

Mapping of Icelandic glaciers (and volcanoes) since 1945



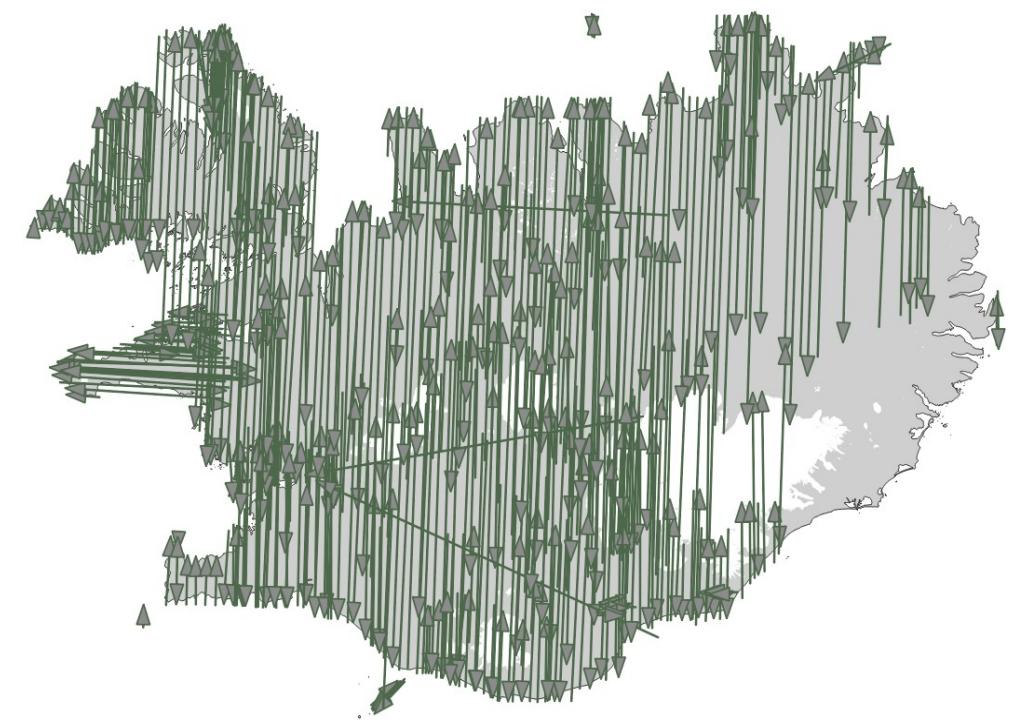
Múlajökull (1945)



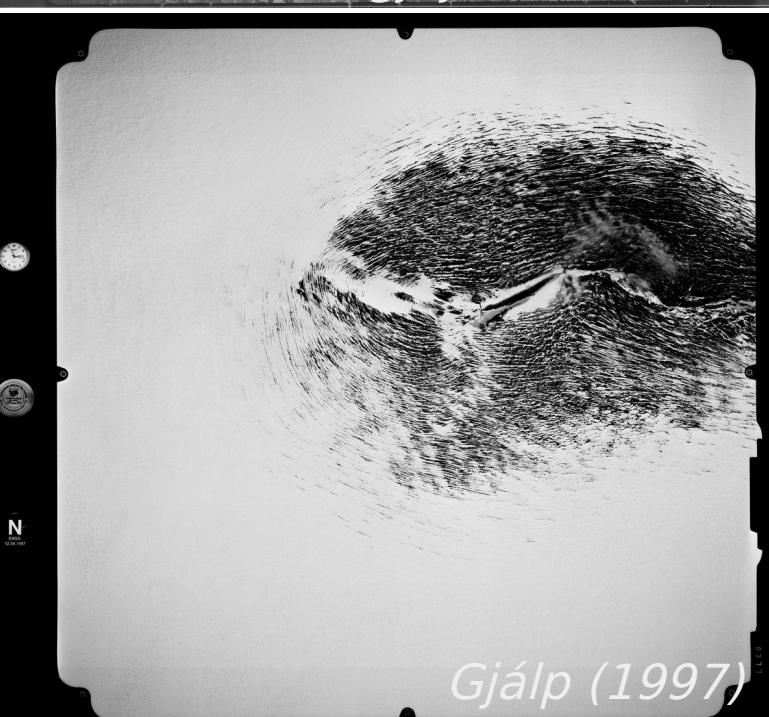
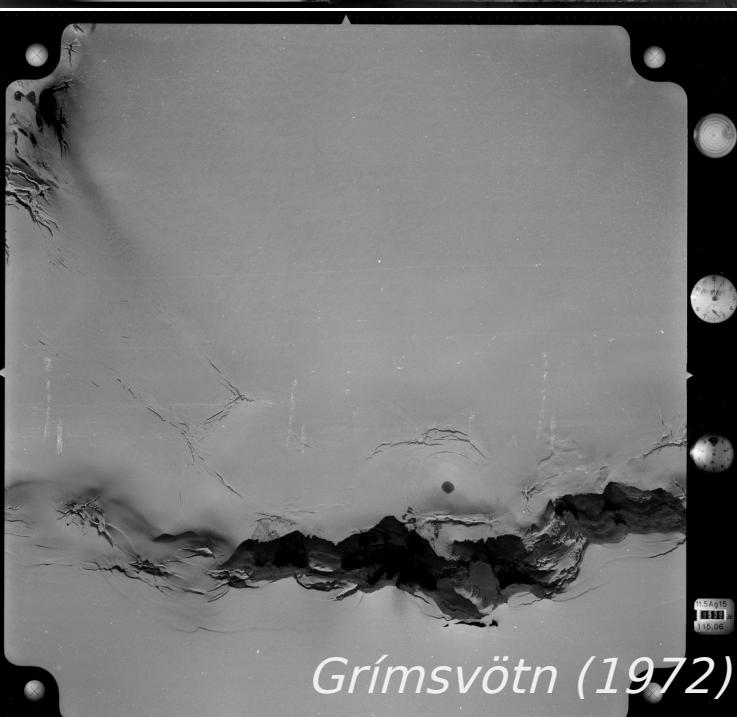
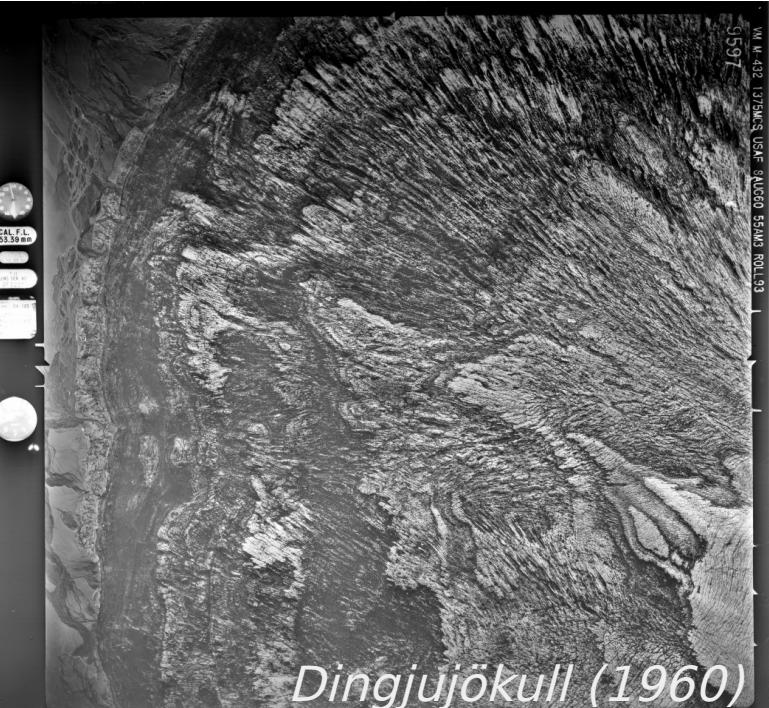
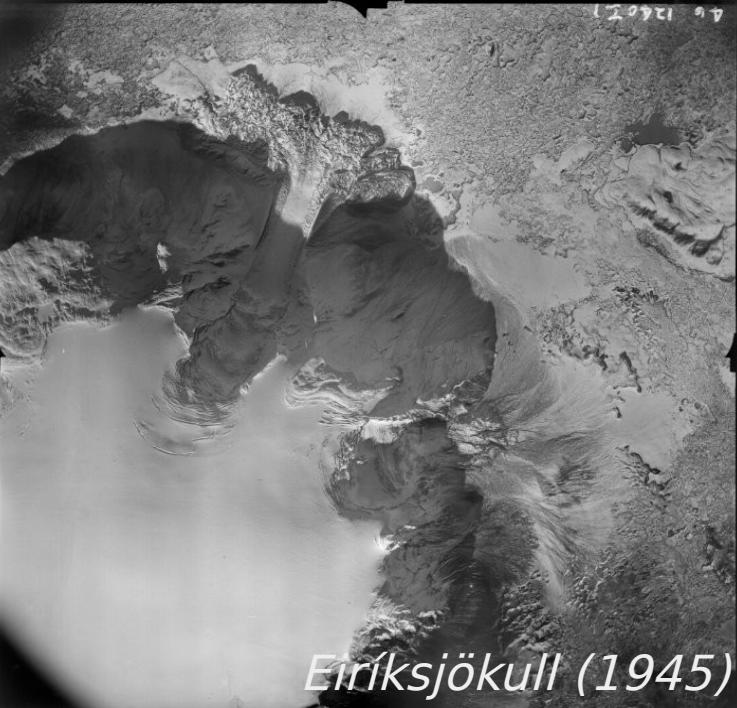
Joaquín M.C. Belart, National Land Survey of Iceland
Snow and Ice workshop at LEGOS, 26 June 2024

