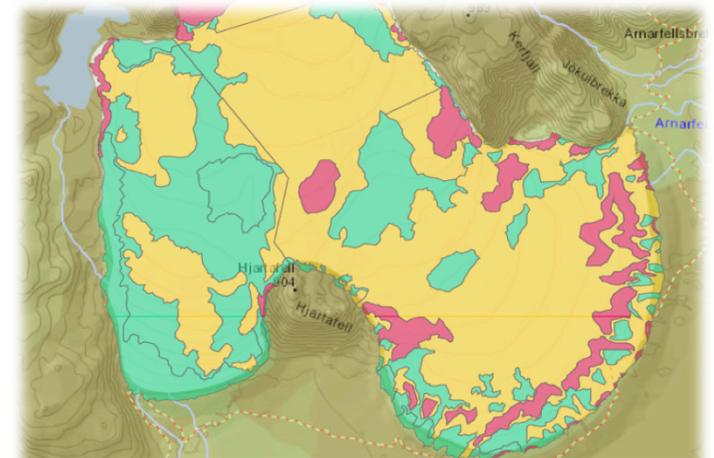


Iceland glacier crevasse mapping project

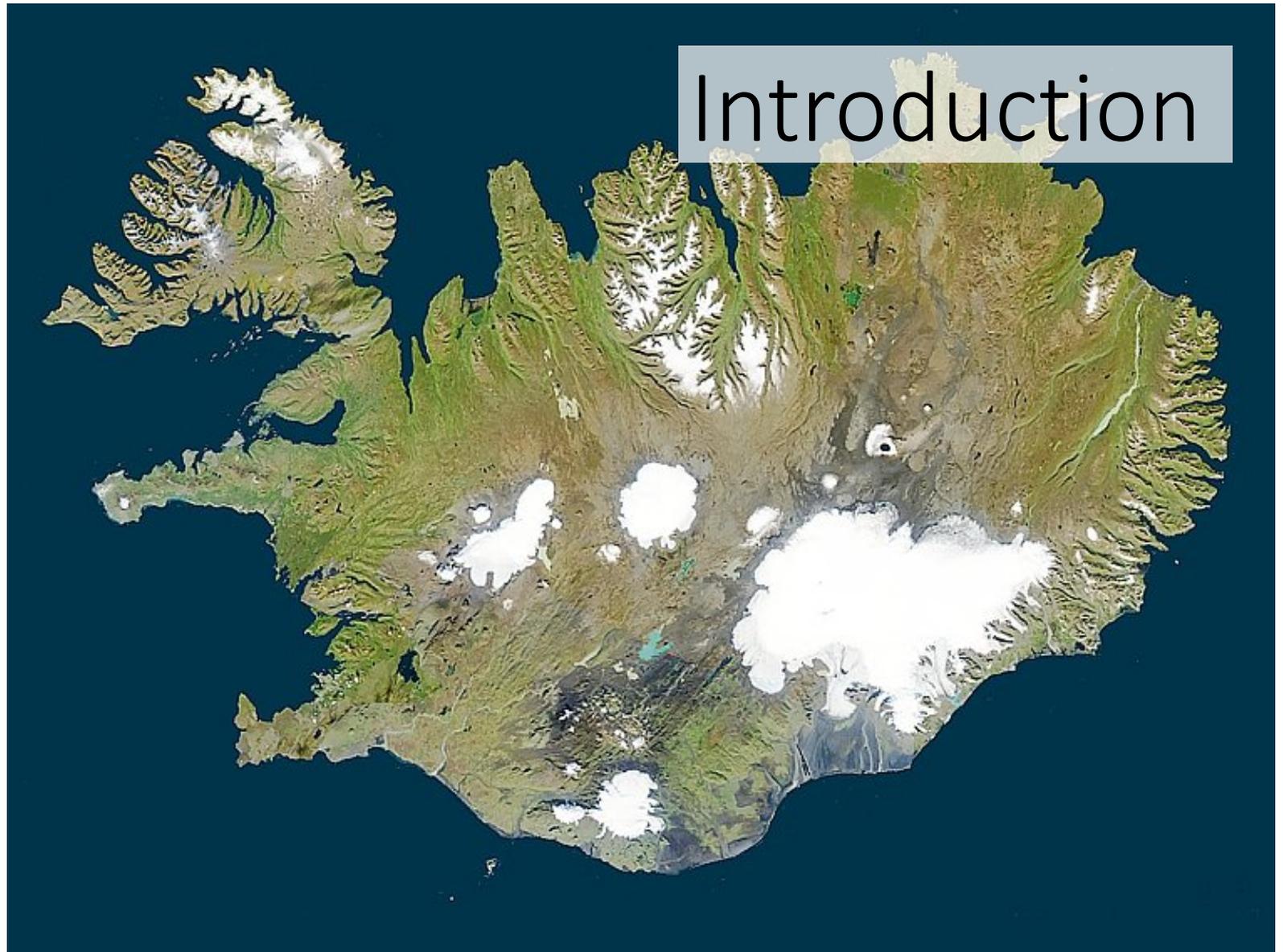
Ágúst Þór Gunnlaugsson

Jónas Guðmundsson & Snævarr Guðmundsson

Icelandic association of search and rescue



Introduction



- Iceland is covered by roughly 11.000 km² of glaciers (meaning that roughly 11% of the country is covered by glaciers)
- No limitations are on who travel on glaciers



- Majority of the glacier terrain in Iceland is flat
- Tourism has been on the rise in the last 10 years
- Occasional volcanic eruption change glacier surfaces.

Glaciers in changing climate



- With warming climate, crevasse areas are more likely to be open and exposed over the year.

