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The Morsárjökull rock avalanche in the southern part of the Vatnajökull glacier, south Iceland

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- Introduction
- Bedrock
- The rock avalanche
- Causes of the rock avalanche
- Do we need to be concerned of further rock avalanches?

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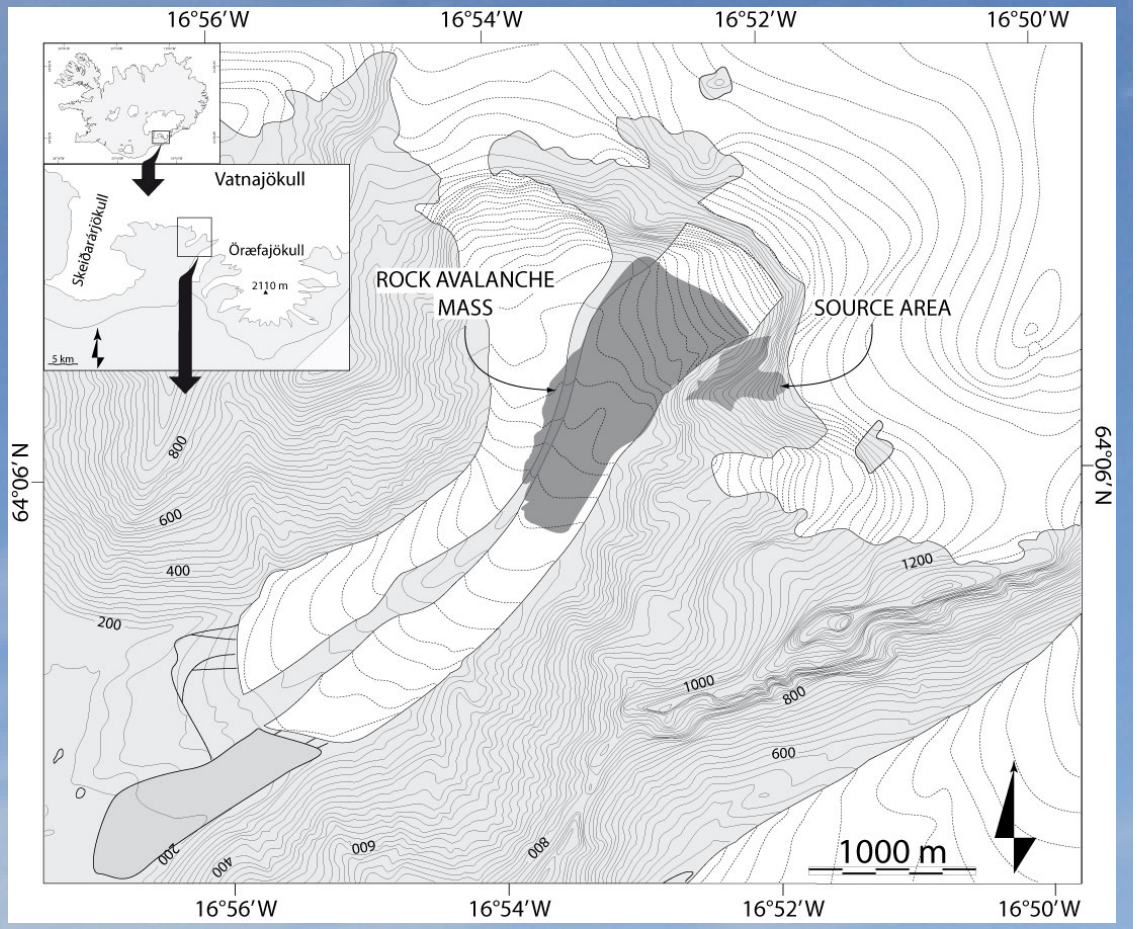
Introduction

- The Morsárjökull glacier is a small outlet glacier on the southern side of the Vatnajökull ice cap.
- It is surrounded by 1000 – 1400 m high mountains.
- The glacier is composed of two ice streams. The western one is today partly connected to the main ice cap, but the eastern one was separated from the main ice cap around 1940.
- The Morsárjökull glacier is about 3,5 km long and up to 1-1.5 km wide.



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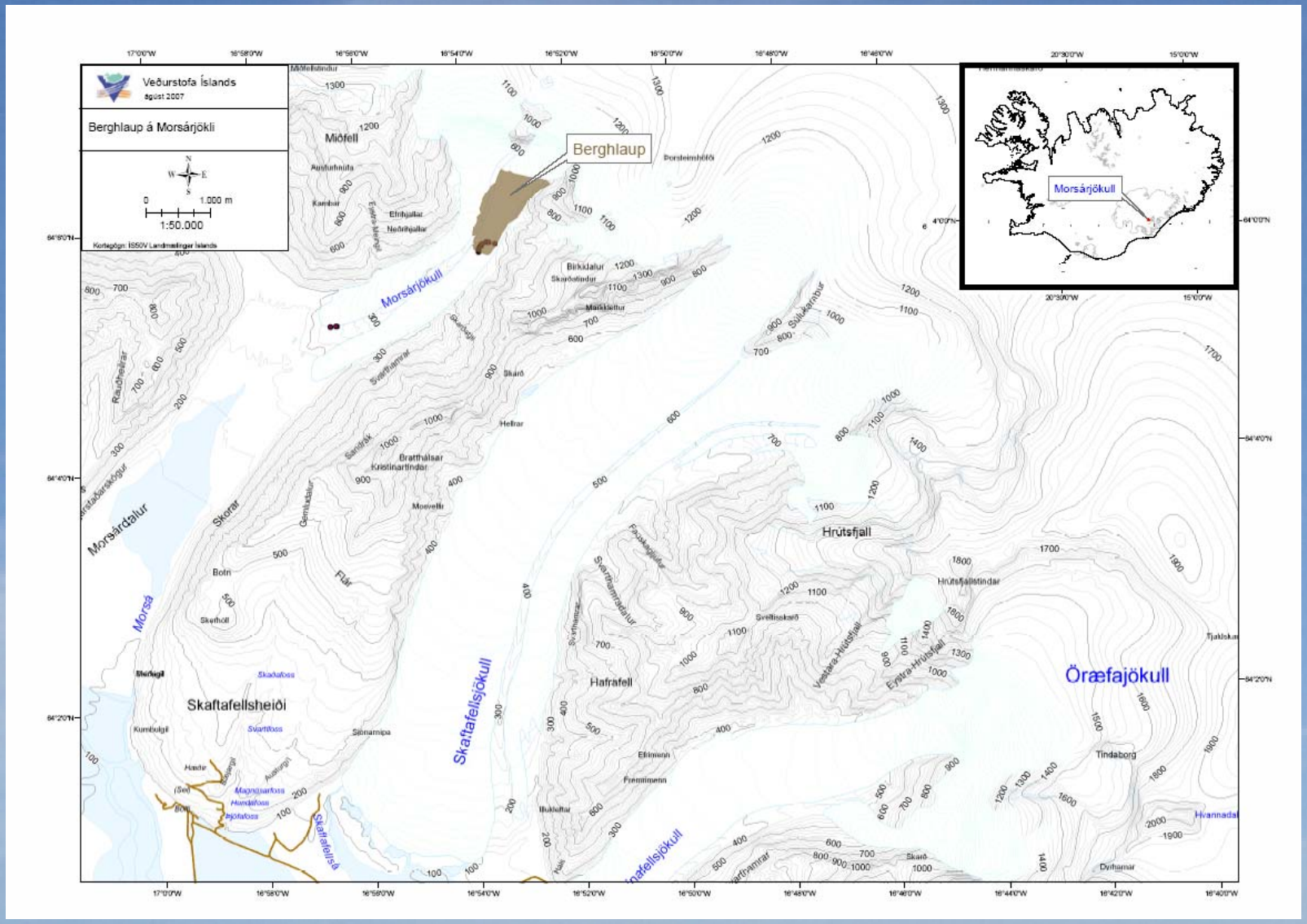
Introduction