From 1945 to 2000

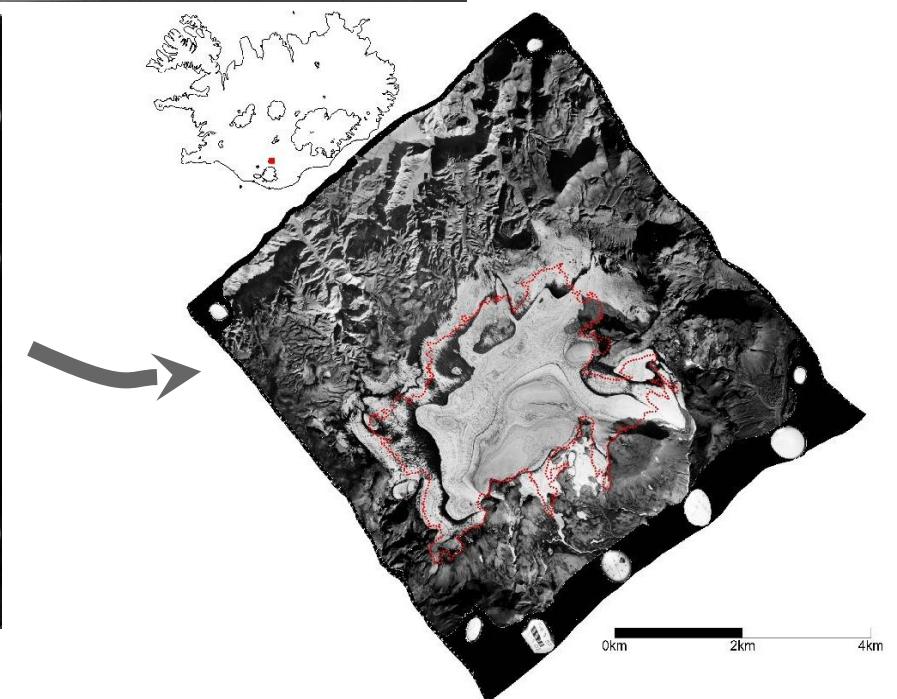
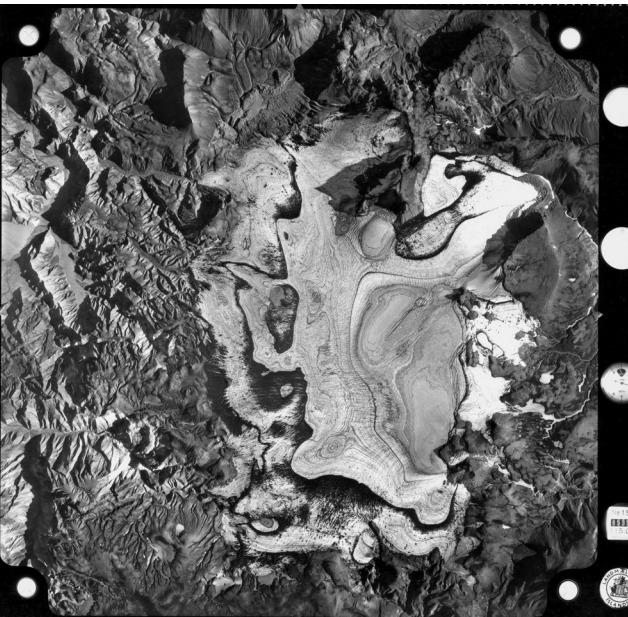
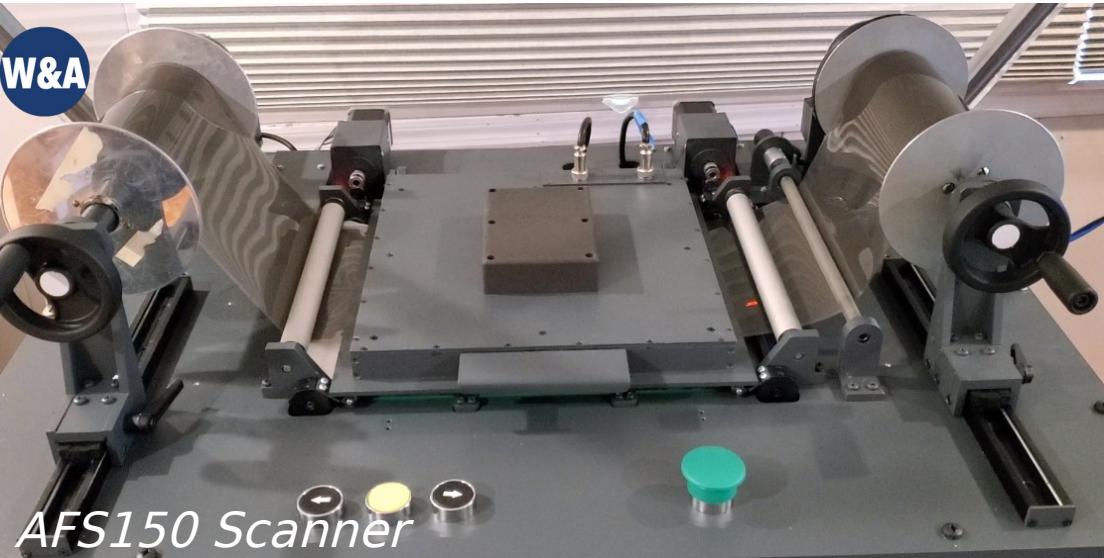
- 140,000 frames (films)
- 12x12 cm, 18x18 cm, 23x23 cm
- 128,735 frames scanned
- 16Tb of raw images