Photo: Snævarr Guðmundsson

Accidents on Icelandic glaciers



- Through the years, accidents on Icelandic glaciers have been common.
- But given the number of people who travel on them all year round, serious or fatal accidents have been seldom.

Langjökull

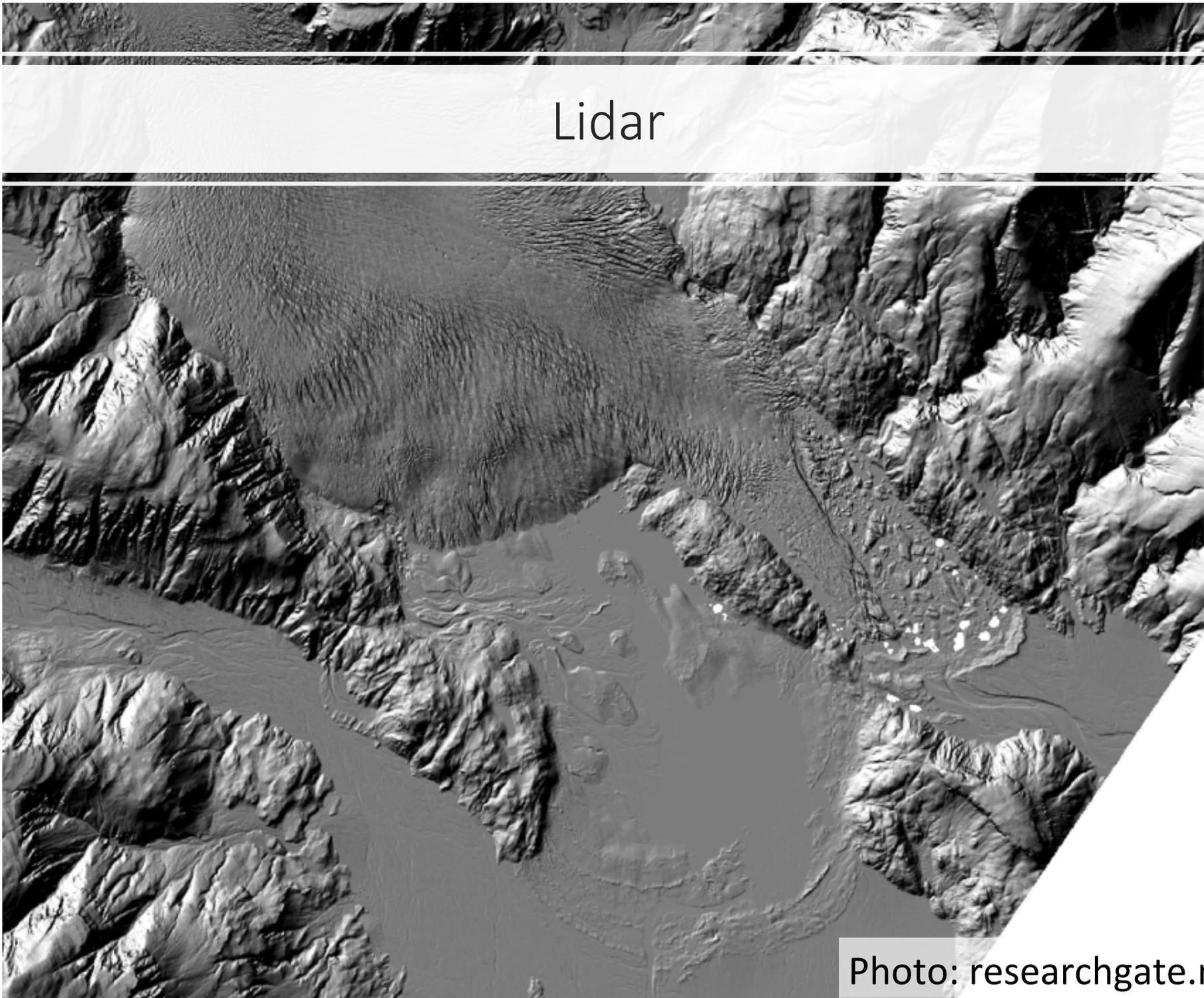


- A tragic accident in 2010 caused the initiation of the crevasse mapping project.



Data gathering and mapping of hazard areas

- Aerial and satellite images.
- Fly over glacier and photos taken
- Known safe driving and hiking routes on the glaciers.
- Lidar digital elevation models.
- Mapping in a Geographical information system.
- 97% of glaciated surface mapped.



Lidar

Photo: [researchgate.net](https://www.researchgate.net)

GIS

Langjökull.mxd - ArcMap - ArcInfo

File Edit View Bookmarks Insert Selection Tools Window Help

1:24,000

Editor Task: Cut Polygon Features

3D Analyst Layout

Layers

- is50v_ornefni_punktar_Anno
- is50v_ornefni_linur_Anno
- is50v_ornefni_flakar_Anno
- is50v_samgongur_linur
- Haedarlinur_Langjokull
- Langjokull_2004_5m
- Sprungulaust
- Sprungur litid
- Sprungur mikid