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The Morsárdalur valley

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The Morsárdalur valley

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The western Ice front

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The eastern ice front

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The Morsárdalur valley

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The medial moraine

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The eastern ice fall

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The ice fall

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The western ice fall

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The Morsárjökull glacier

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Bedrock

- The bedrock of the area is highly variable in composition.
- It was build up during the last 5 million years.
- From 5 to 2.7 million years the area was ice free and the build up was preliminary lava flowing from the volcanic zone.
- From 2.7 million years more variations can be seen in the bedrock, reflecting climate variations, with subglacial volcanism producing palagonite and “moberg” ridges during the glacial periods and lava beds during the interglacial periods.
- During the last 2,7 million years glacial erosion have been effective in the area.
- From 2.7 to 1.9 million years a central volcano was active in the highlands west of the area and today extensive rhyolite formations gives the area a unique look.
- The bedrock is heavily intersected by dykes, in E-W orientation.

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Bedrock

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The rock avalanche

- The Morsárjökull rock avalanche is one of the largest rock avalanche which has occurred in Iceland during the last decades.
- The avalanche occurred in two events. The former and the bigger one, occurred on the 20th of March and the second one on the 17th of April.
- In both instances “surface” earthquakes were observed.
- The scar of the rock avalanche is located on the north face of the headwall above the uppermost part of the glacier.
- The rock avalanche fell on the uppermost part of the glacier and covered about 1/5 of the glacier surface, an area of about 720.000 m^2.

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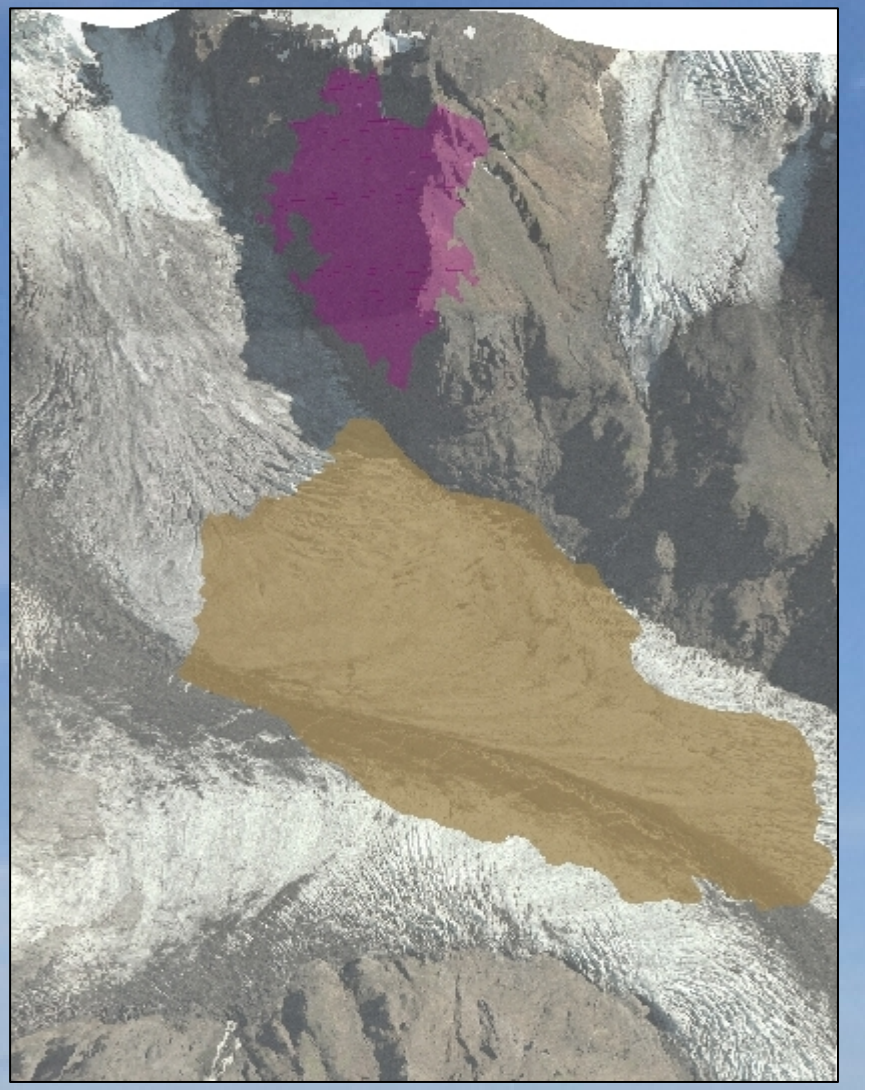
Fracture zone/ debris tong

- **Fracture zone**

  Height from 950-620 m a.s.l. or 330 m
- **Debris**
  - Length from 1400-1600 m
  - Mean 1500 m
  - Wideness 125-650 m
  - Mean 480 m
  - Area 720.000 m^2
  - Upper part of debris 520 m
  - Lower part of debris 352 m
  - Mean thickness c. 5.5 m
- **Volume**
  - About 4.000.000 m^3
  - About 10,4 million tons