*Flightlines American Surveys
1956-1961*



Processing



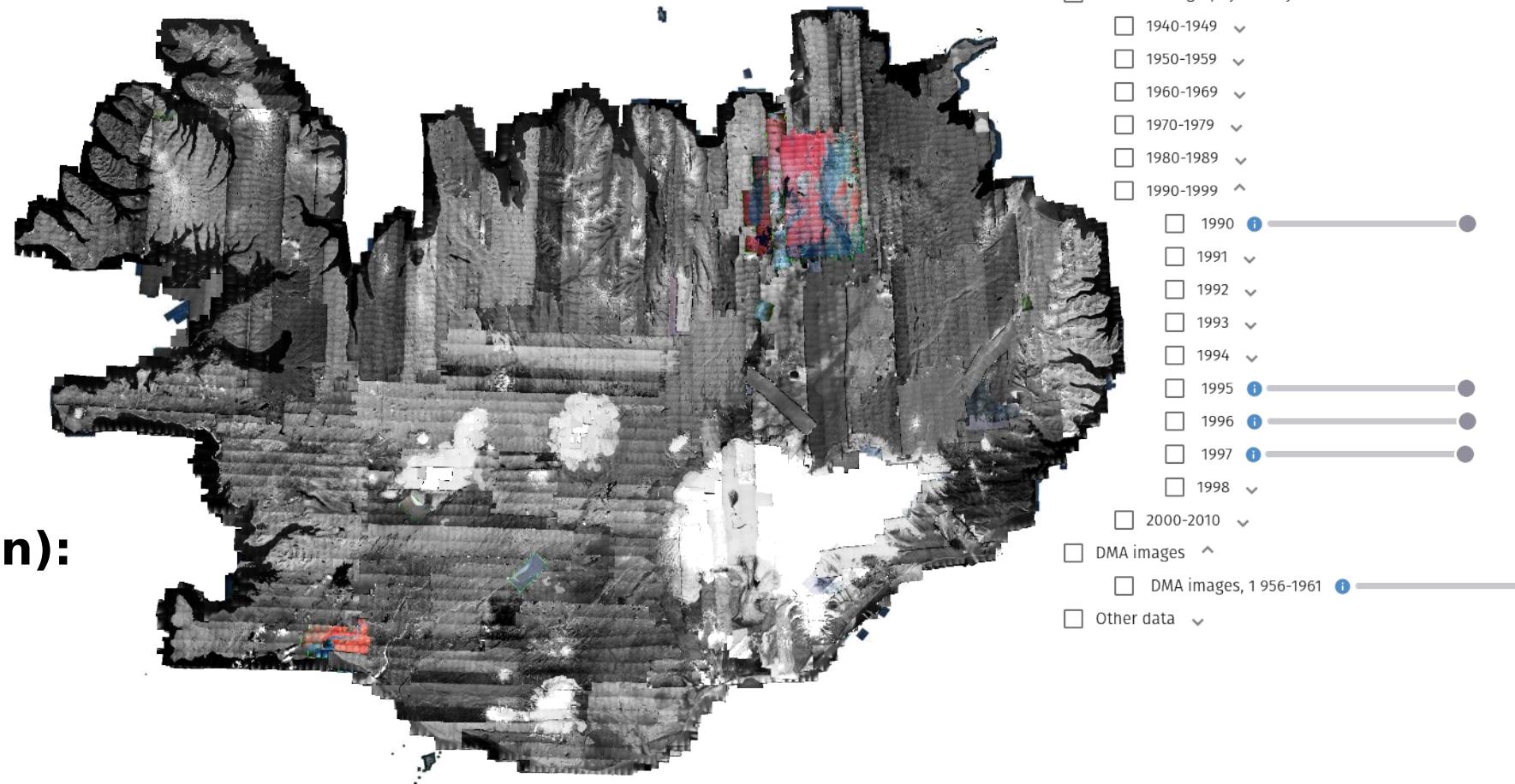
NeoGeographyToolkit/
StereoPipeline

The NASA Ames Stereo Pipeline is a suite of
automated geodesy & stereogrammetry tools
designed for processing planetary imagery
captured...



