

Rockslides/Rock avalanches in the Skagafjörður area, Iceland – report on a work in progress

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Introduction

- Rockslides are very common phenomena in the landscape of Iceland.
- Around 500 rockslides have been mentioned in geological literature and on maps, and still there are many to be observed.
- They vary in form, size and complexity although many show very similar features.

Berghlaup



A 623 page book published in 1976 in Iceland.

Author is Ólafur Jónsson (1895-1983), an agricultural scientist and amateur geologist.

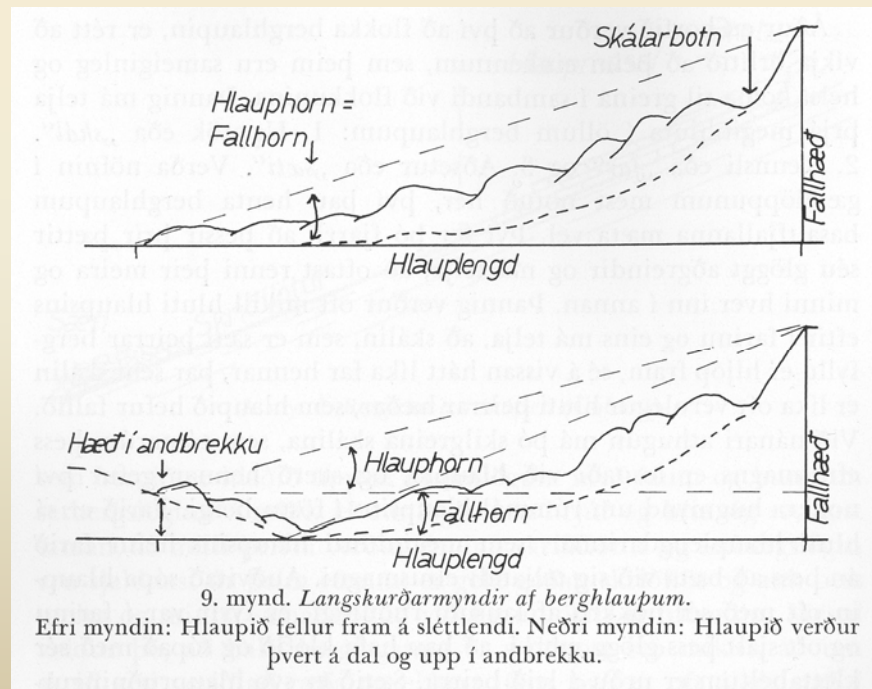
Descriptions and measurements on 226 rockslides

Contains photographs, drawings and a few b/w aerial photos, but no maps.