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The front 2007

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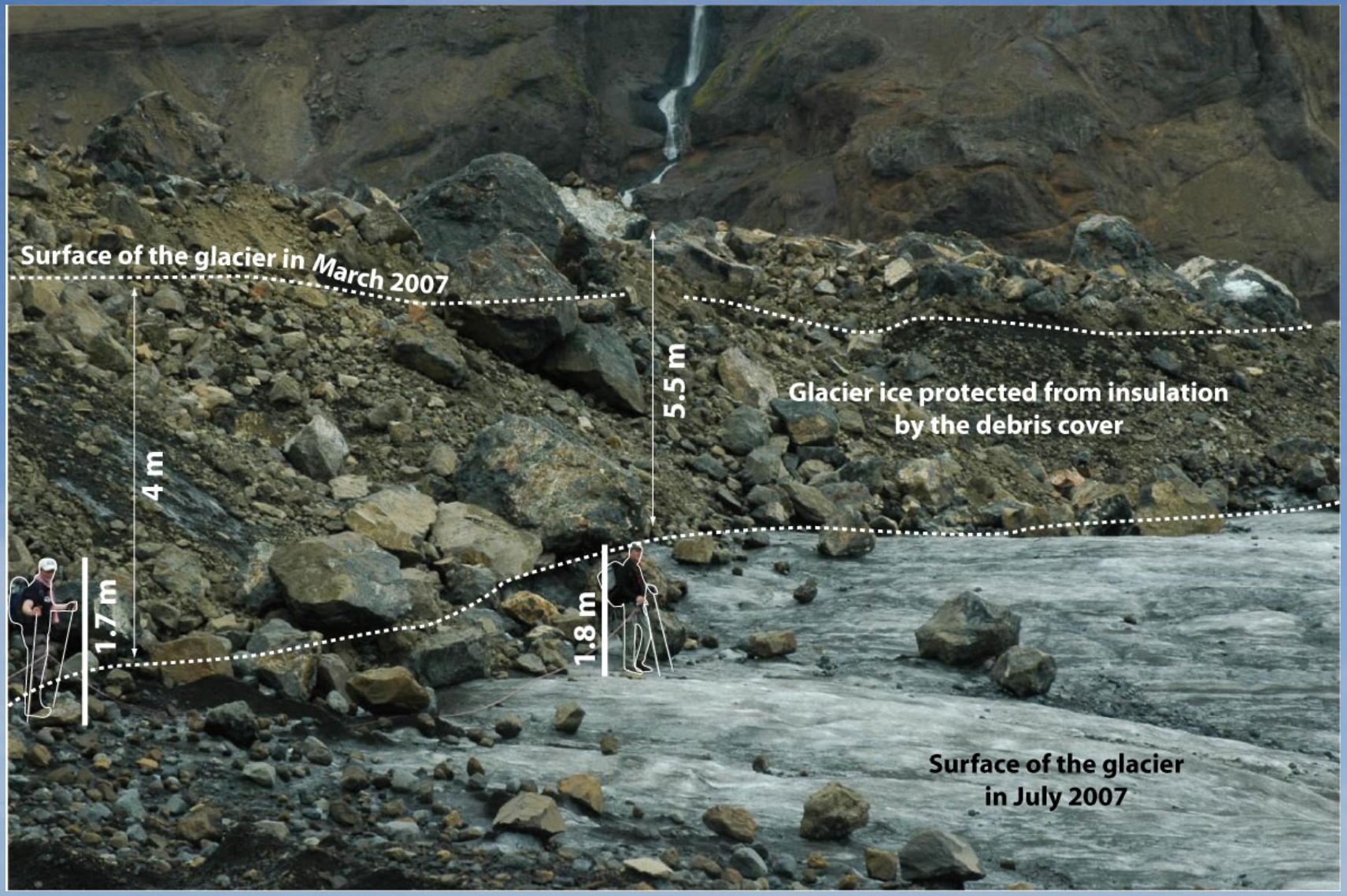
The front 2007



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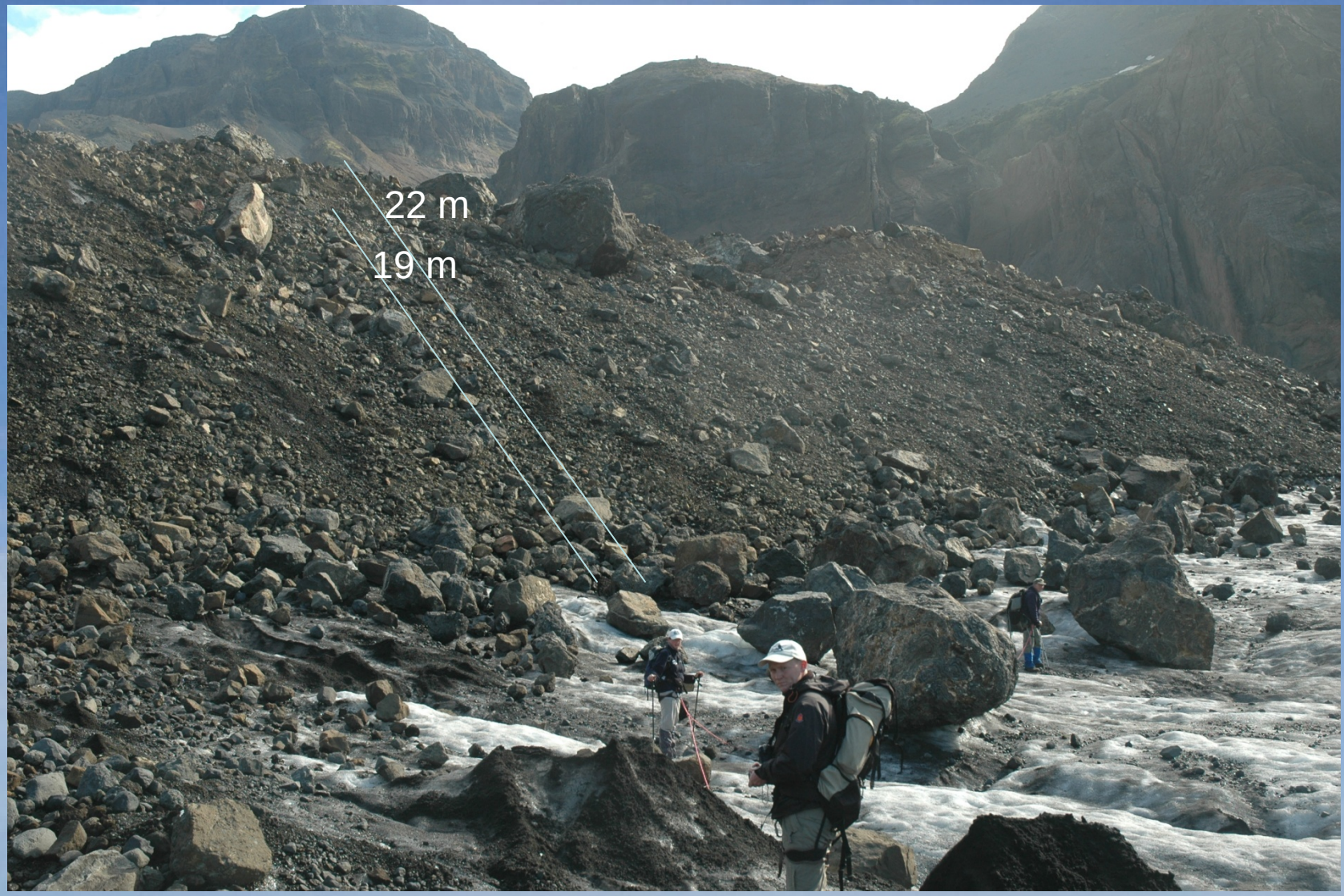
The front 2008