Attributes of

OBJECTID	Shape	Frjuteqund	Frjuflokkur	NAMEID	NAME	LYSING	Z	FACING	ALT LOW	ALT HIGH	CREVASSES	CRE CODE	NAME CODE	DAGS IIII	DAGS LEIDR	DAGS UPPF	gagna Eign	heimild	nafn_G	nakv XY	vidmidun	Plan Uppr	vinnsla F	SKRAMING	ALDUR LOF
25	Polygon Z	701	Sprungusvaeði	7	Langjokull	Sporðsvaeði	999	Z	<Null>	<Null>	0	0	2	4 3.6.2010	<Null>	17.5.2010	Lofthmyndir	<Null>	<Null>	10	1	4	Sneevarr G	<Null>	
27	Polygon Z	701	Sprungusvaeði	7	Langjokull	Sporðsvaeði	999	Z	<Null>	<Null>	0	0	2	4 3.6.2010	<Null>	17.5.2010	Lofthmyndir	<Null>	<Null>	10	1	4	Sneevarr G	<Null>	
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42	Polygon Z	701	Sprungusvaeði	7	Langjokull	Sporðsvaeði	999	Z	<Null>	<Null>	0	0	0	4 3.6.2010	<Null>	17.5.2010	Lofthmyndir	<Null>	Lofthmyndir	10	1	4	Sneevarr G	<Null>	
44	Polygon Z	701	Sprungusvaeði	7	Langjokull	Sporðsvaeði	999	Z	<Null>	<Null>	0	0	0	4 3.6.2010	<Null>	17.5.2010	Lofthmyndir	<Null>	<Null>	10	1	4	Sneevarr G	<Null>	
46	Polygon Z	701	Sprungusvaeði	7	Langjokull	Sporðsvaeði	999	Z	<Null>	<Null>	0	0	0	4 3.6.2010	<Null>	17.5.2010	Lofthmyndir	<Null>	<Null>	10	1	4	Sneevarr G	<Null>	
47	Polygon Z	701	Sprungusvaeði	7	Langjokull	Sporðsvaeði	999	Z	<Null>	<Null>	0	0	0	4 3.6.2010	<Null>	17.5.2010	Lofthmyndir	<Null>	<Null>	10	1	4	Sneevarr G	<Null>	
48	Polygon Z	701	Sprungusvaeði	7	Langjokull	Sporðsvaeði	999	Z	<Null>	<Null>	0	0	0	4 3.6.2010	<Null>	17.5.2010	Lofthmyndir	<Null>	<Null>	10	1	4	Sneevarr G	<Null>	

Record: 14 | 0 | Show: All Selected | Records (1 out of 80 Selected) | Options

Legend

- Jaðarurð
- Jökullaur/flæður
- Jökulökur
- Malarás
- Urðarrani
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- ortho_aug_17_2004.pxi
- La07LI-and.tif
- La07LI-I.tif
- La07LI-II.tif
- La07LI-III.tif
- La07LI-IV.tif
- La07LI-V.tif
- Island_grunnmynd
- WMS Miðlari Lofthmynda ehf.

Geitlandsjökull

Sprungusvaeði

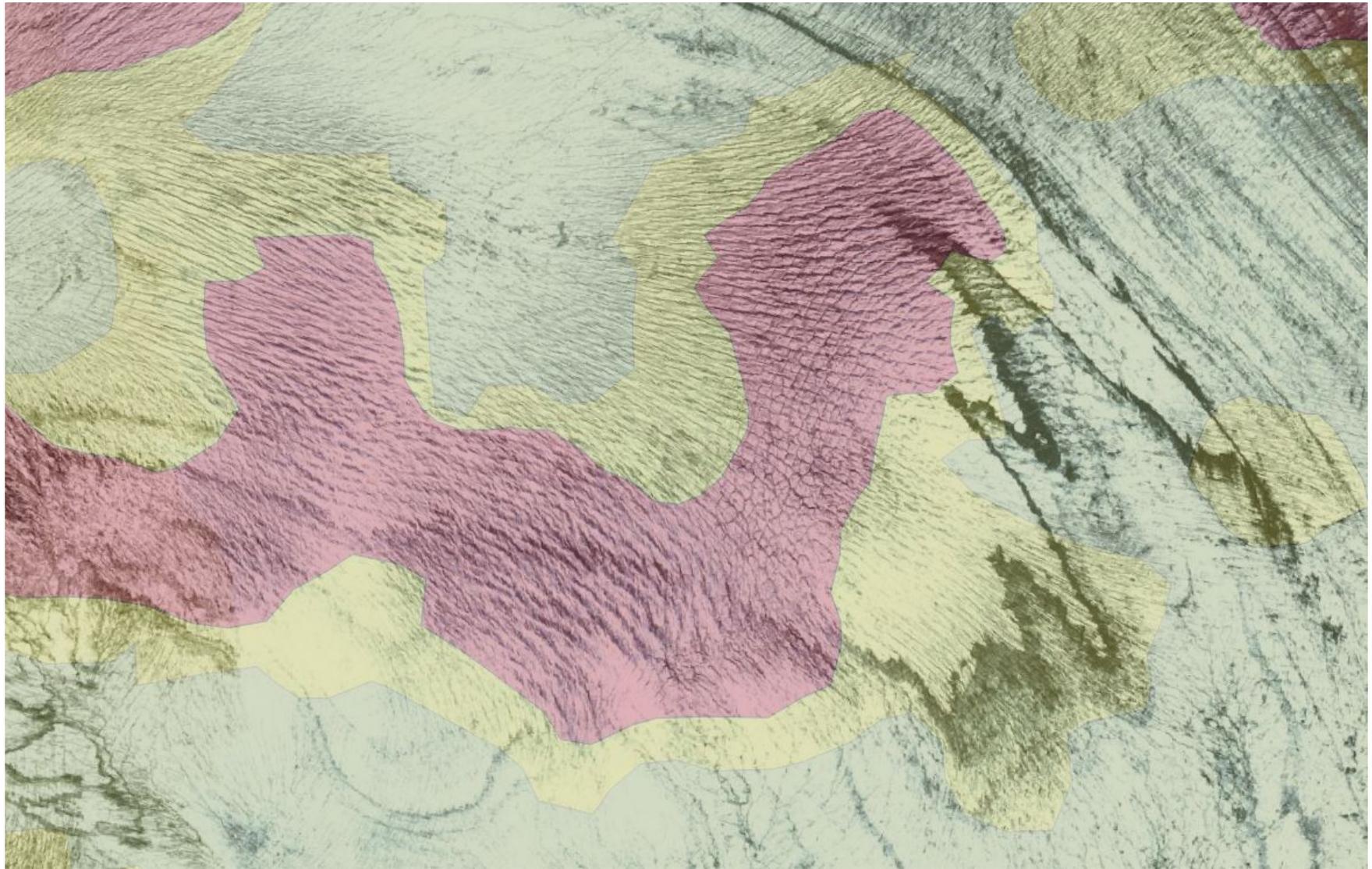
- Sprungulaust
- Sprungur litid
- Sprungur mikid
- Sprungur lifshættulegt