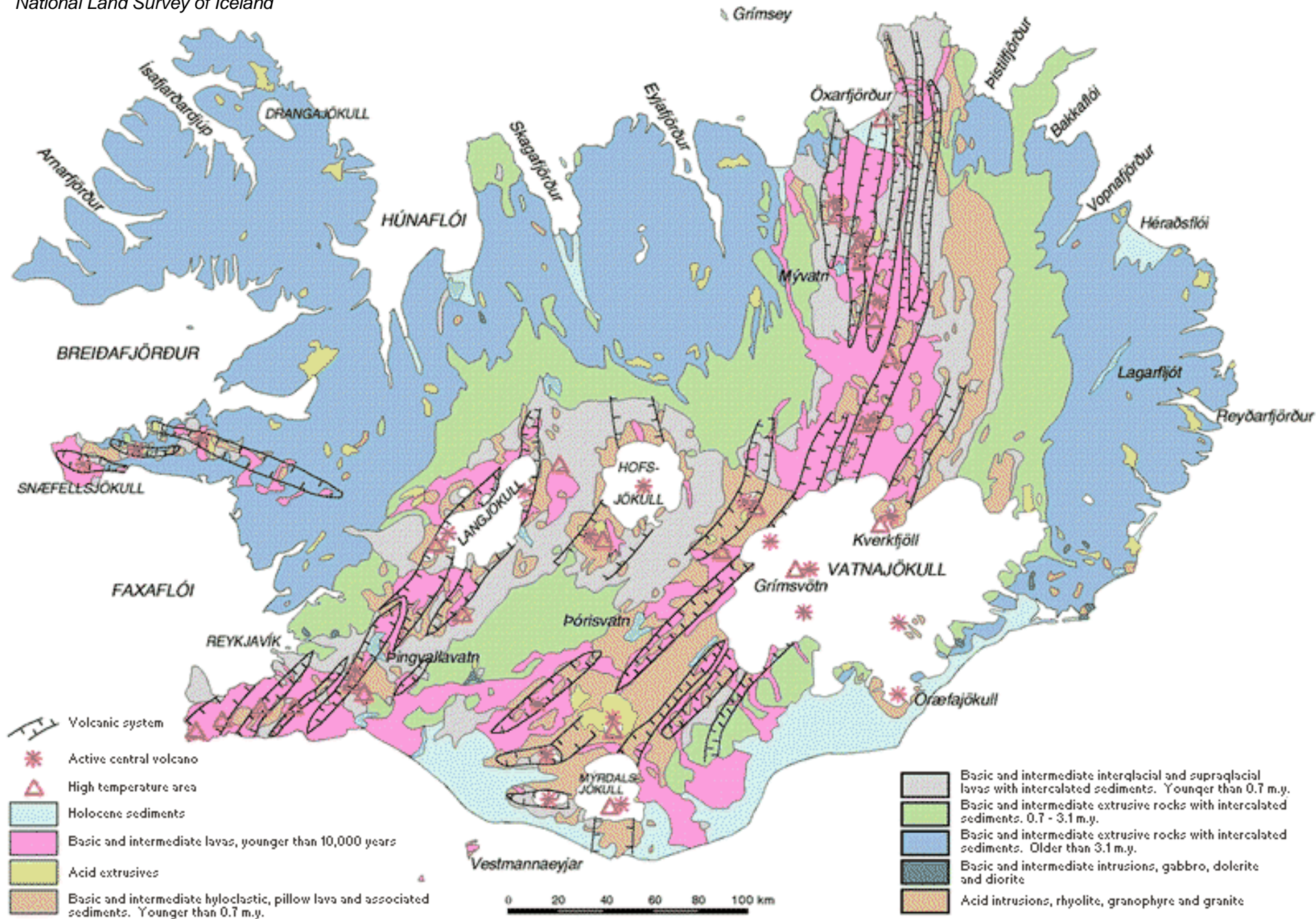
The first systematic study of the Icelandic rockslides