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The east margin 2007

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The east margin 2008

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The west margin 2007

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The west margin 2008

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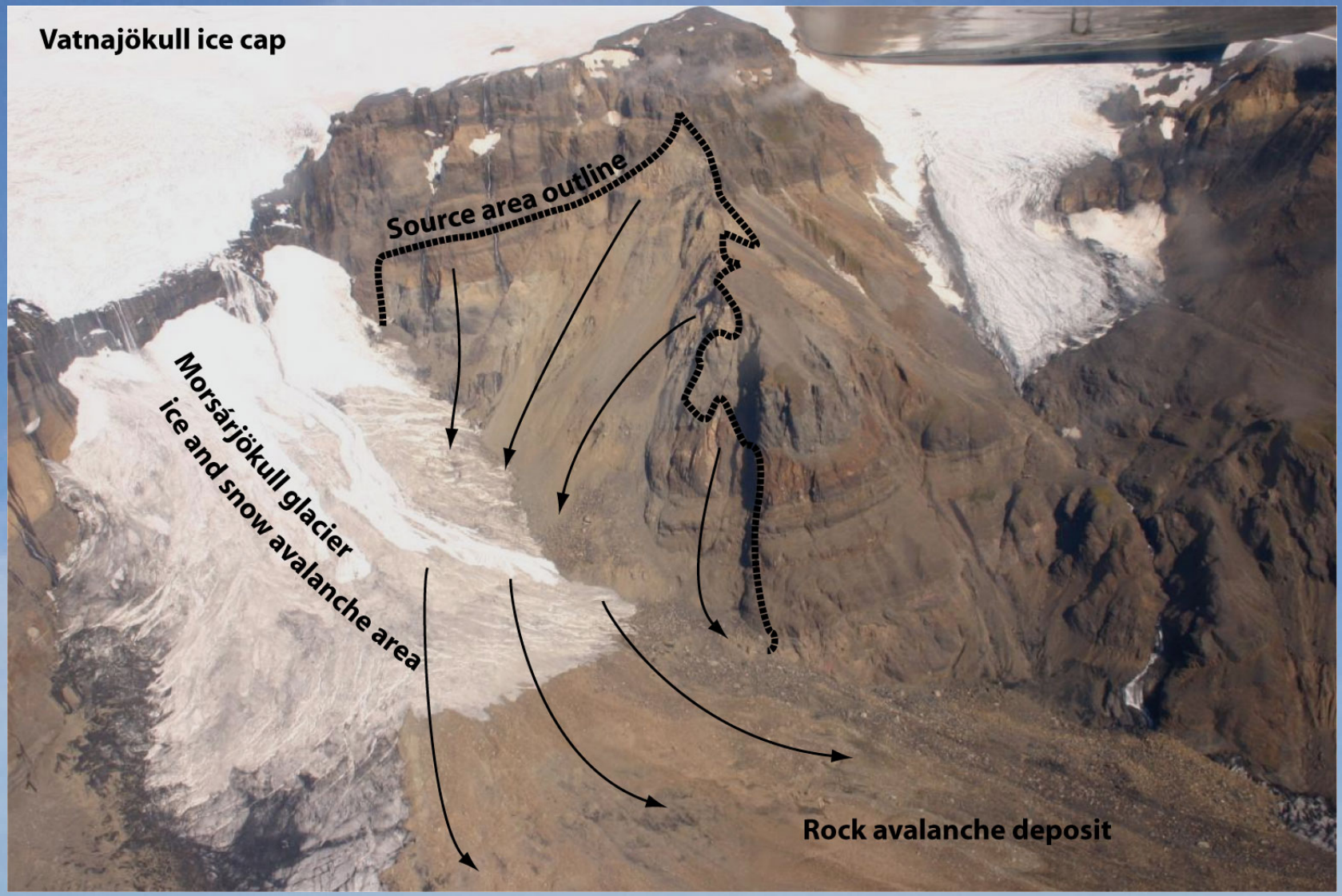
The fracture zone