Records calculated: 1

422296,185 458738,743 Meters | 5,45 17,38 Centimeters

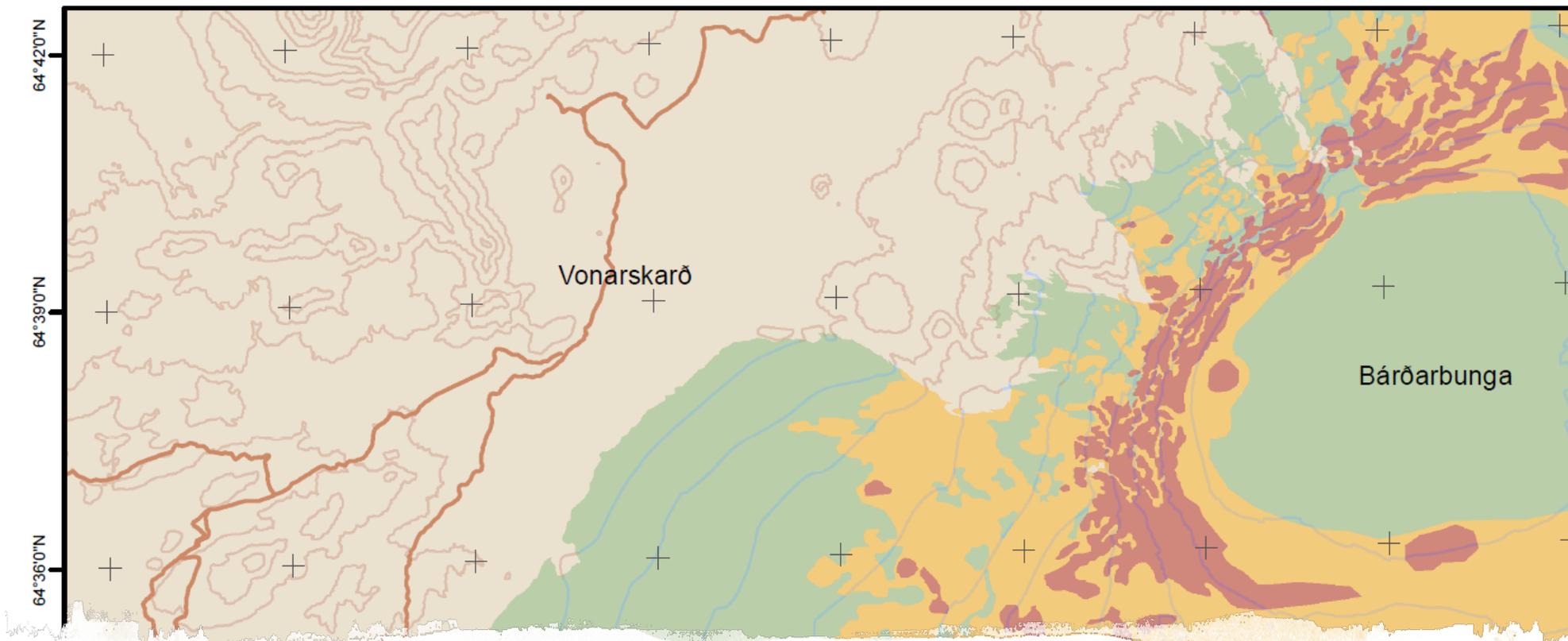
start | Start Menu | Langjokull.mxd - Arc... | HB_fj_Gf_OS-AoGL2... | Microsoft PowerPoint... | Search Desktop | 13:25

Mapping the glacier surface



Maps for everyone

- Free of charge
- Crevasse maps are not an authority
- They do not ban travel on dangerous areas
- They are meant for reference
- Common sense is still needed!