Open access

Search Data



loftmyndasja.lmi.is

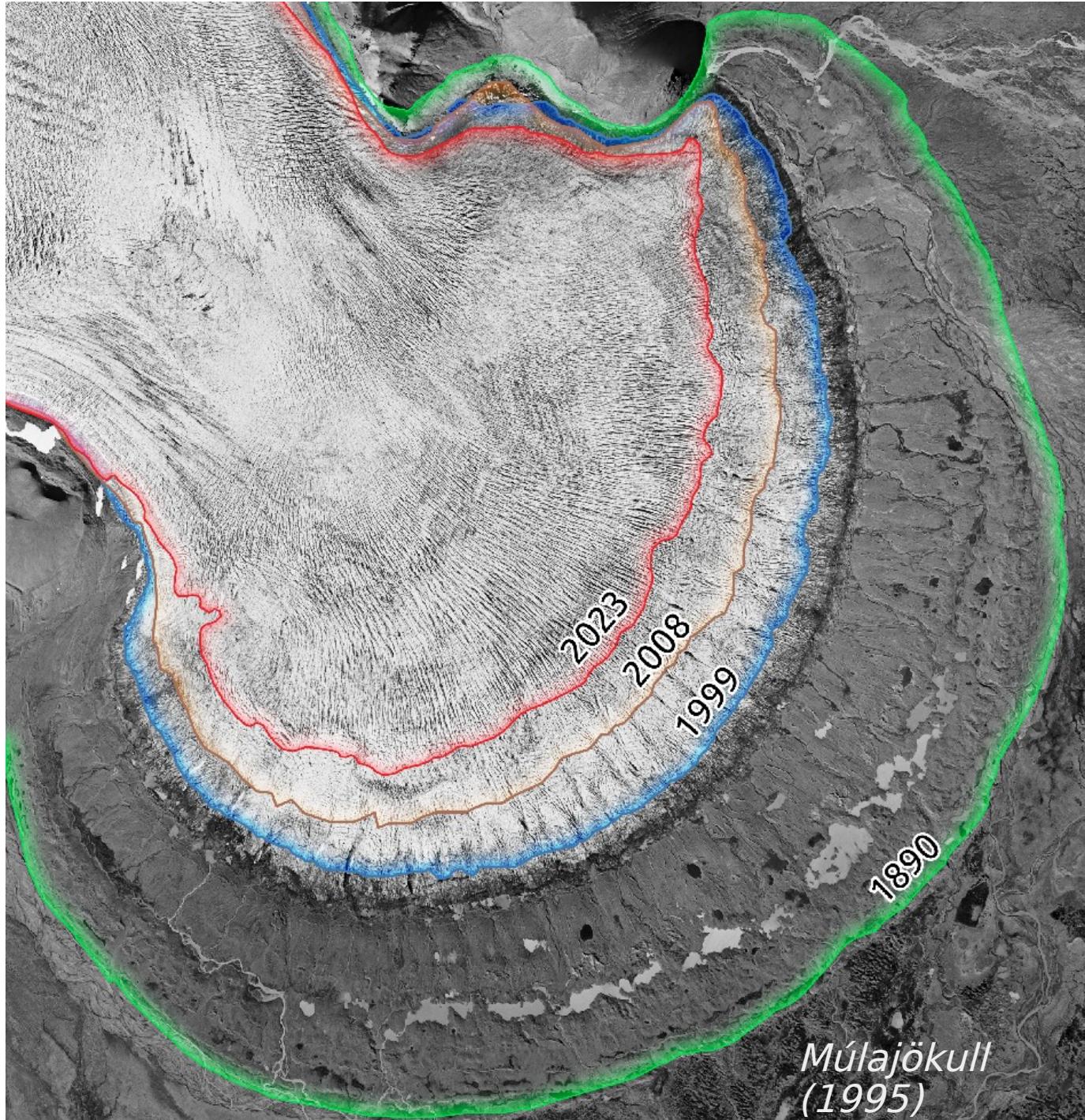
Status (15% done):

- 1,100 Orthos & DEMs
- 20,000 Oriented images
- 765 Gb of data

Validation (stable terrain):

- Pléiades orthoimages
- Pléiades DEMs
- Lidar DEMs
- Positional accuracy >10 m (XYZ)

Glacier changes



Other applications in geosciences

Volcanology

(e.g. Askja eruption, 1961)

Coastal erosion

(e.g. Surtsey, 1964-2000)

Tectonics

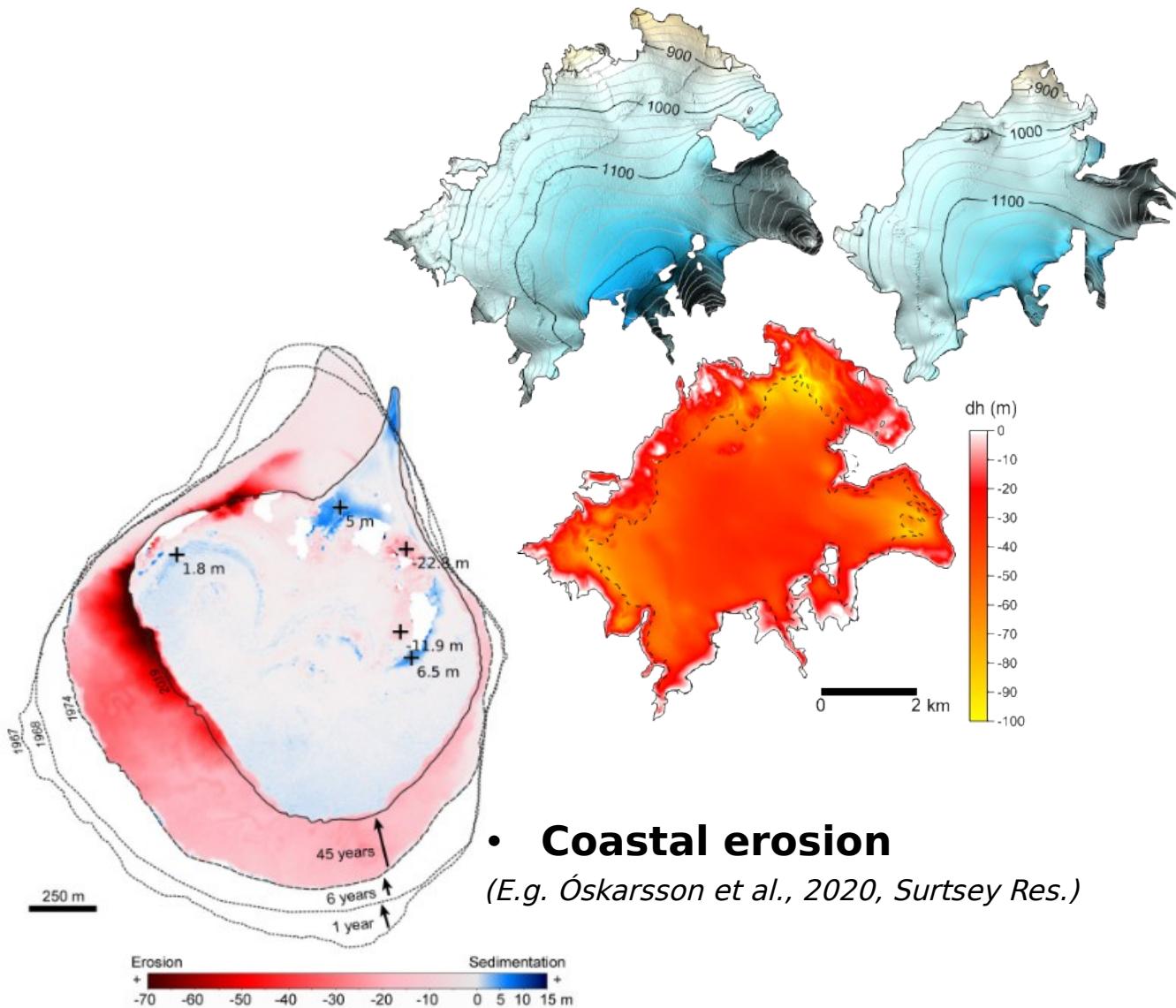
(e.g. Krafla fires, 1975-1984)



@Kieran Baxter (UI)