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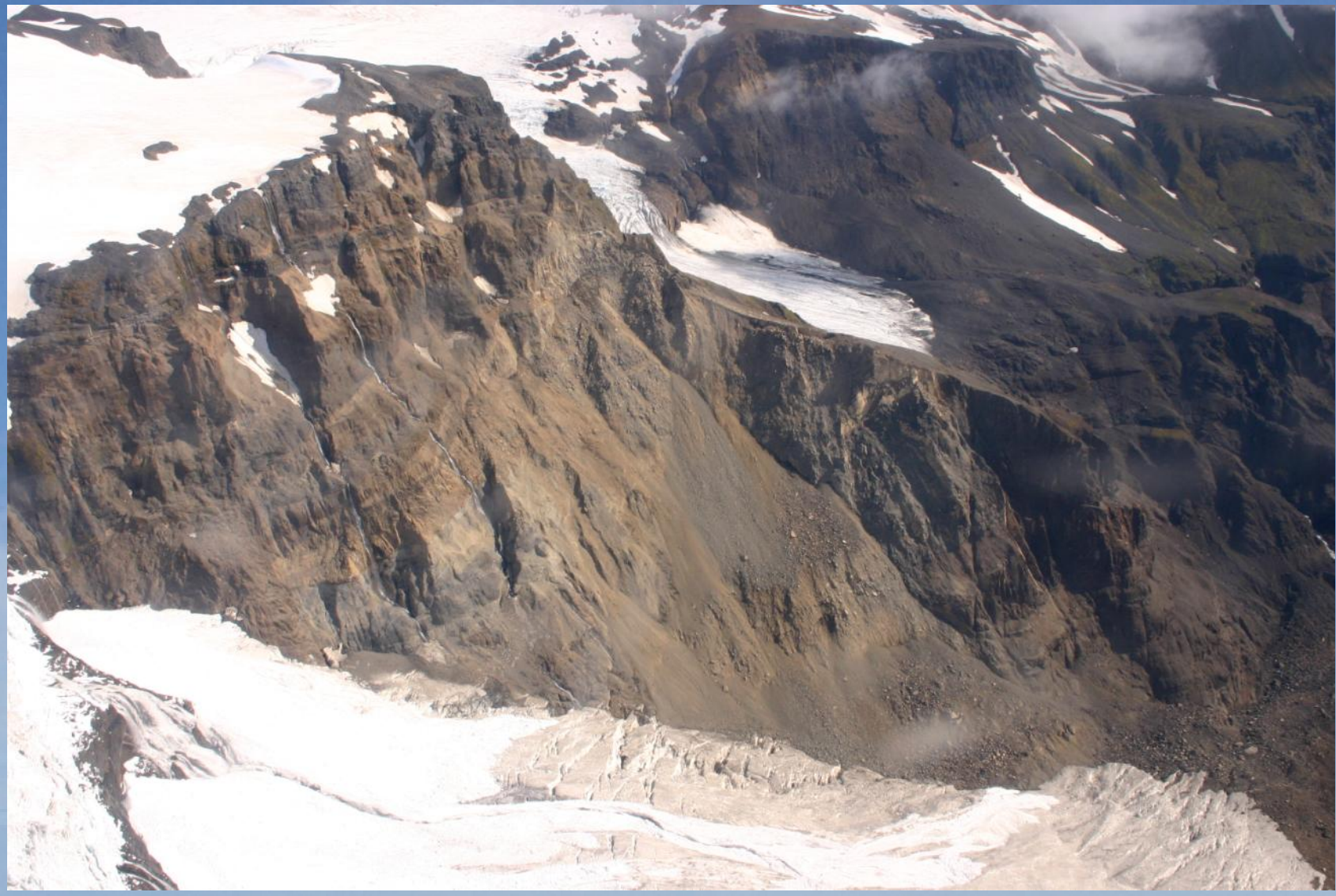
The fracture zone



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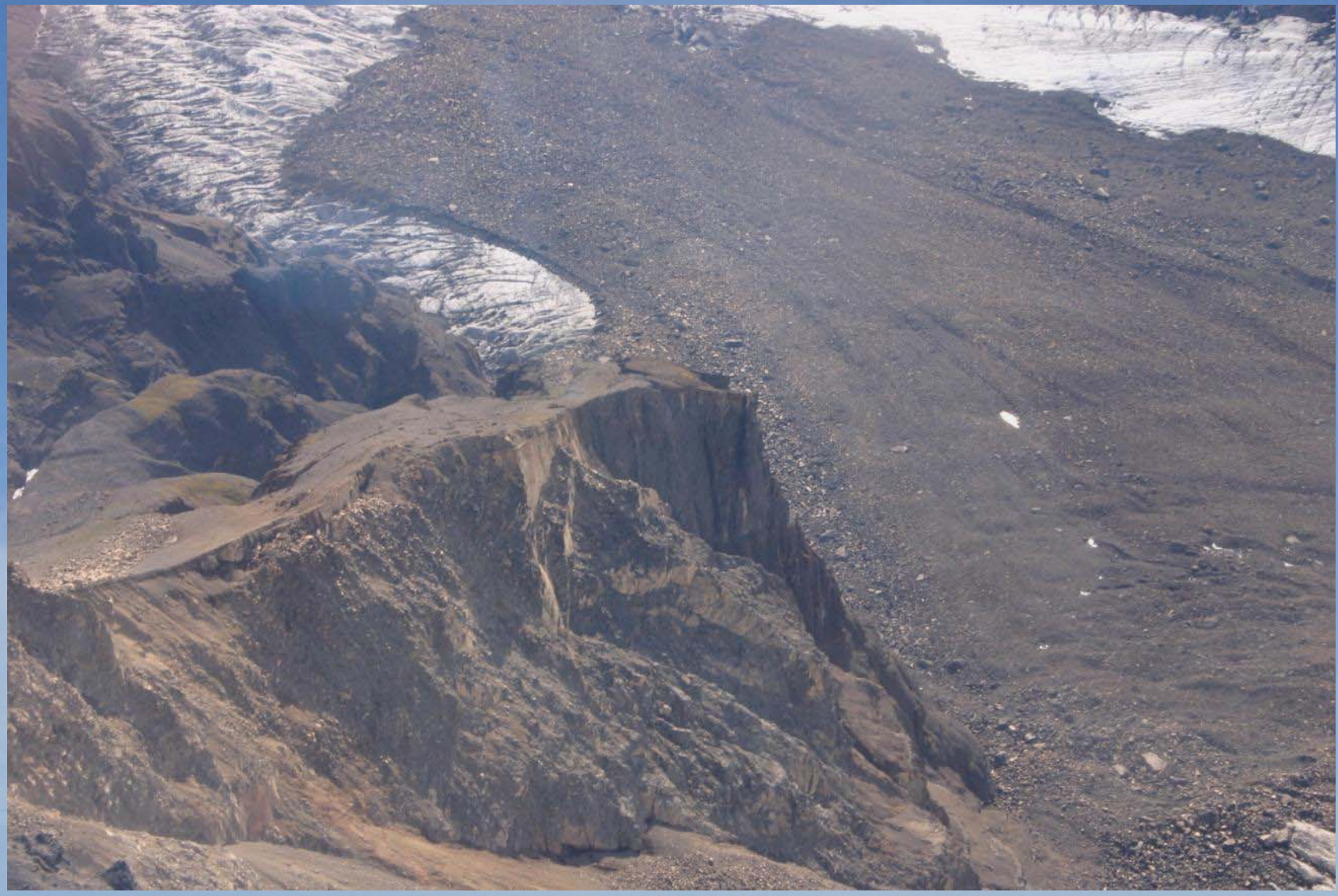
The fracture zone