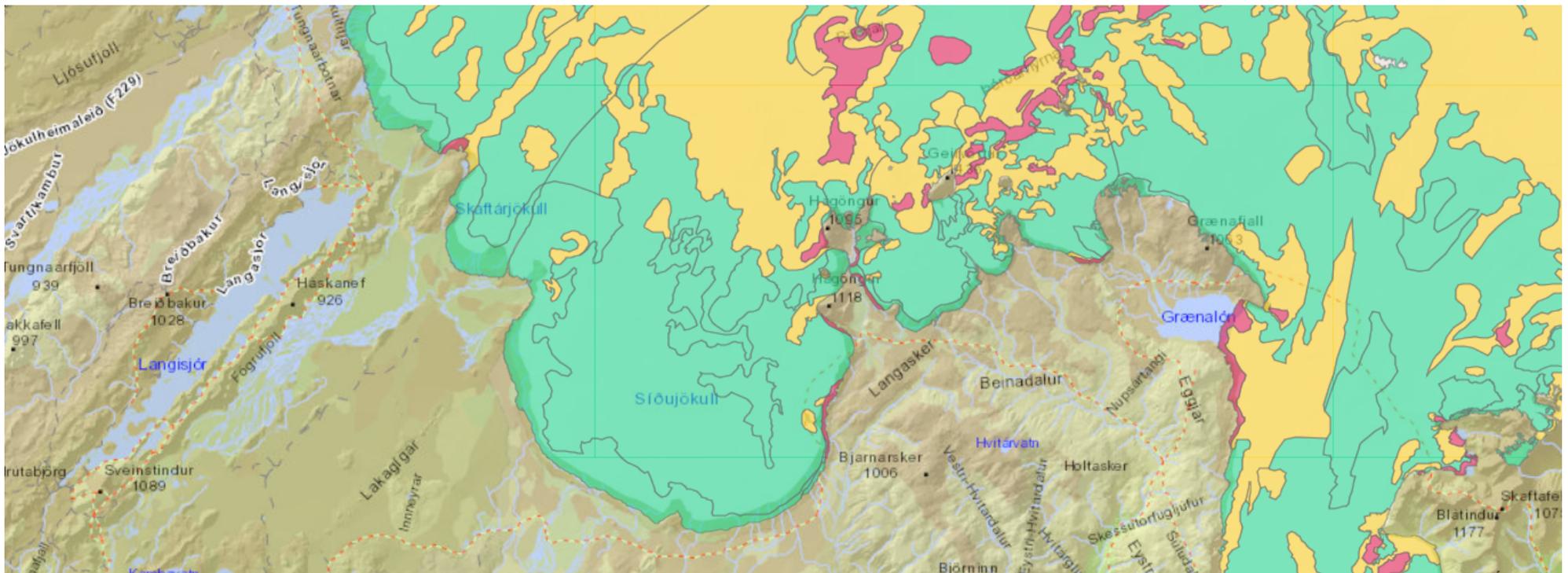


Crevasse
classification

- Green
- Yellow
- Red

Green

- Relatively flat and safe glacier surface.
- Safe to travel on regardless of travelling method.
- Only small crevasses in late summer or autumn.



Green



Photo: Snævarr Guðmundsson

Green



Photo: Snævarr Guðmundsson

Green



Photo: Snævarr Guðmundsson

Yellow

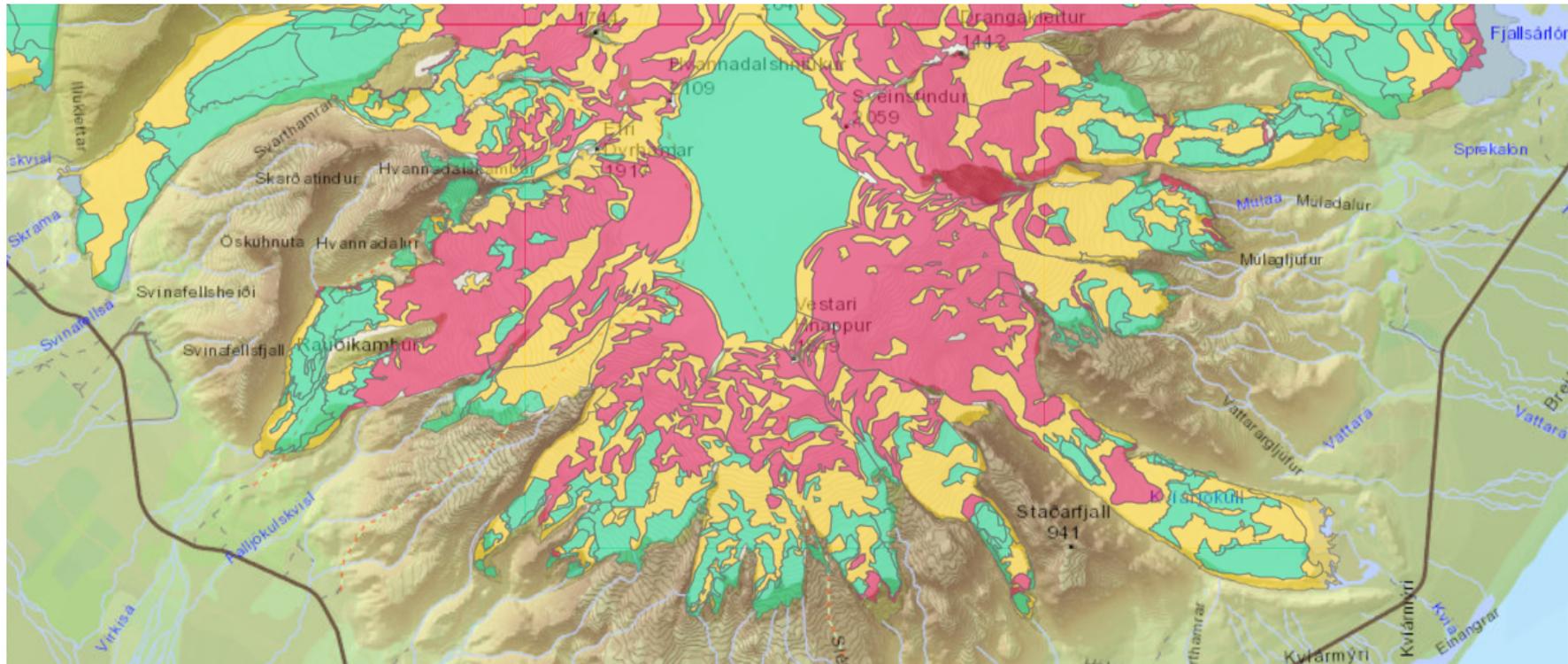
Photo: Snævarr Guðmundsson

Yellow

Photo: Snævarr Guðmundsson

Red

- Big crevasses and dangerous for travel all year.
- Steep icefalls or around subglacial geothermal areas.