Elevation changes and volume changes from DEMs

- **Glacier Volume Change & Geodetic Mass Balance**

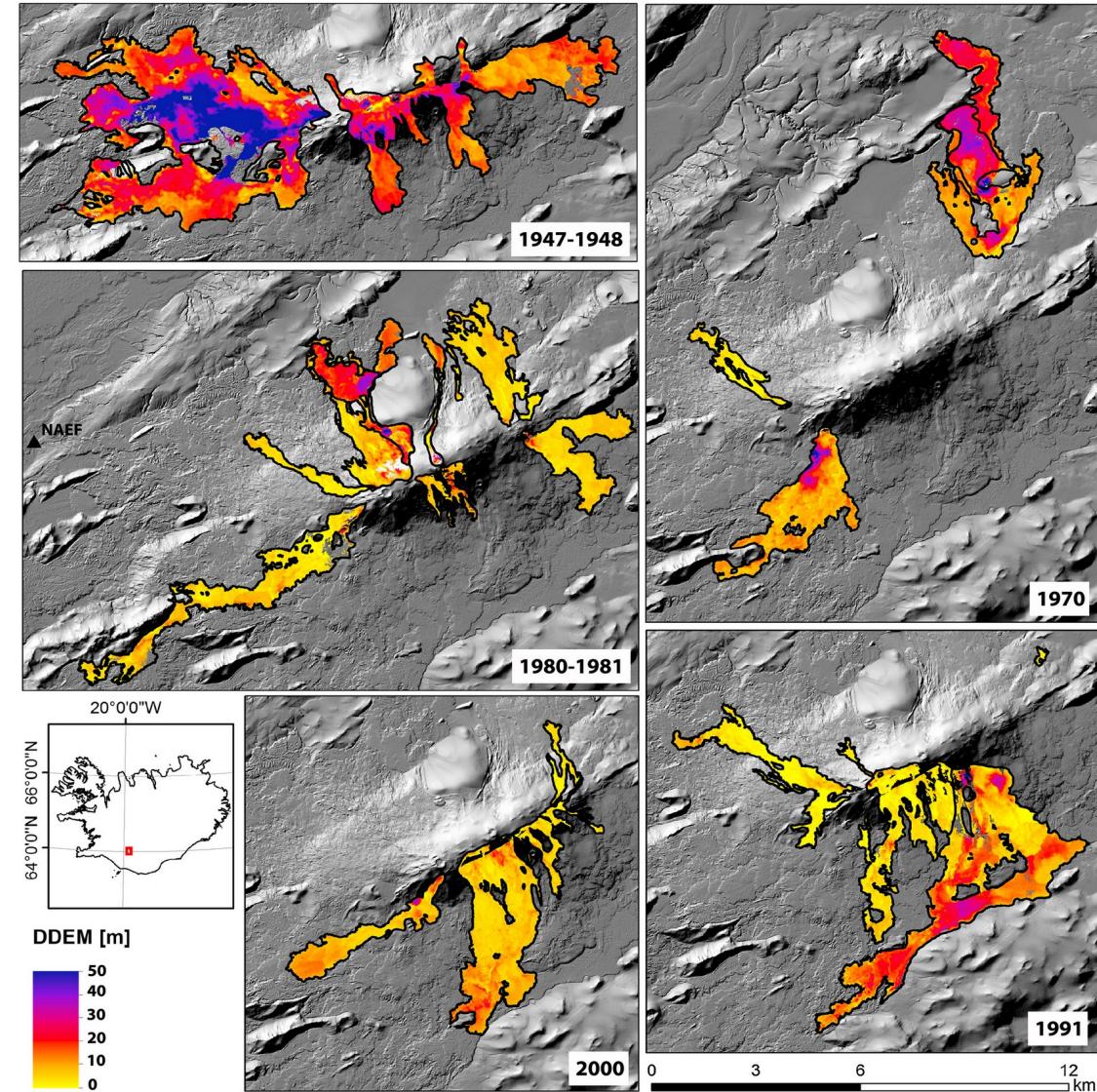


- **Coastal erosion**

(E.g. Óskarsson et al., 2020, Surtsey Res.)

- **Lava volumes & Mean Output Rate**

(E.g. Pedersen et al., 2018, GRL)



Aerial photography nowadays

In-house surveys:

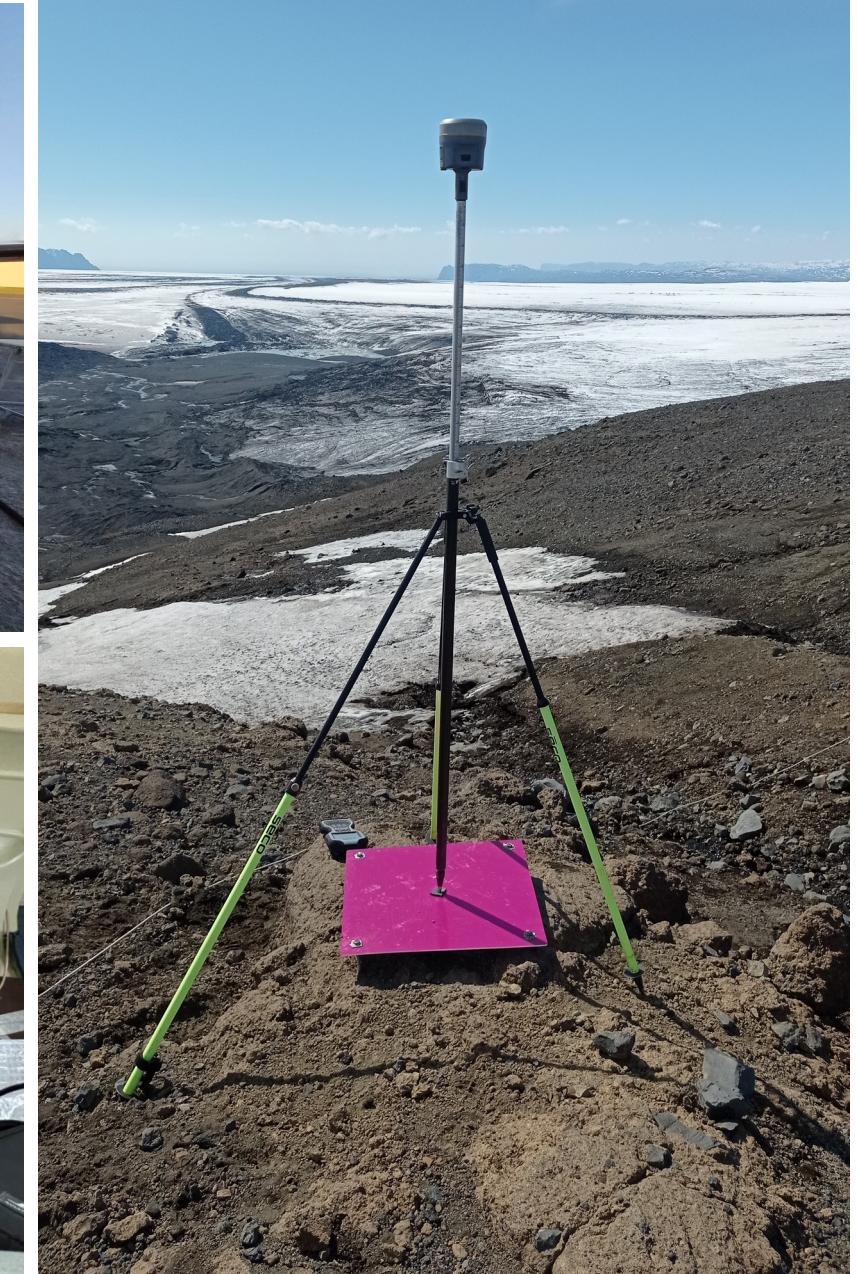
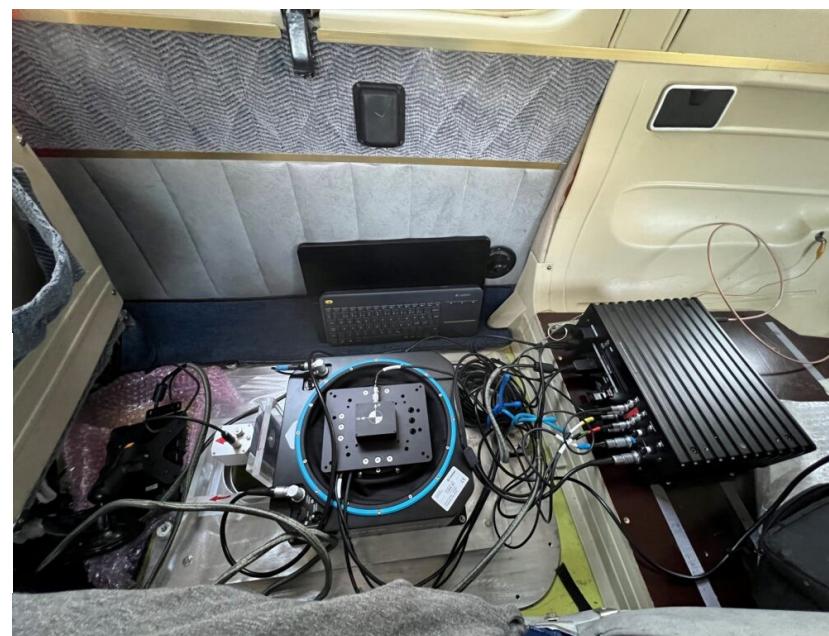
- Snow monitoring
- Reykjanes Eruptions