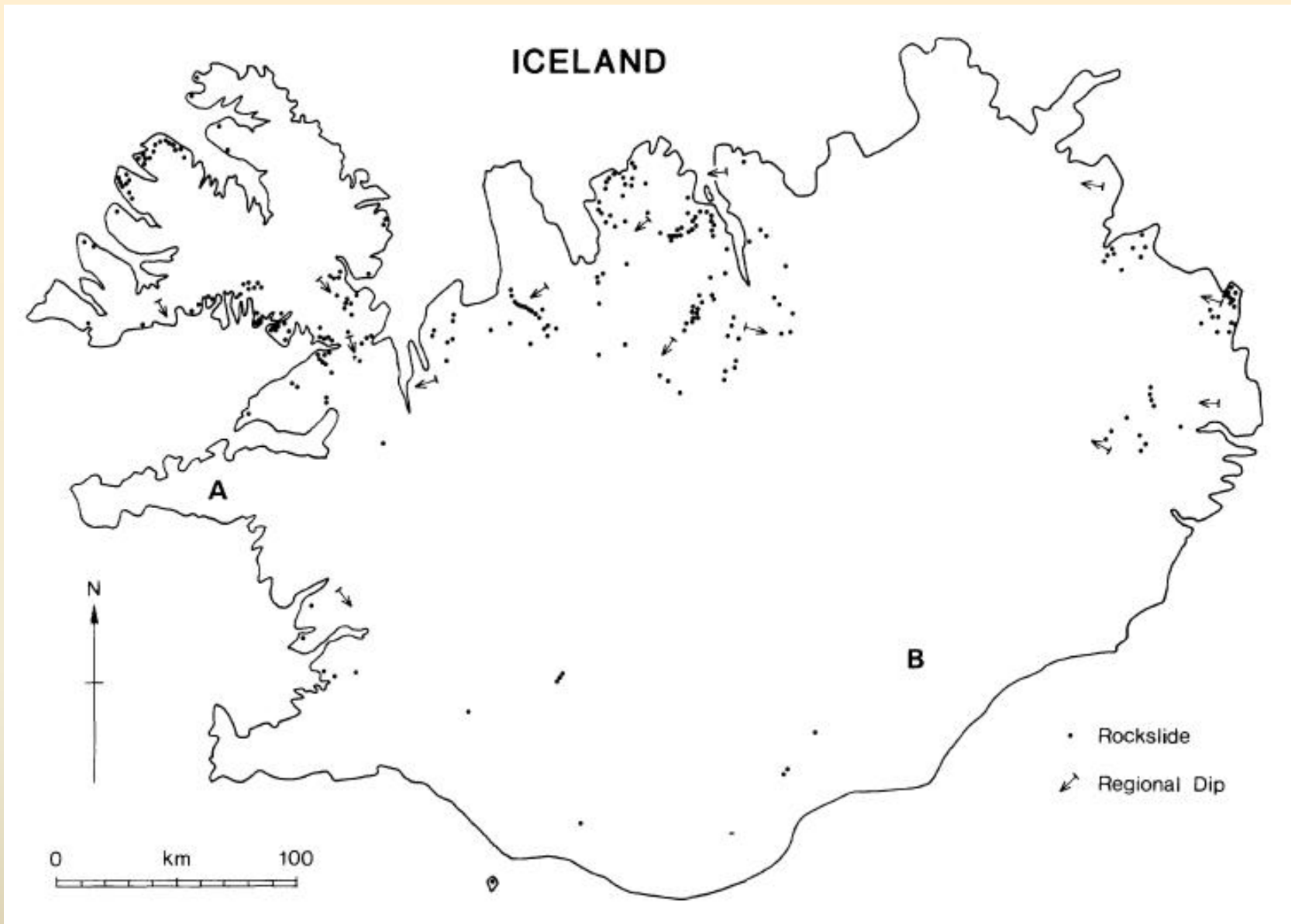
	Fall height [m]	Runout distance [m]	Area [km ²]	Volume [m ³]
Min	40	180	0.01	8.00E+04
Max	1120	6500	13.00	1.20E+08
Average	407	1292	1.01	1.75E+07
	N = 210	N = 207	N = 201	N = 193

Data from Jónsson (1976)