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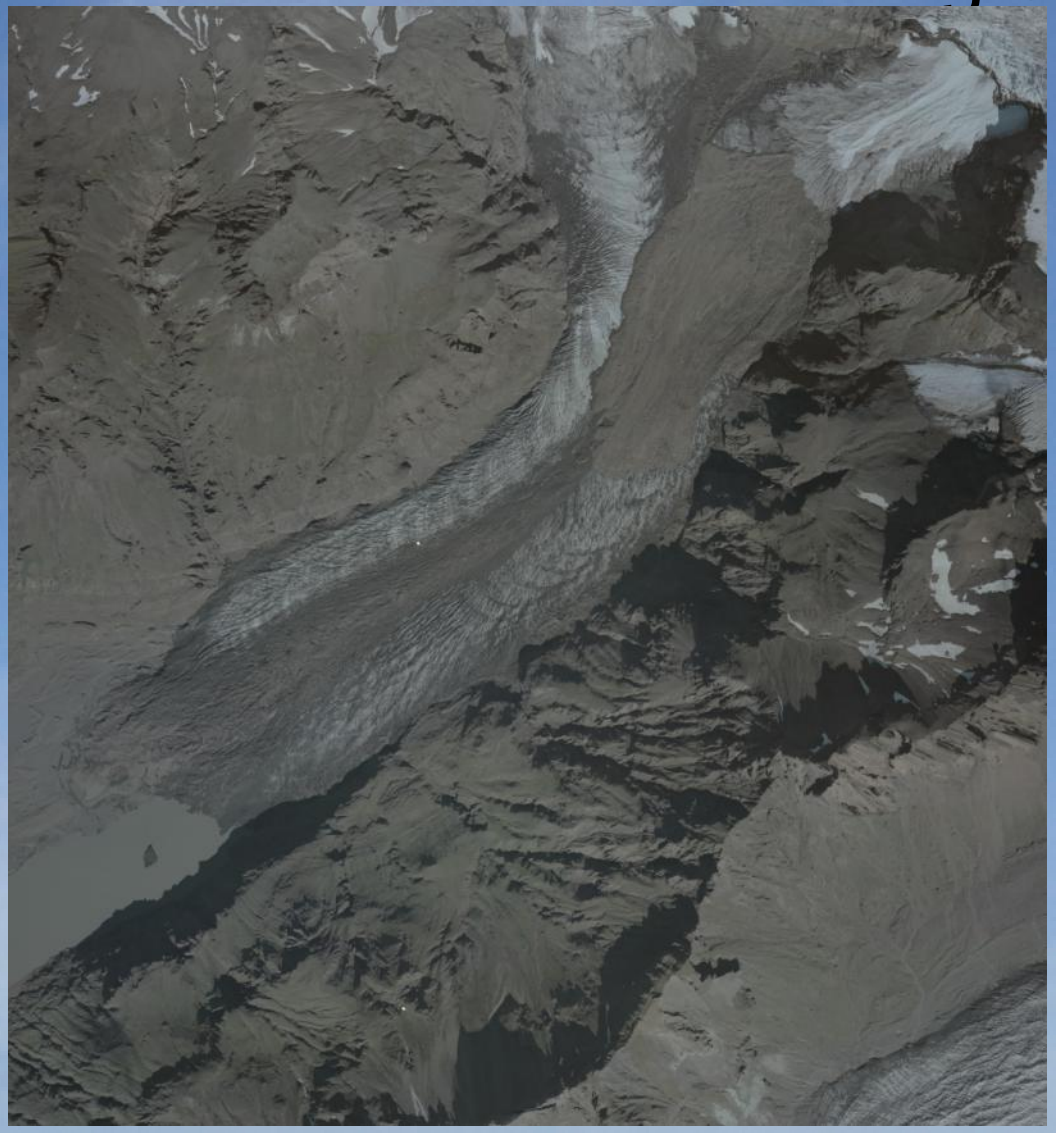
The debris and grain size



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The debris and grain size

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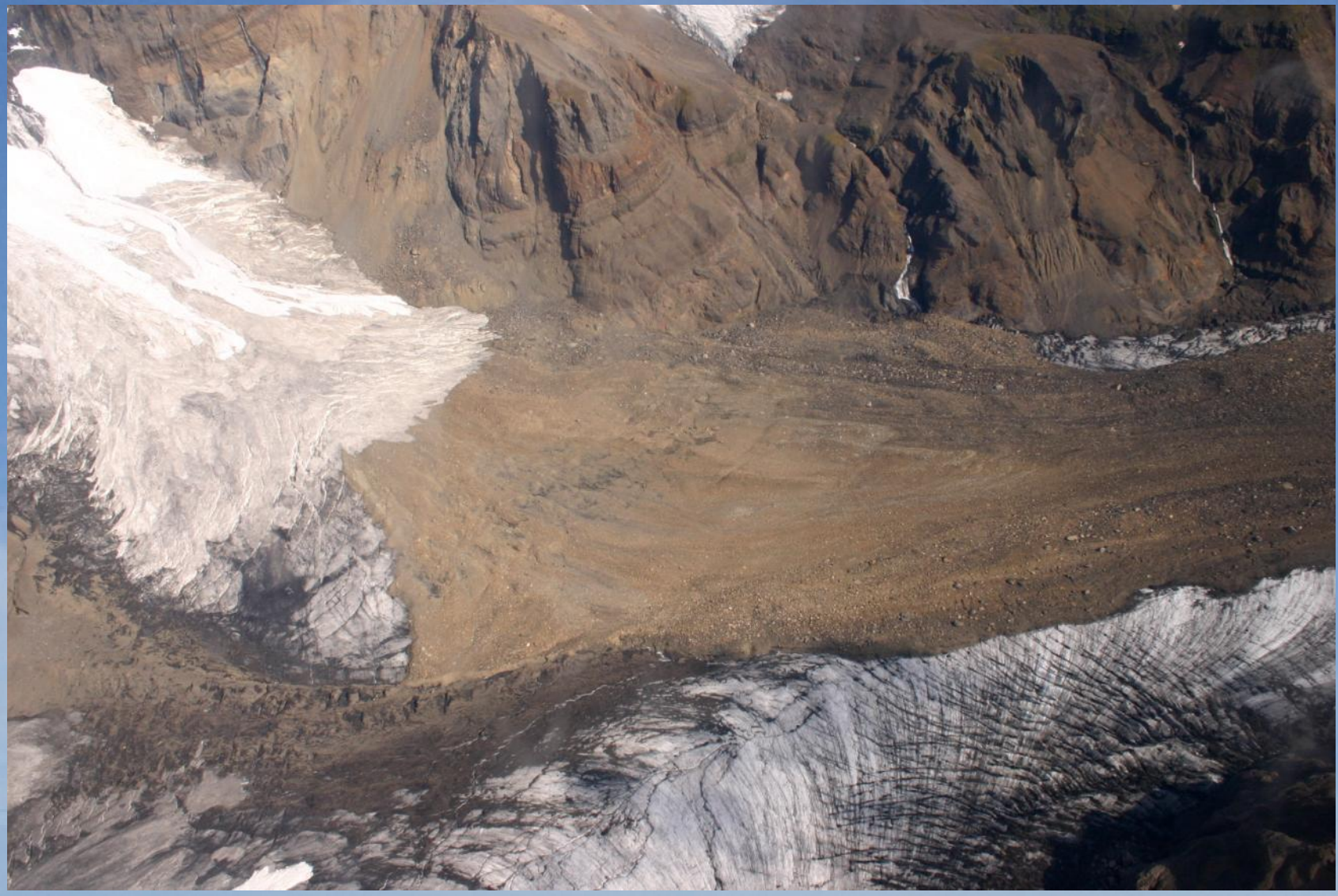