Tendered surveys:

- Country-wide survey Iceland
- Summers 2024-2026
- GSD25 (GSD10 urban)

Ground Control Points

- 600 GCPs country-wide
- Accuracy >5 cm XYZ

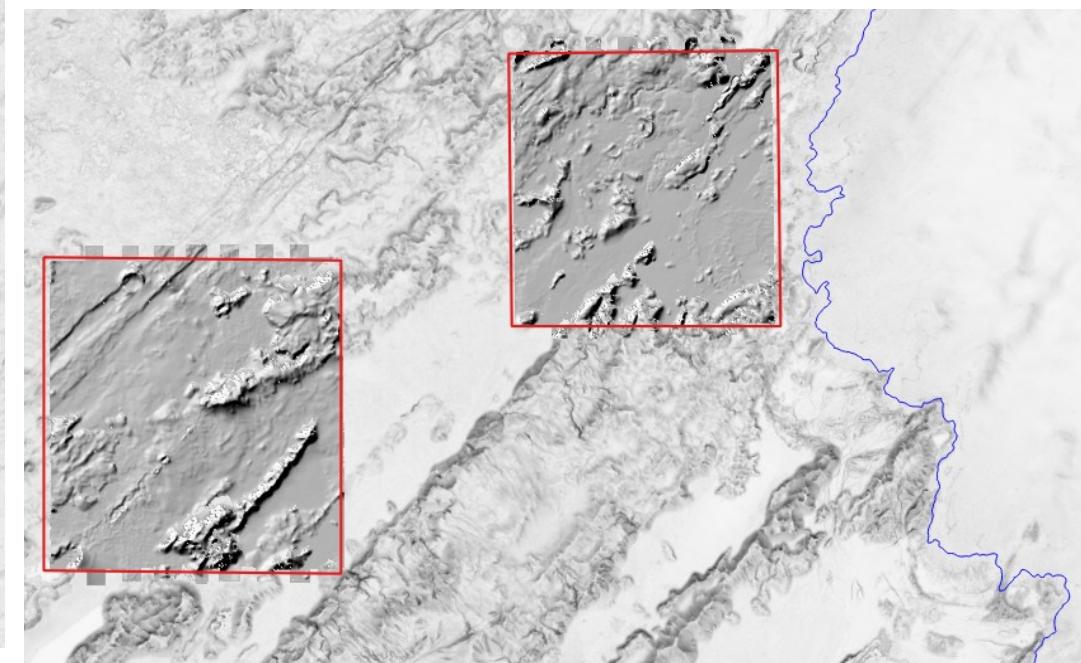
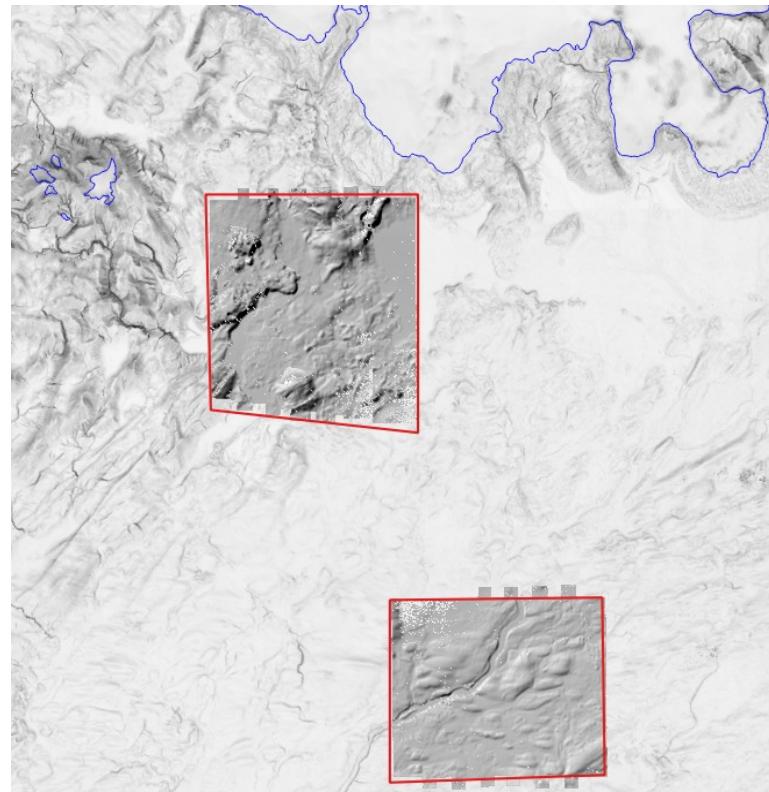