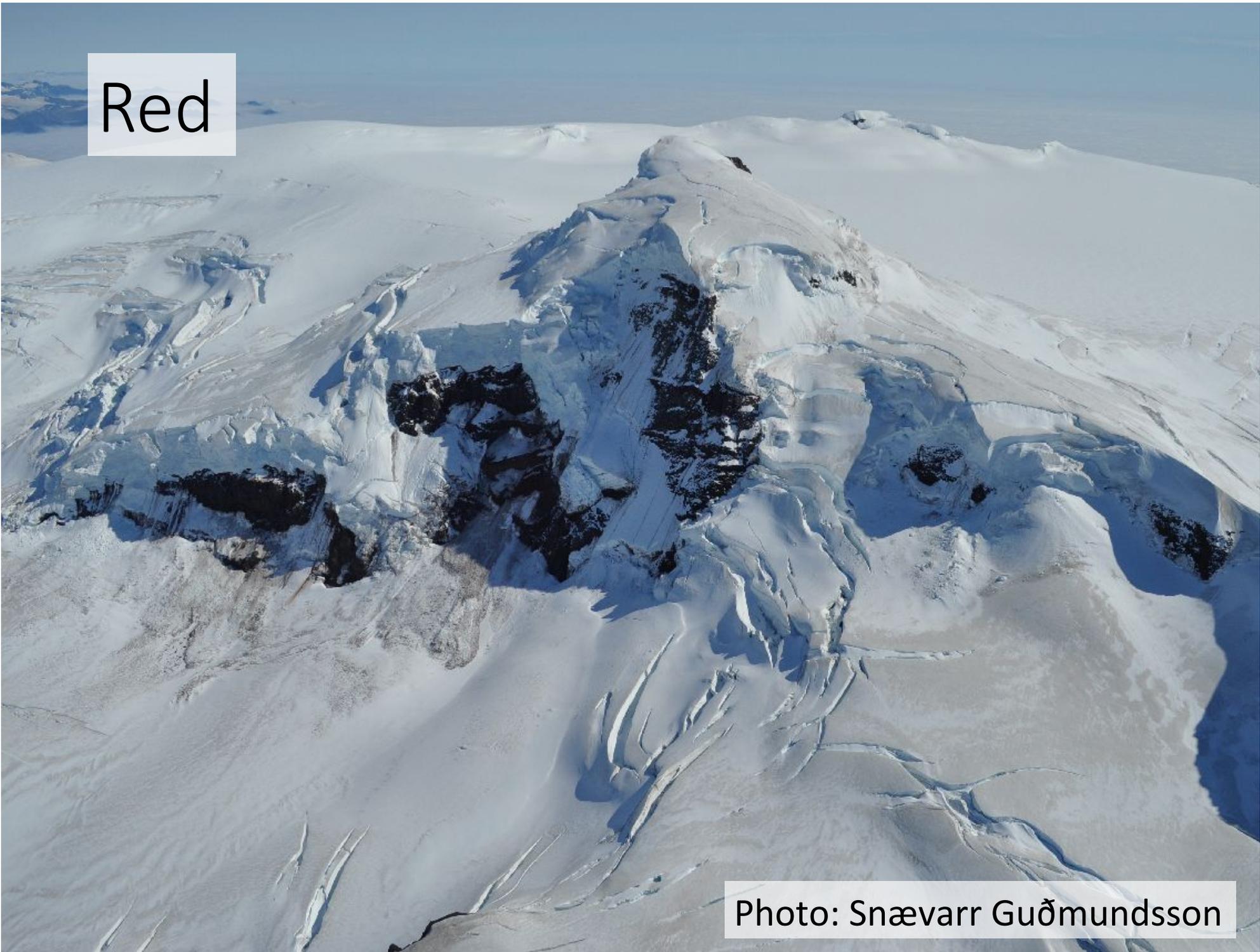
A black and white photograph showing a close-up view of a glacier's surface, characterized by numerous vertical crevasses and a jagged, rocky appearance. In the background, a calm lake is visible, surrounded by dark, forested hills under a cloudy sky. The overall scene is desolate and majestic.

Red

Photo: Snævarr Guðmundsson

Red

Photo: Snævarr Guðmundsson



Red



Photo: Oddur Sigurðsson

Application

- PDF files in computers or on paper
- GPS
- Web based

GPS



Maps can be used as a layer in handheld GPS devices and smart phones

Web based

Ferilvöktun

Hópur	Nafn	Kallnúmer	Hvar	Svæði	GPS Tími	Staða tækis	Tetra talstöð
SL - Svæði 5	Lífsbjörg (3634)	6413634	Norðurgarður	Hellissandur - 360	18.09.2018 12:18:27	Af korti > 24 klist	SL-Lífsbj-3634
SL - Skrifstofa	Bakvakt Landsstjórnar (52)	6415200	Hrauneyjar	Hella (dreifbýli) - 851	18.09.2018 15:44:36	Af korti > 24 klist	BJ-5200
SL - Svæði 5	Berserkir (3674)	6413674	Háls	Grundarfjörður - 350	18.09.2018 16:39:50	Af korti > 24 klist	BJ-Stykk-3674
SL - Svæði 12	Sv.stj 12 Guðmundur (512)	6415121			19.09.2018 16:09:05	Engin hreyfing innan 24 klist	BJSV-6415121
SL - Svæði 3	Sv.stj.3 Bakvakt (5031)	6415031			18.09.2018 11:38:17	Af korti > 24 klist	BJ.ARS-5031
SL - Svæði 7	Jaki (3911)	6413911	Mjósund	Ísafjörður - 400	18.09.2018 15:14:30	Af korti > 24 klist	SL-Ísafj-3911