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The debris and grain size

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The debris and grain size

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Sturzstrom

- A sturzstrom is a rare, unique type of landslide.
- It consists of dry soil and rock and moves great distances horizontally with only a comparatively small verticall drop.
- Sturzstroms flow across land easily, and their mobility increases when volume increases.
- Once moving, a sturzstrom is able to ride over nearly any terrain reaching speeds around 70 mph / 100 kmph.

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Ice Valley Glacier

- The Mount Munday
  - British Columbia
  - Type = rock avalanche,
- Fall height from 3000 – 2100 m a.s.l. or around 900 m
- Runout length 4,7 km
- Clear flow lines
- The debris tong has similar characteristics as the Morsárdalur rock avalanche.

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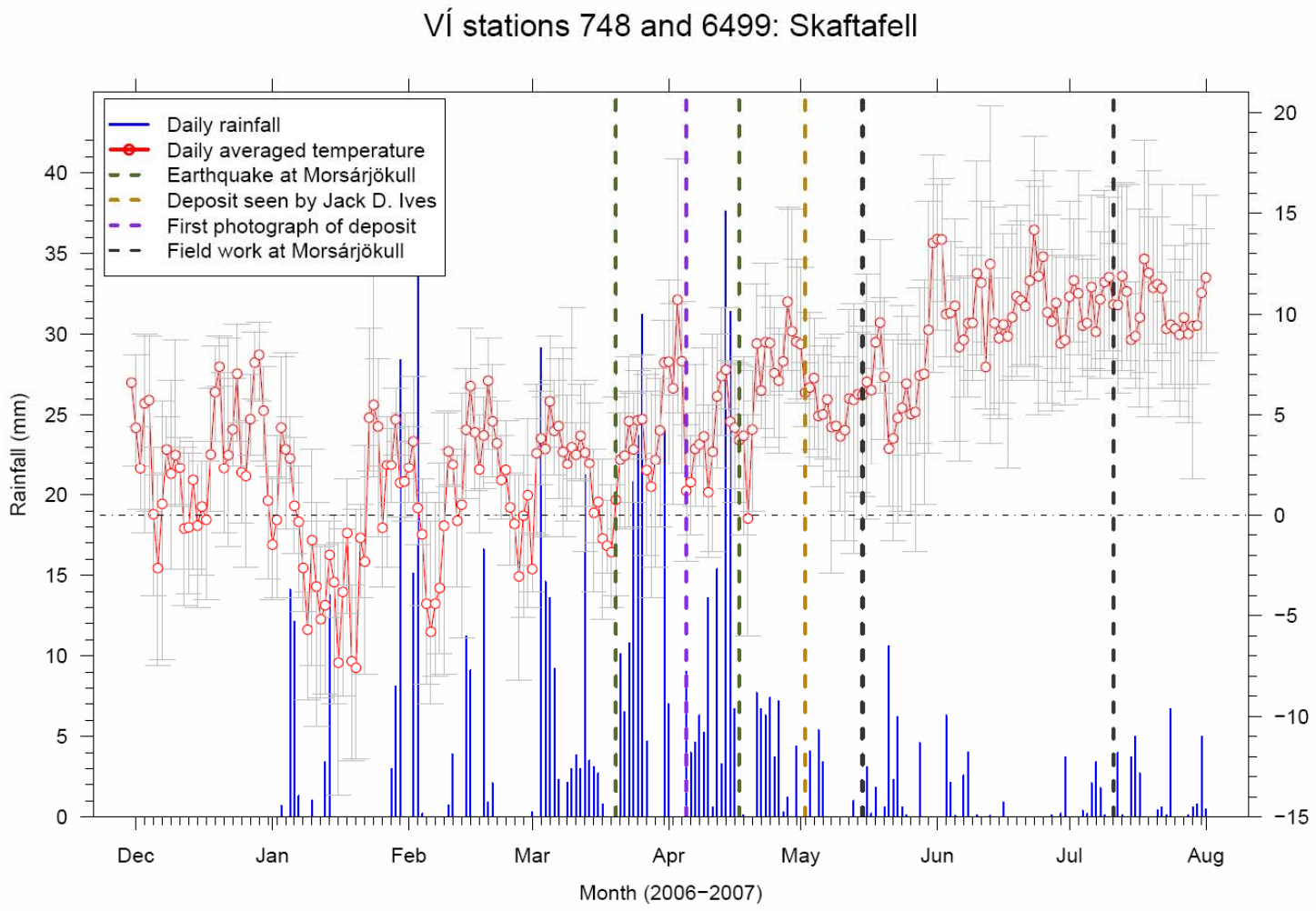
The causes of the rock avalanche