Snow mapping in Iceland

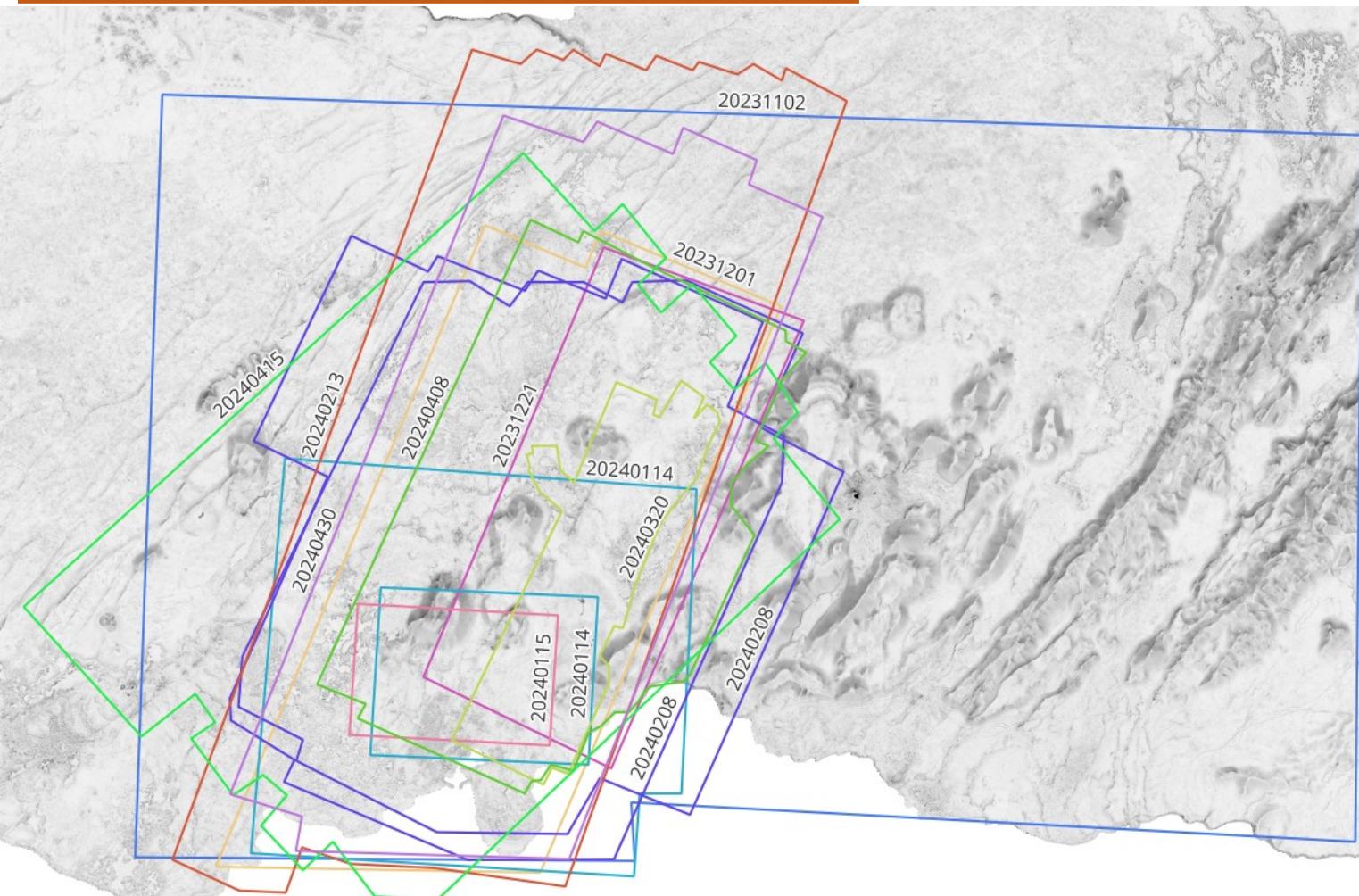


Two surveys throughout winter:

- 14.2.2024
- 15.4.2024
- 8 flying hr
- 572 km², GSD15



Volcano monitoring



- 13 surveys between Nov 2023 and May 2024
- 15 flying hr (1300 km², GSD10 to GSD30)



Reykjanes fires: Eight eruptions in three years



INSTITUTE OF
EARTH SCIENCES

Date of event

Fagradalsfjall
- Geldingadalir



19/03/2021

2021

Eruption timeline

Fagradalsfjall
- Meradalir



03/08/2022

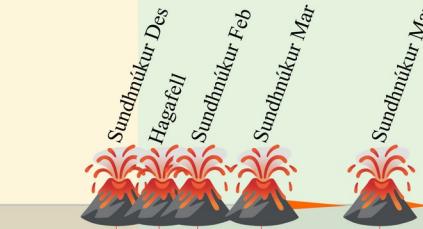
2022

Fagradalsfjall
- Litli-Hrútur



10/07/2023

2023



2024



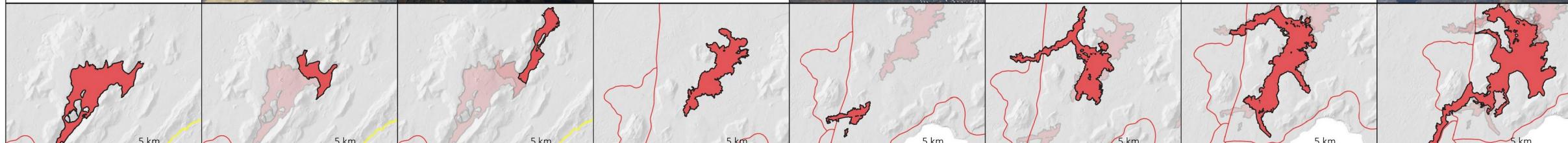
Icelandic
Met Office



Date of event



Volcano images



Flow field area

Date of eruption

19/March/2021

18/September/2021

Geldingadalir

03/August/2022

21/August/2022

Meradalir

10/July/2023

05/August/2023

Litli-Hrútur

18/December/2023

21/December/2023

Sundhnúkur 1

14/January/2024

16/January/2024

Hagafell-Grindavík

08/February/2024

09/February/2024

Sundhnúkur 2

16/March/2024

08/May/2024

Sundhnúkur 3

29/May/2024

21/June/2024

Sundhnúkur 4

End date

Name

Area

Volume (bulk)

