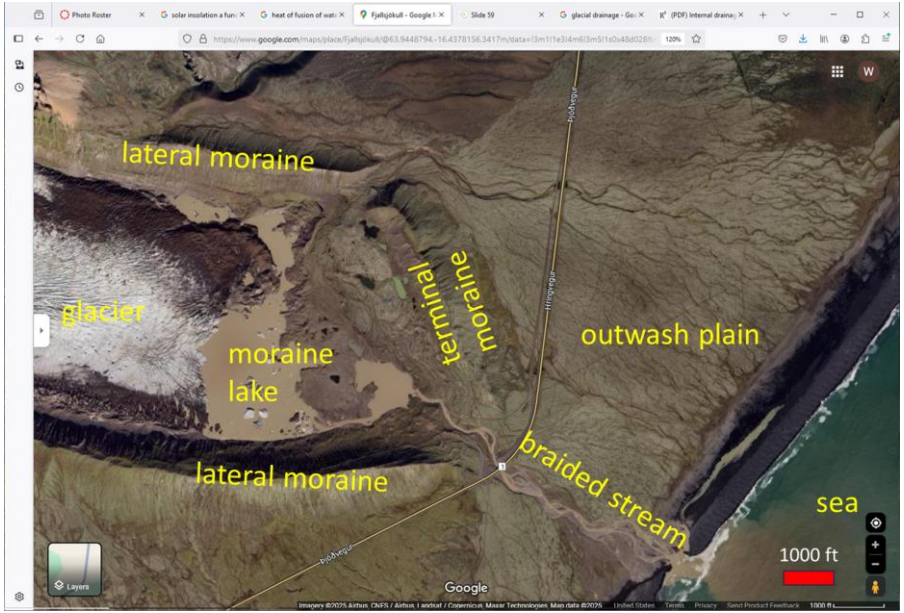
What is type of moraine-dammed lake is this example?



What is type of moraine-dammed lake is this example?



End-moraine-dammed lake!

Group Project 4: Examine Moraine Lakes

Learning Goals:

- ★ To locate a moraine lake in your location and identify glacial features surrounding it.
- ★ Analyze moraine lake area change, retreat rate, and outwash plain scale.

Make four figures:

1. Google Earth Map of your assigned location with a scale bar, labeled location, labeled moraine lake, and labeled glacial features.
2. Google Earth Map with a scale bar and the two moraine lake polygons labeled with the image year.
3. Google Earth Map with the scale bar, two terminus points, and distance between them labeled. Include a text box with the calculated retreat rate.
4. Google Earth Map with the scale bar and length of outwash plain labeled. Include your zoomed in screenshot of a braided stream in the corner with its approximate location inside a box.

Locations:

Group 1: -46.6972860, -73.1615099

Group 2: -47.4902090, -73.2619704

Group 3: -48.4605855, -73.0242787

Group 4: -51.0699135, -73.1372242

Group 5: -47.1700955, -73.8641866

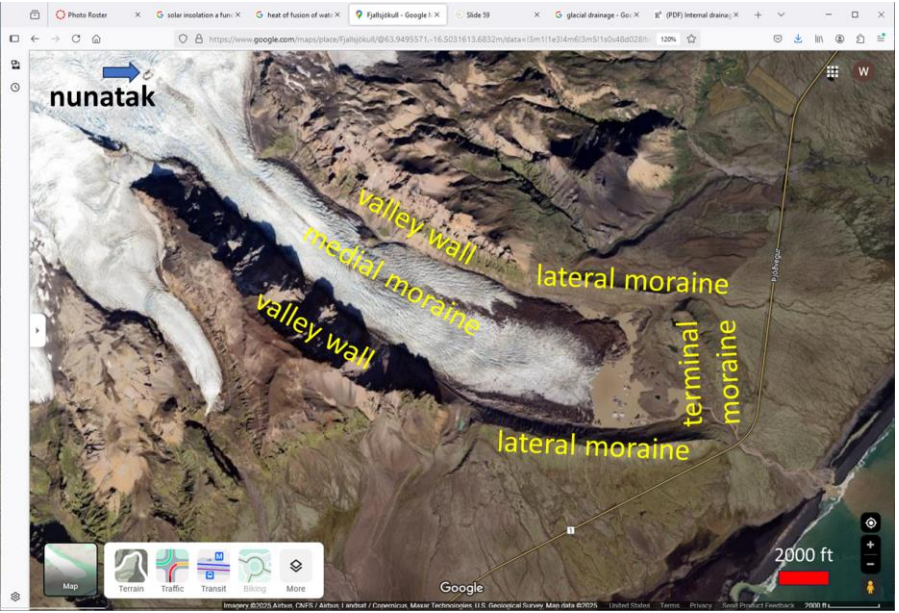
Group 6: -46.8441178, -74.0593958

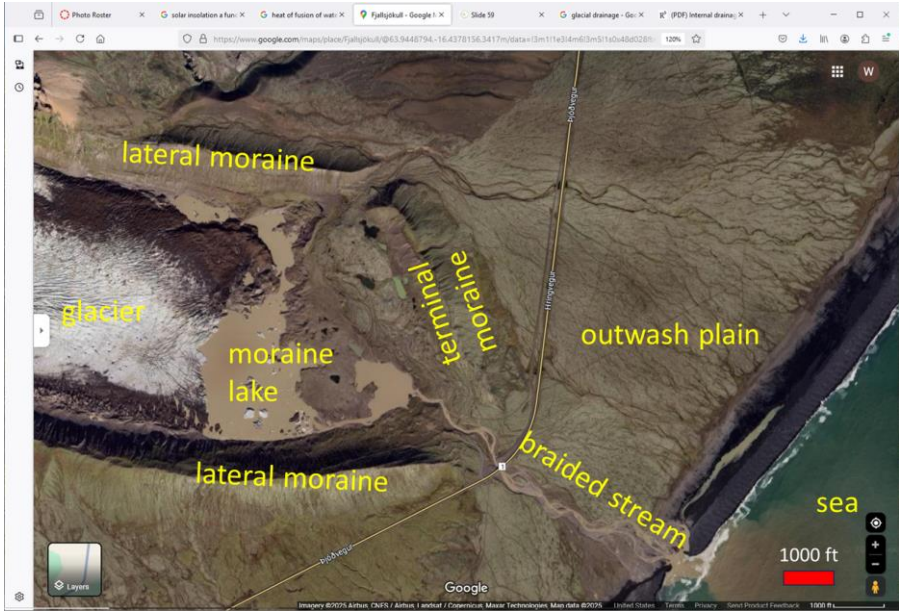
- ★ **In Google Earth, please complete the following tasks:**

1. Label Features

Reminder: Include scale bars!

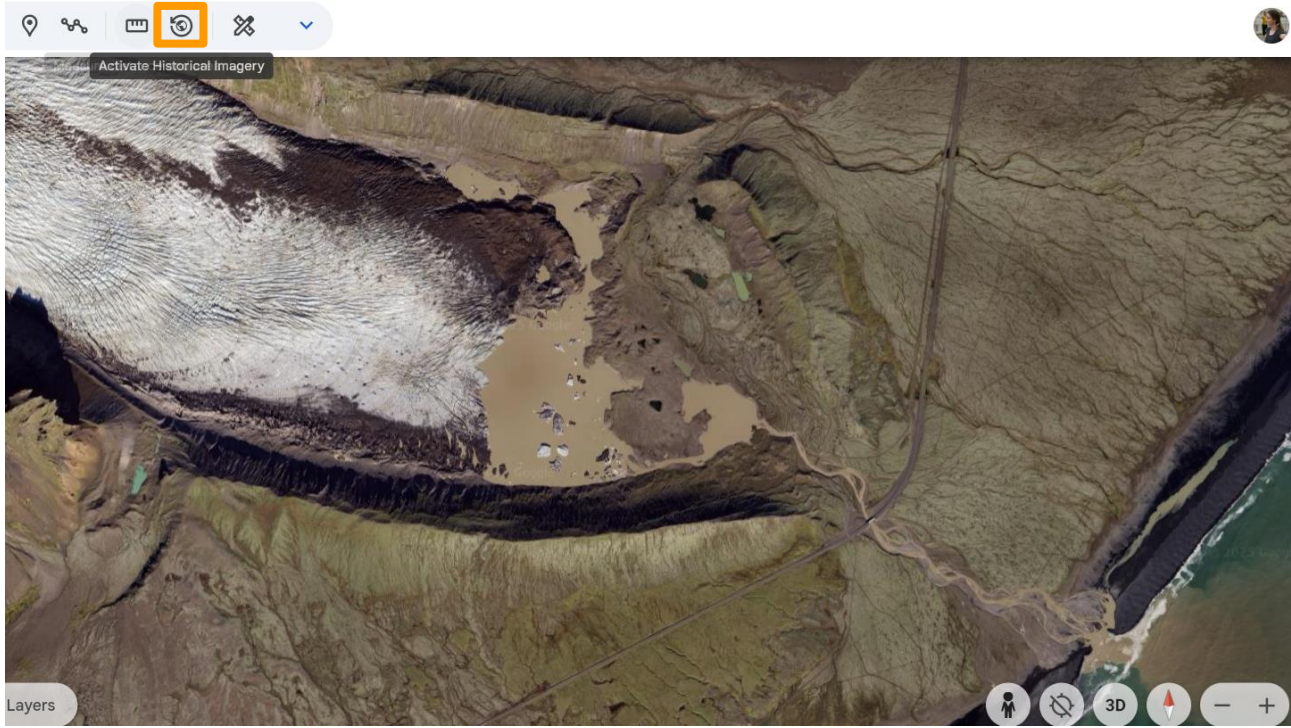
- Take a screenshot and label the moraine lake and any glacial features you see.
- Example from Lecture: Iceland (63°57'N, 16°28'W)