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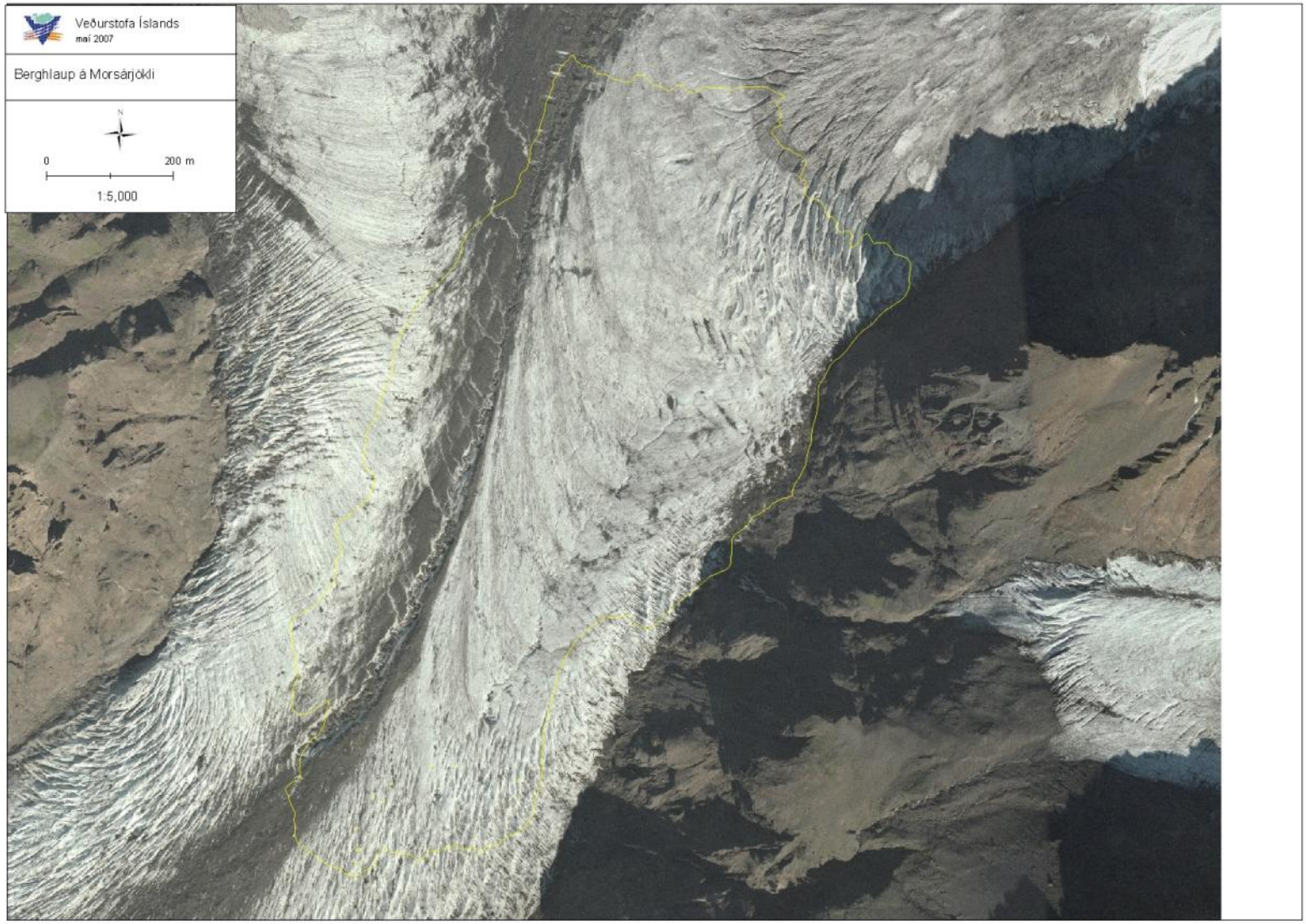
Morsárjökull 2003



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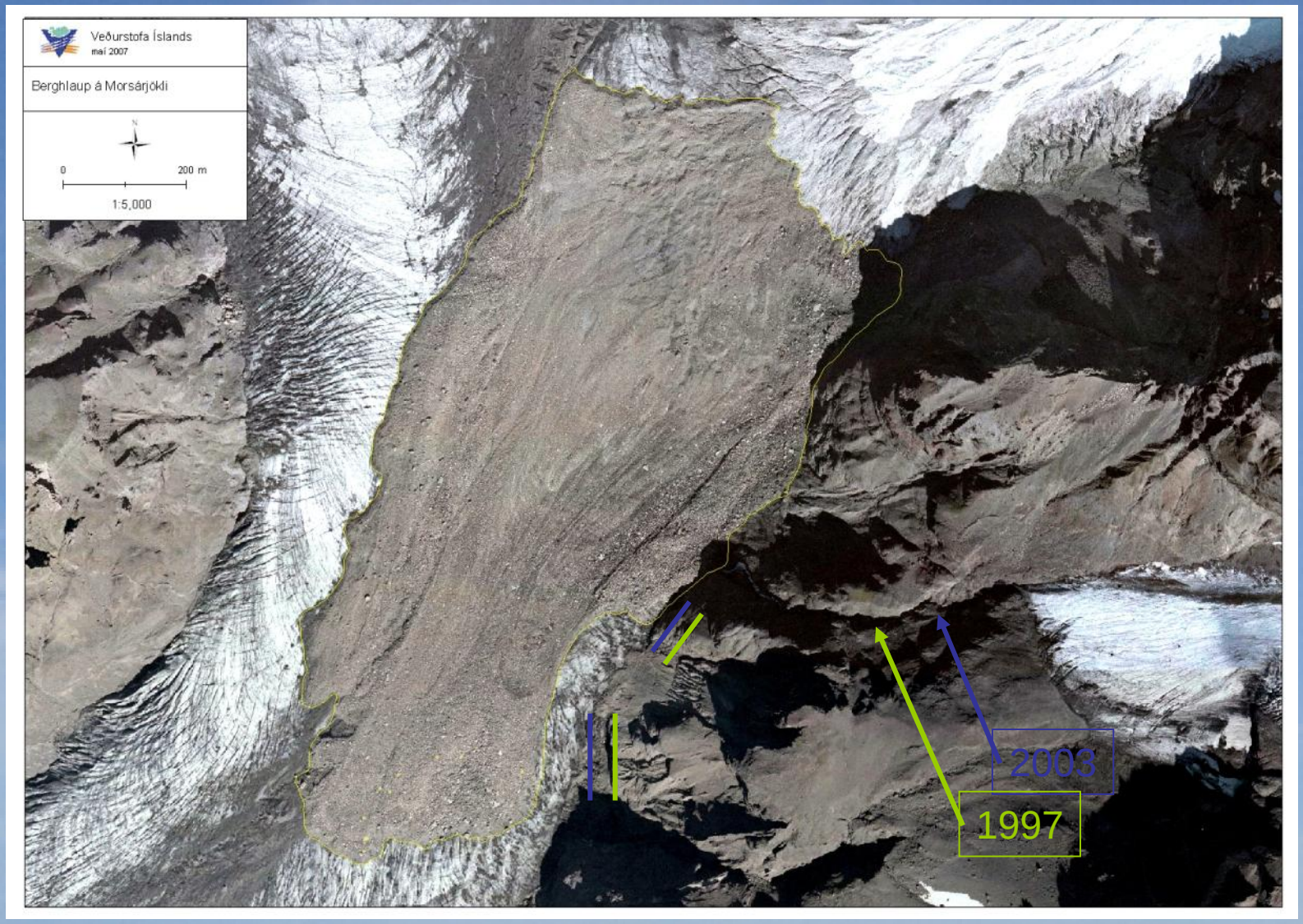
Morsárjökull 2007



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Do we need to be concerned of further rock avalanches in Iceland?

- Yes

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Ég þakka fyrir gott hljóð