Kort

Loftmynd

Kort 2

Grjótbótstindur
1397

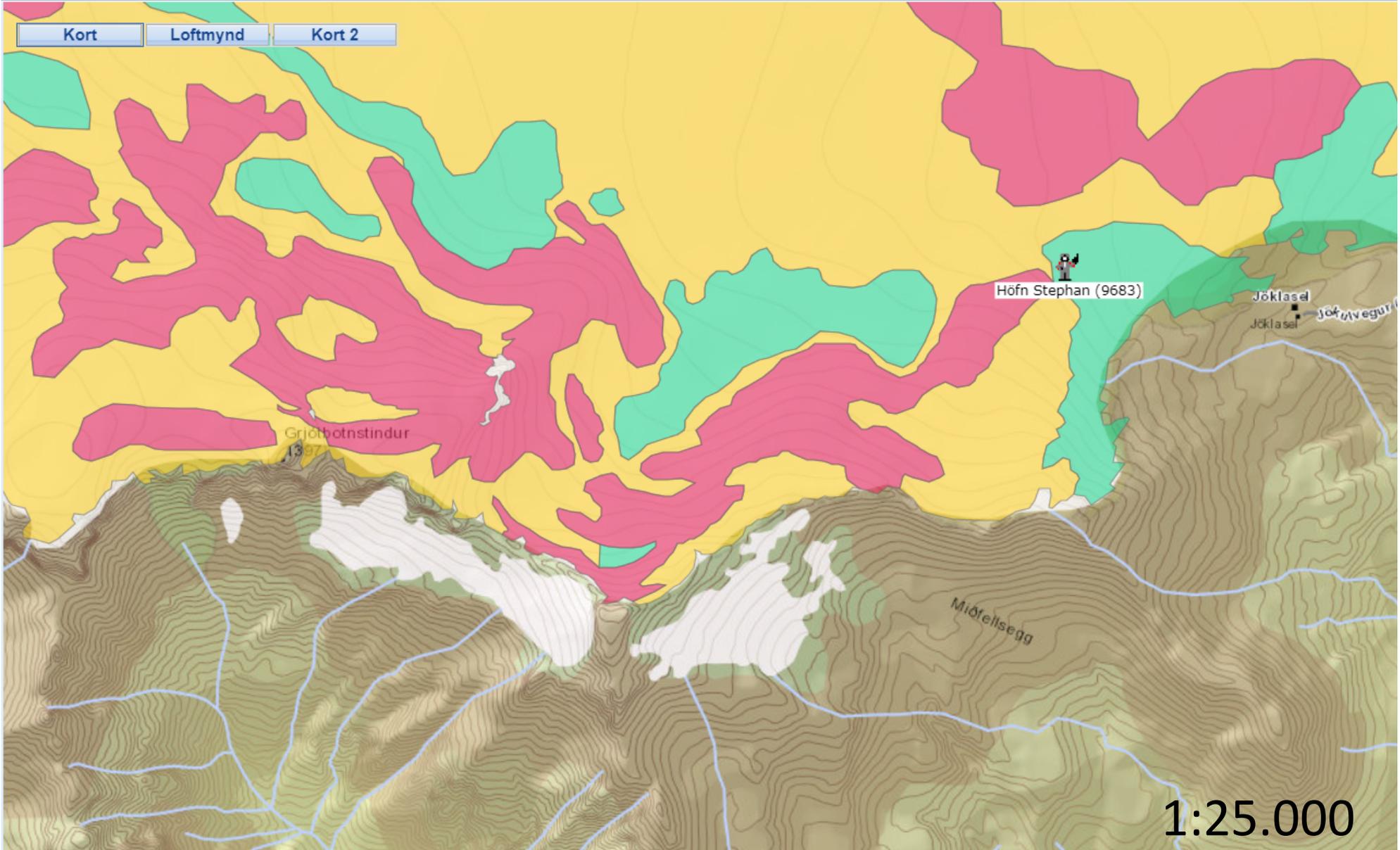
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Jöklaasel
Jöklaasel