2. Activate Historical Imagery

- Click on the icon that activates the **historical imagery**
- Explore the imagery available



3. Draw a Polygon around Moraine Lake (Present day)

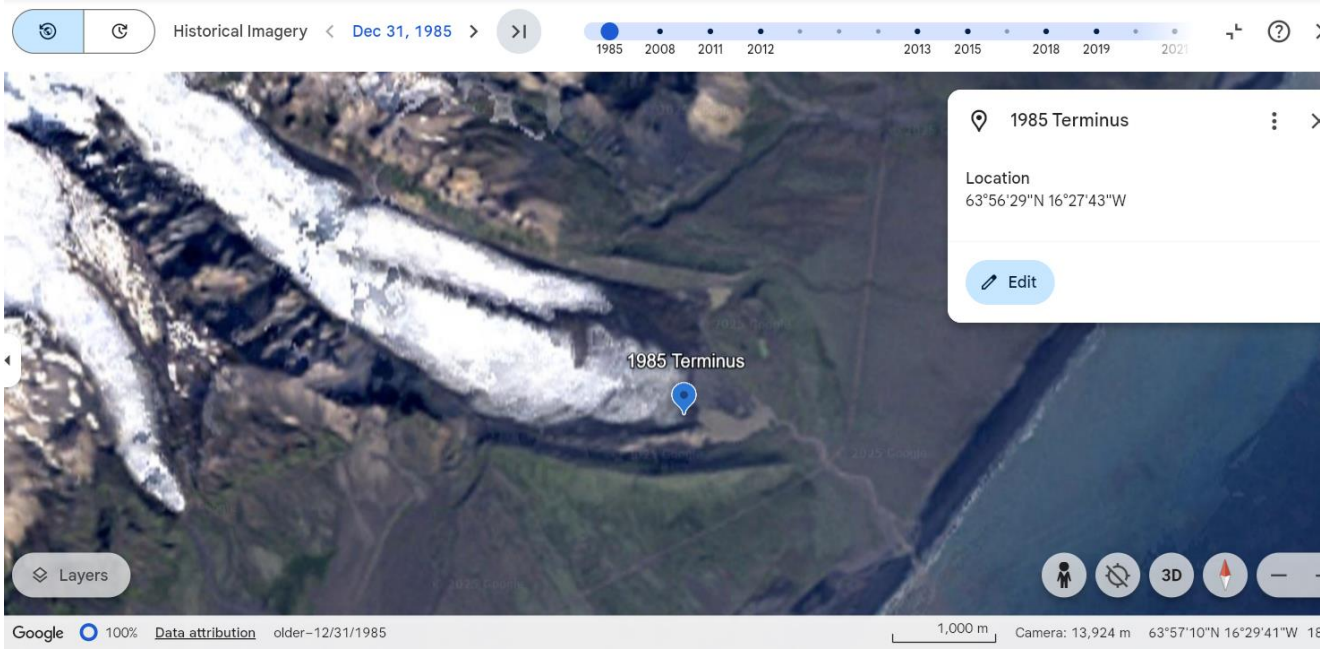
- Draw a polygon around your moraine lake using the **Polygon Tool** and label it with the **Add Placemark Tool**
- Record the perimeter and area of your lake for this year

4. Draw a Polygon around Moraine Lake (Oldest image)

- Draw a polygon around your moraine lake using the **Polygon Tool** and label it with the **Add Placemark Tool**
- Record the perimeter and area of your lake for this year
- Compare the two lake extents. Did your lake shrink? By how much? Can you observe rings around your lake that indicate past lake levels?