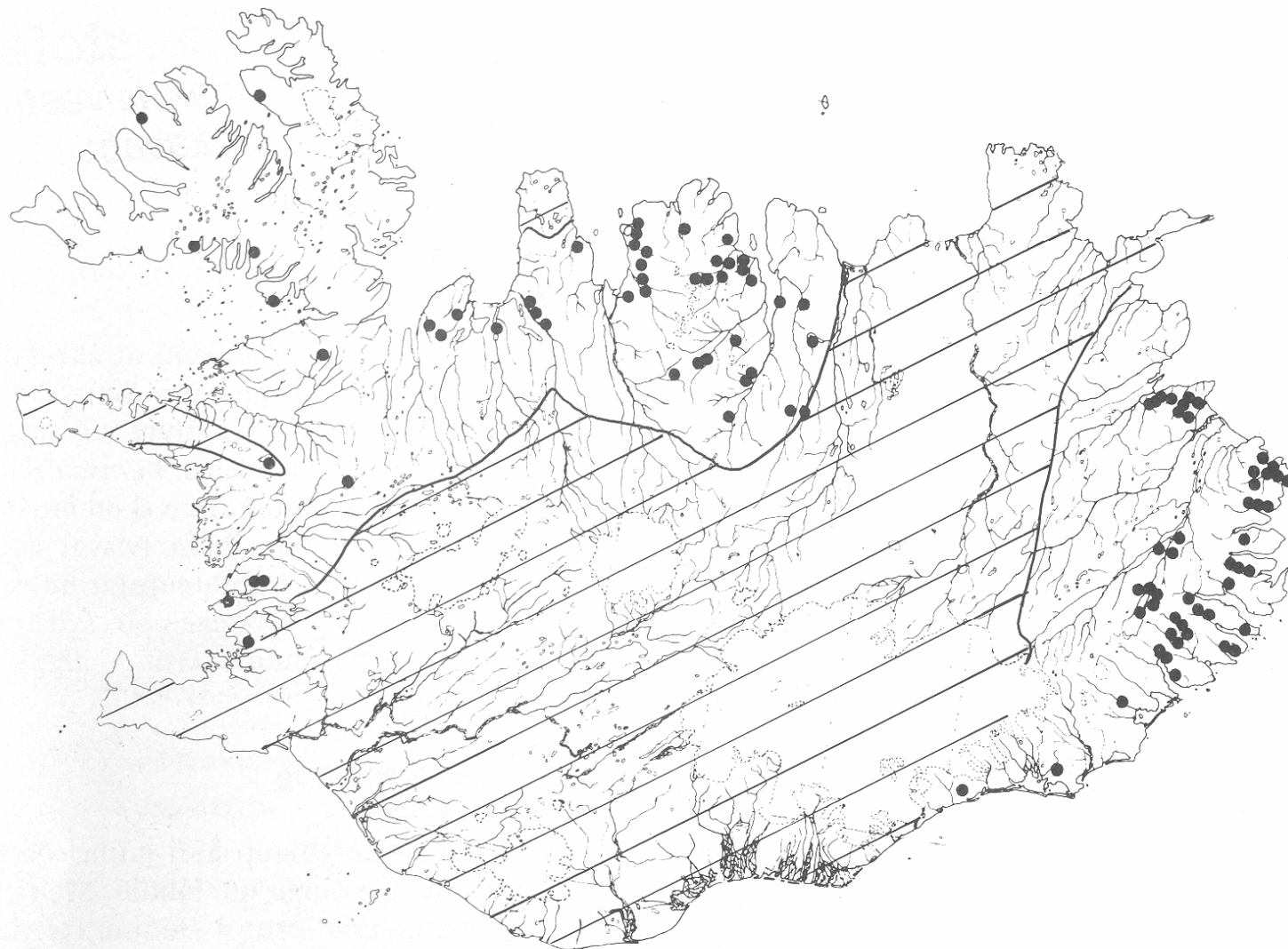


Geological map of Iceland
National Land Survey of Iceland





Rockslide distribution in Iceland
From Whalley (1983). Map by Ægir Jónsson (1980) based on Ólafur Jónsson (1976)



Rockslides with surface area $>1 \text{ km}^2$
Map by Hjartarson (1981)

The Tertiary bedrock of Iceland



Extinct silicic central volcano

Highest frequency of rockslide events



A succession of tholeiitic basalt lavas interbedded with red layers of paleosols



A new study on the Icelandic rockslides

- A joint project
 - Natural Research Center, Northwestern Iceland
 - Icelandic Institute of Natural History
- Locating every rockslide event in Iceland, starting in the areas of highest rockslide frequency (Skagafjörður and Eyjafjörður areas in Central North Iceland)
- Integrate the available published data and new data into a computer database
- We start with data collection and basic mapping which will lay the groundwork for further field mapping and dating.
- The long term goal is to advance the current understanding of rock slide and rock avalanche phenomena in Iceland.