150 mill. m³

11 mill. m³

15.5 mill. m³

4.85 km²

1.28 km²

3.44 km²

1.50 km²

11.6 mill. m³

0.7 km²

11.6 mill. m³

2.5 mill. m³

4.03 km²

12.8 mill. m³

6.18 km²

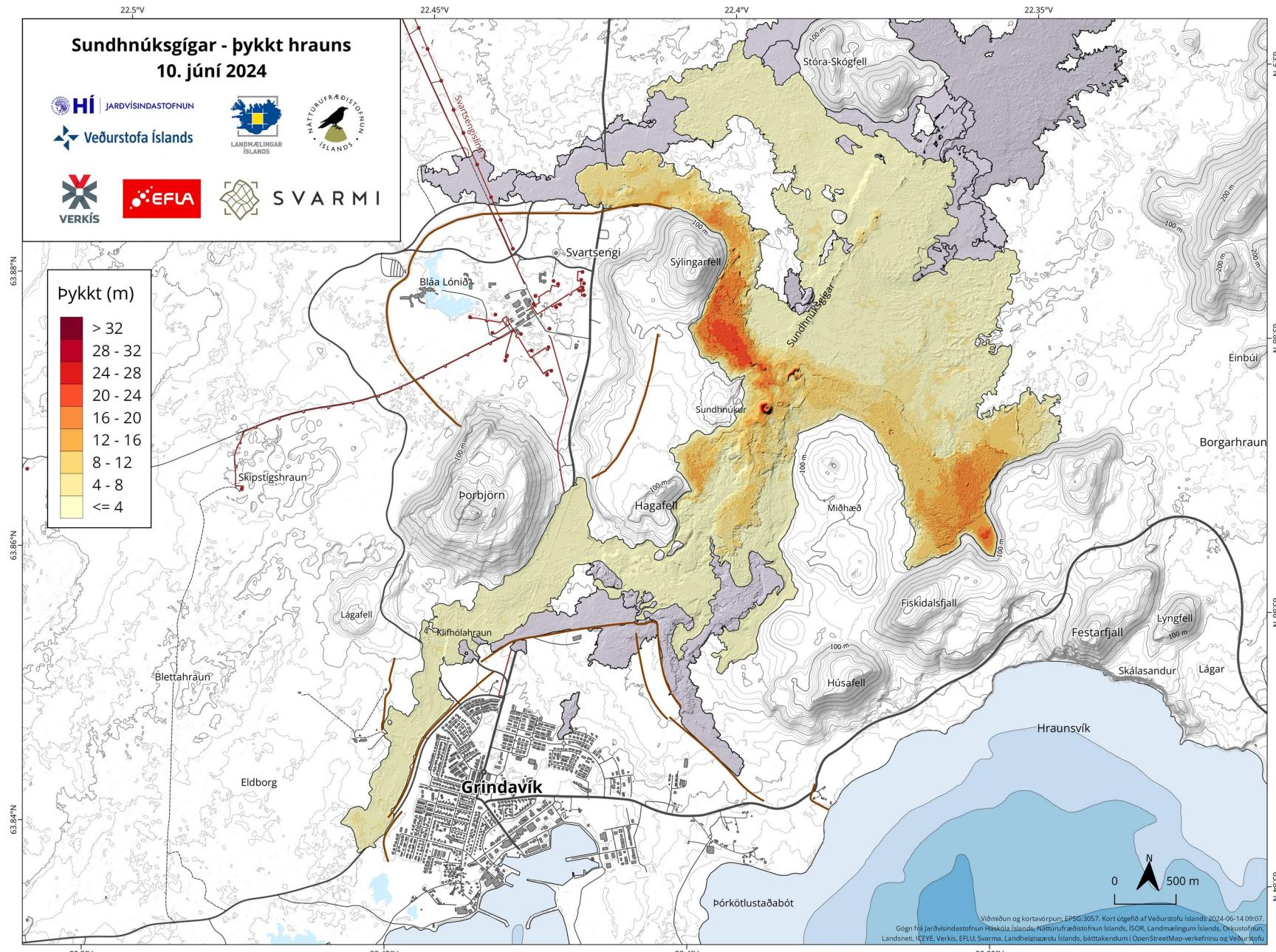
34.7 mill. m³

41.3 mill. m³

9.22 km² (As of 10th June)

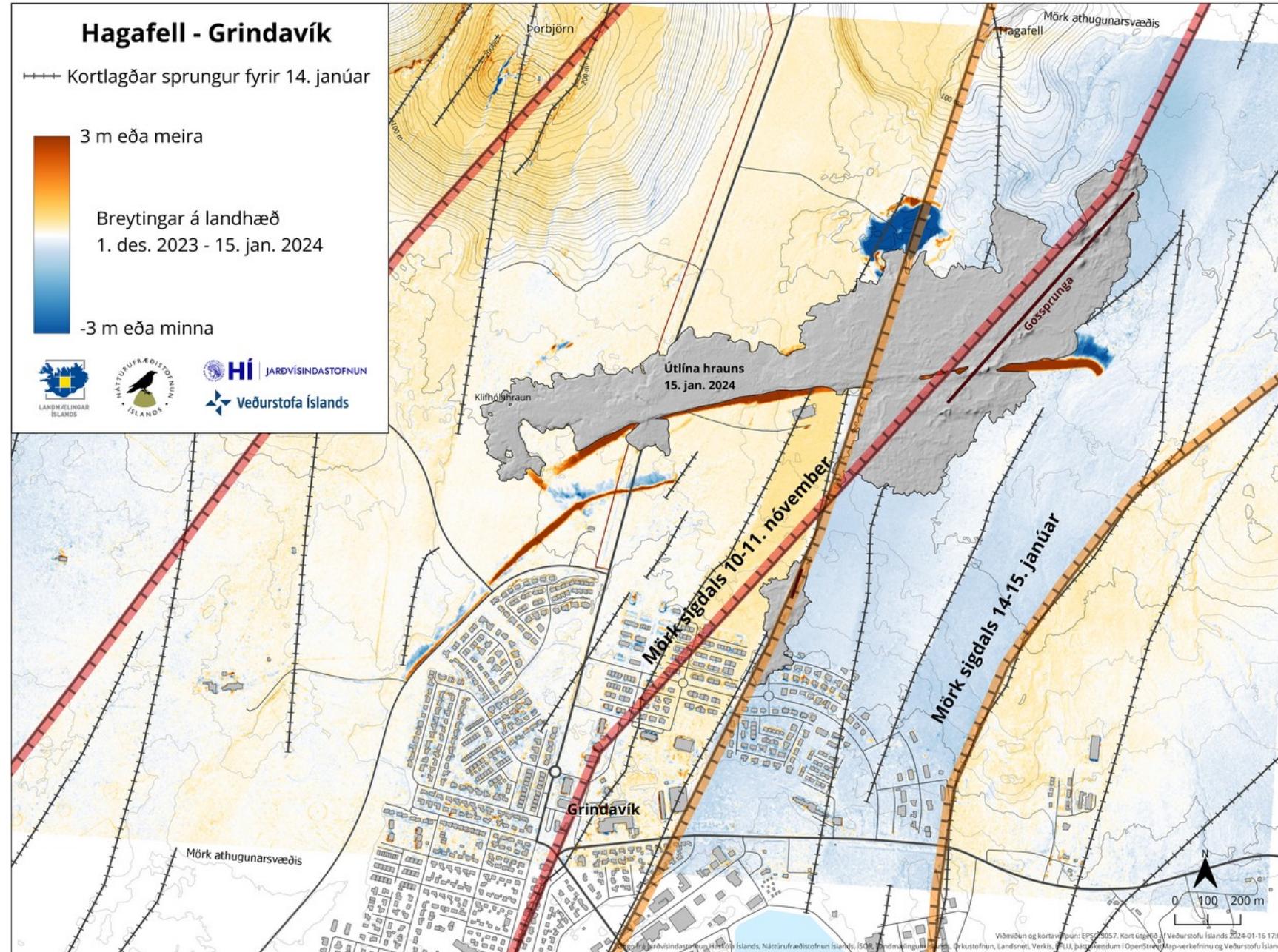
@Rob Askew (IINH)

Mapping from DEMs



@Ragnar
þrastarson (IMO)

Mapping from DEMs



@Ragnar
þrastarson (IMO)

Feature-tracking