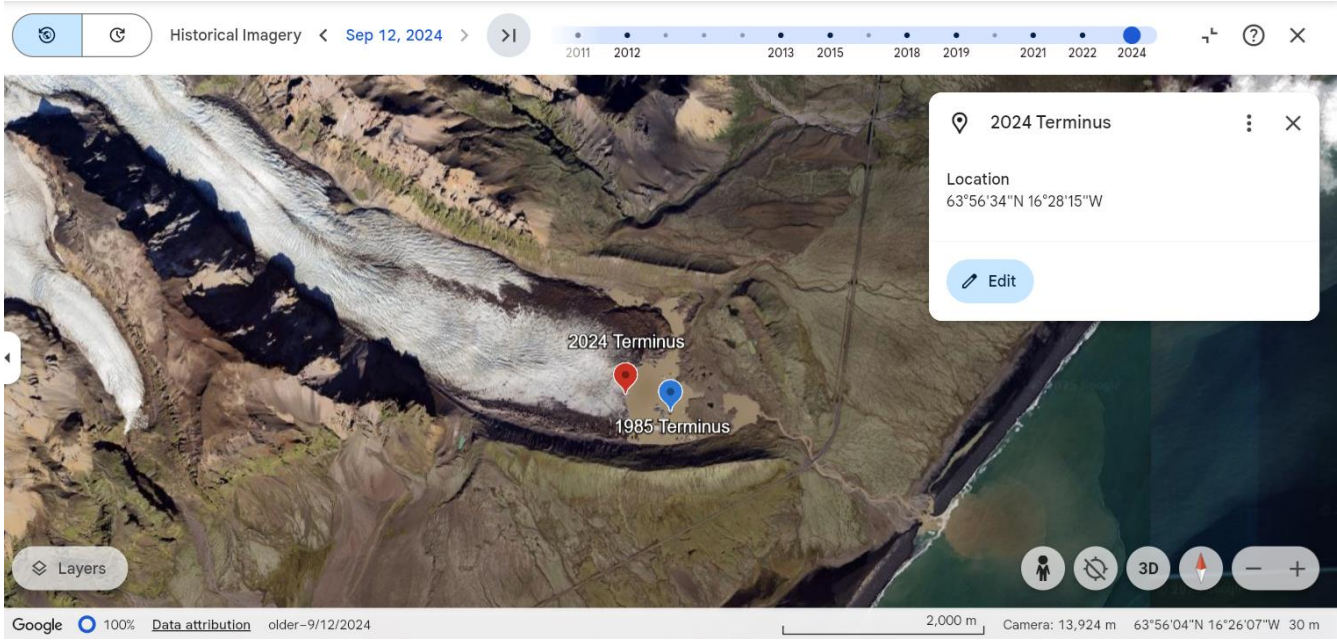
5. Locate Terminus (Oldest Image)

- Use the **Add Placemark Tool** to record the terminus location in the oldest (and clearest) image avaliable



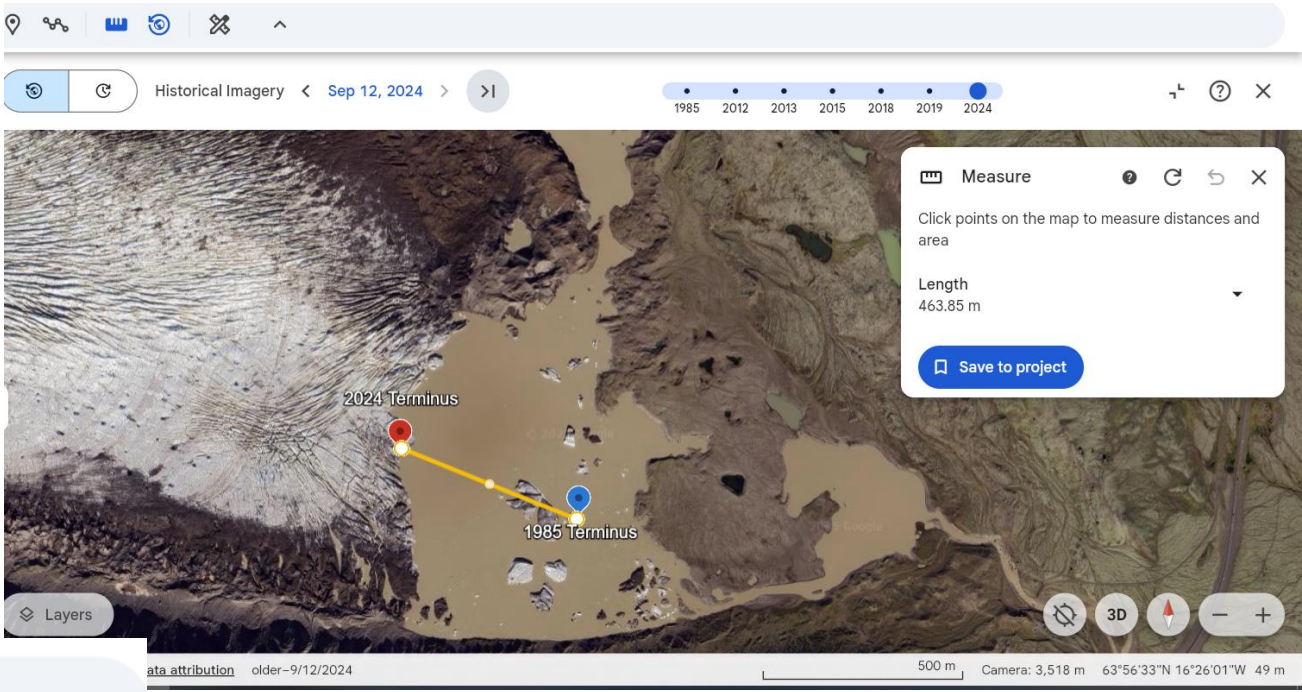
6. Locate Terminus (Present day)