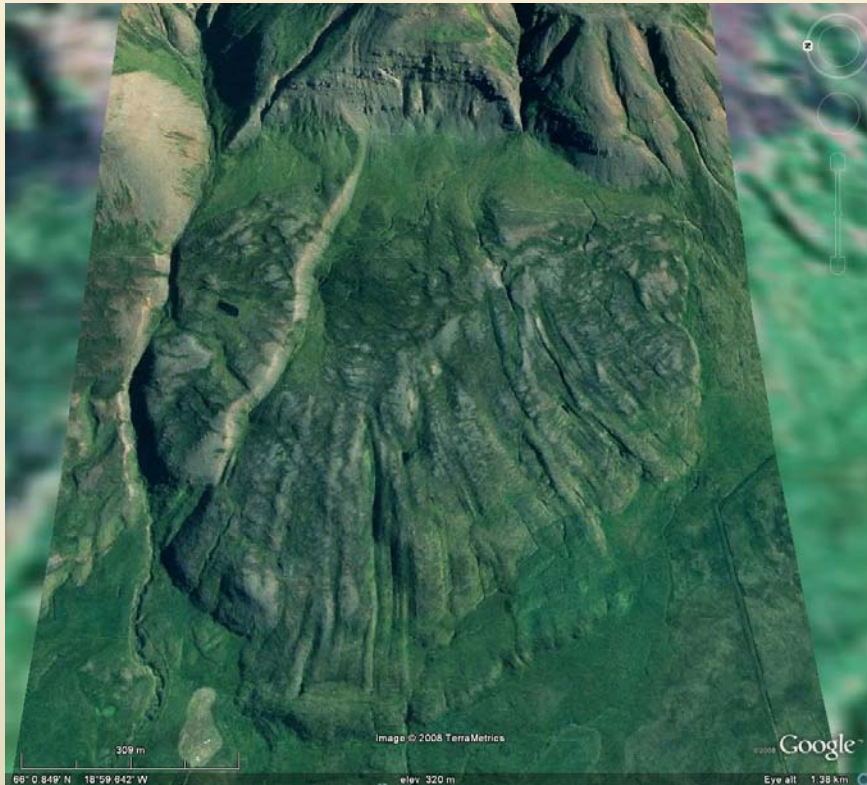
Questions

- Absolute age of the Icelandic rockslides?
 - Their frequency throughout the Holocene (decreasing, increasing)?
- Rockslides or a combination of rockslide activity and other processes?
 - Rockslides falling onto glaciers
 - Rock glaciers (a different view)
- Triggering factors?
 - Glacial undercutting
 - Weakness in bedrock (embedded sediment layers, rhyolite, other)
 - Hydrological changes related to climatic events (heavy precipitation events)
 - Earthquakes
 - Dip of bedrock

Method

- High resolution color aerial photos of Iceland are publicly available on the World Wide Web.
- Google Earth is a powerful software with amazing capabilities for displaying satellite and aerial photographs.
- The images and software have been used together to identify and catalog rockslide events in Iceland. All rockslides are registered into a computer database
- The overlay feature, zooming and 3D capabilities of Google Earth allow the user to view the landforms from different angles and produce images
- The keyhole markup language files (kml/kmz) are easily transferred into a complete GIS system for further mapping and analyses

Two Icelandic rockslides showing similar features



Skagafjörður area, Central North Iceland

Image: Google Earth and www.map24.is



Eyjafjörður area, Central North Iceland

Image: Google Earth and www.map24.is

Skagafjörður area – first results

Over one hundred rockslide events have been located in Skagafjörður, central north Iceland.

This indicates that previous reports on the frequency of rockslide events in the Skagafjörður area and in Iceland is highly underestimated.

In the western part of the Skagafjörður the majority of rockslides is distributed around extinct silicic central volcanoes which might indicate that weaknesses in bedrock (rhyolite rocks) are dominant triggering factors of rockslides in that area.



Image: Google Earth

Next steps

- Producing a map on rockslide events in Northern Iceland in greater accuracy and detail than has previously been done.
- Finding patterns and connecting rockslide events with possible triggering factors (bedrock, earthquakes etc.)
- Adapting a classification system to the rockslides in Iceland.
- Publish our findings.

Thank you for your attention