- Use the **Add Placemark Tool** to record the current terminus location



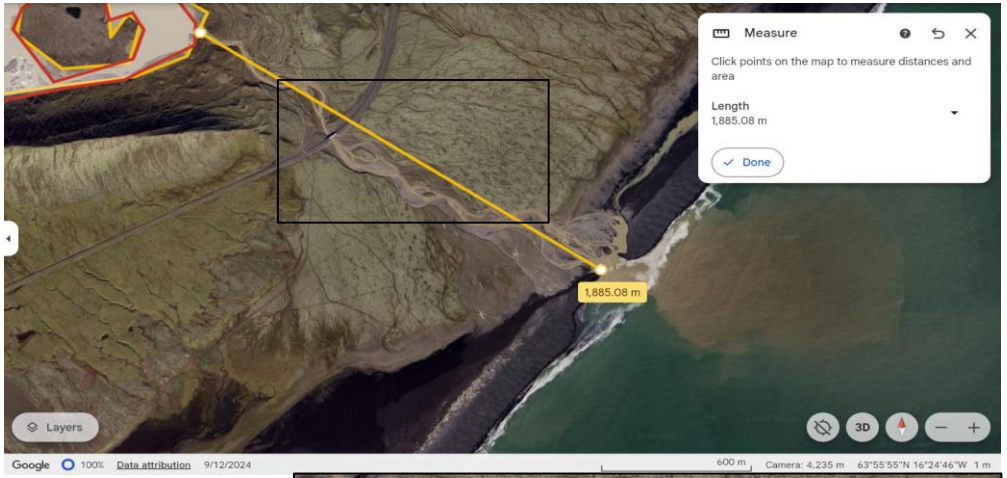
7. Calculate Retreat Rate

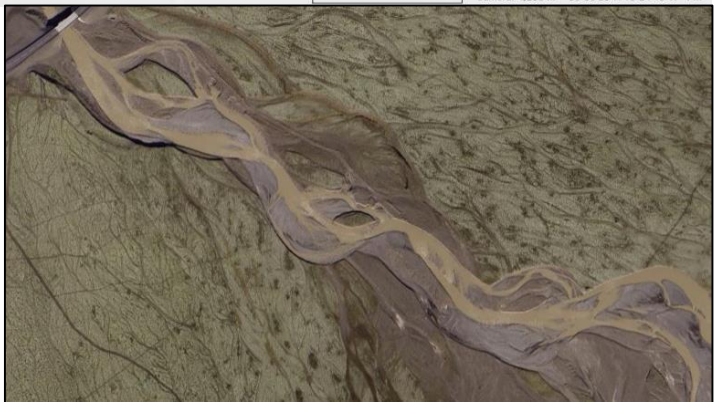
- Use the **Measure Tool** to measure the distance between the terminus points
- Calculate the retreat rate (Distance = Velocity*Time)



8. Determine Length of Outwash Plain

- Use the **Measure Tool** to determine the length of the outwash plain
- Zoom in and take a screenshot of some braided streams





Something to think about: How can moraines and moraine lakes help us learn about past glacial extent?