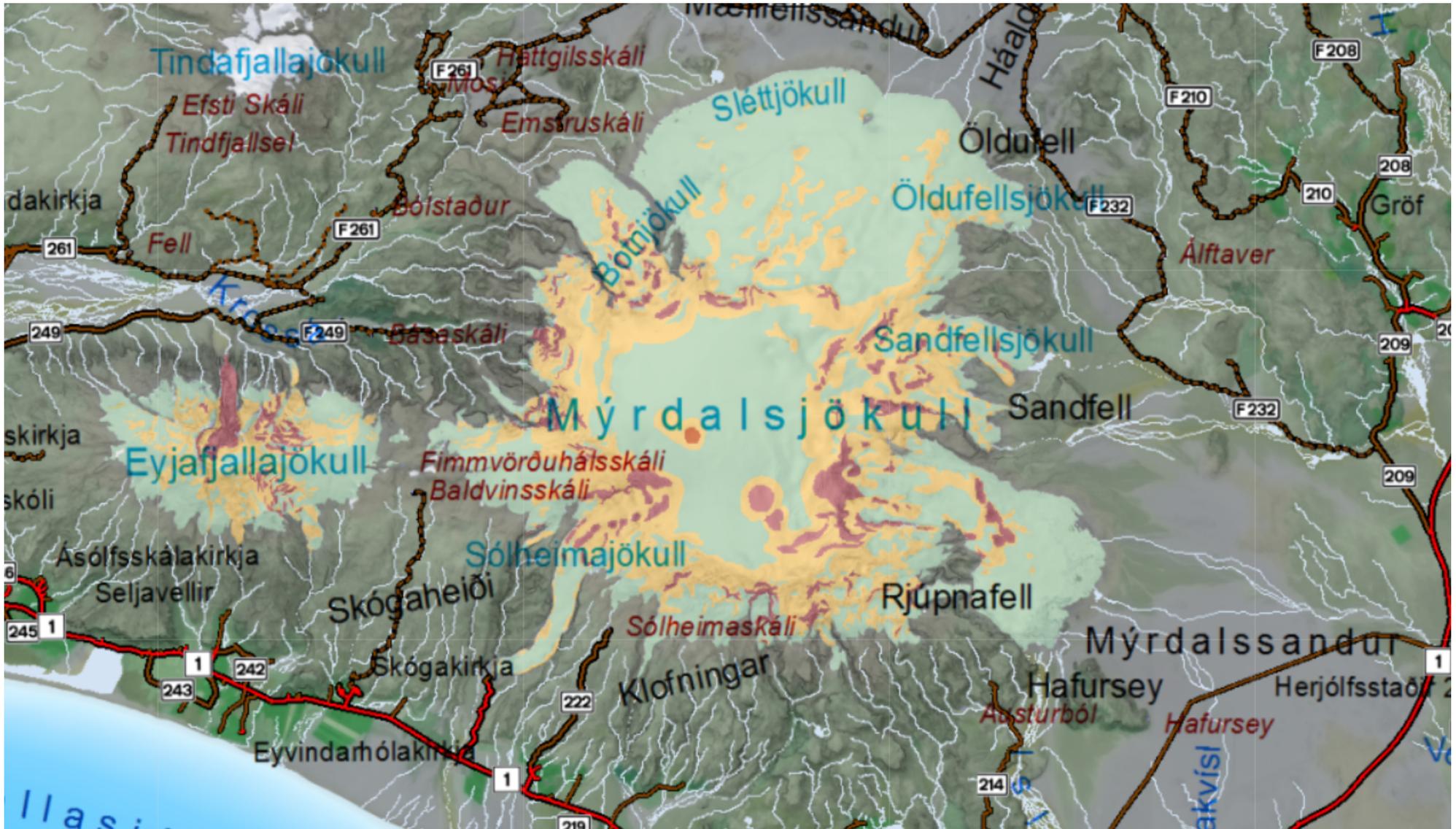
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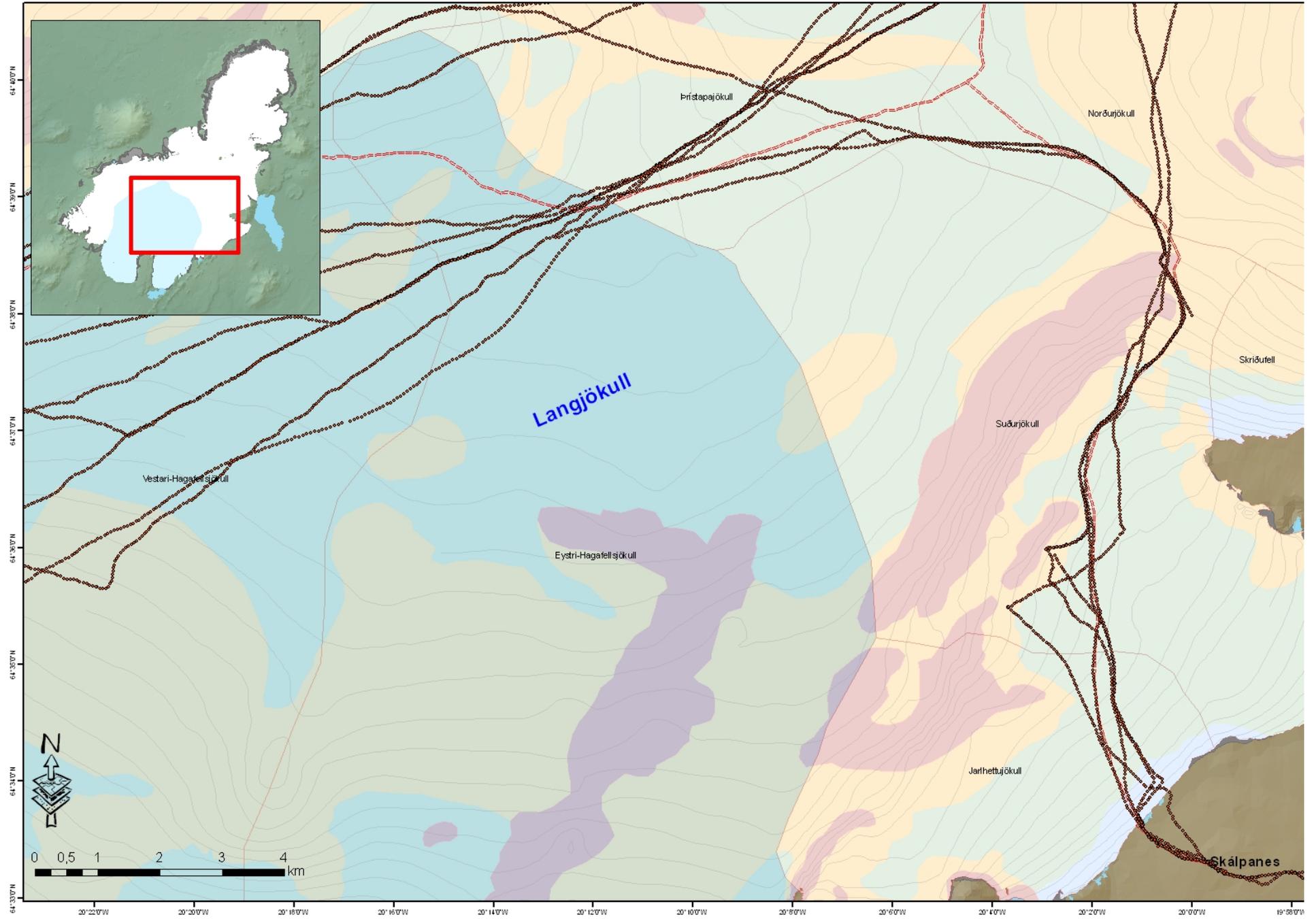
Mjófellsægg

1:25.000

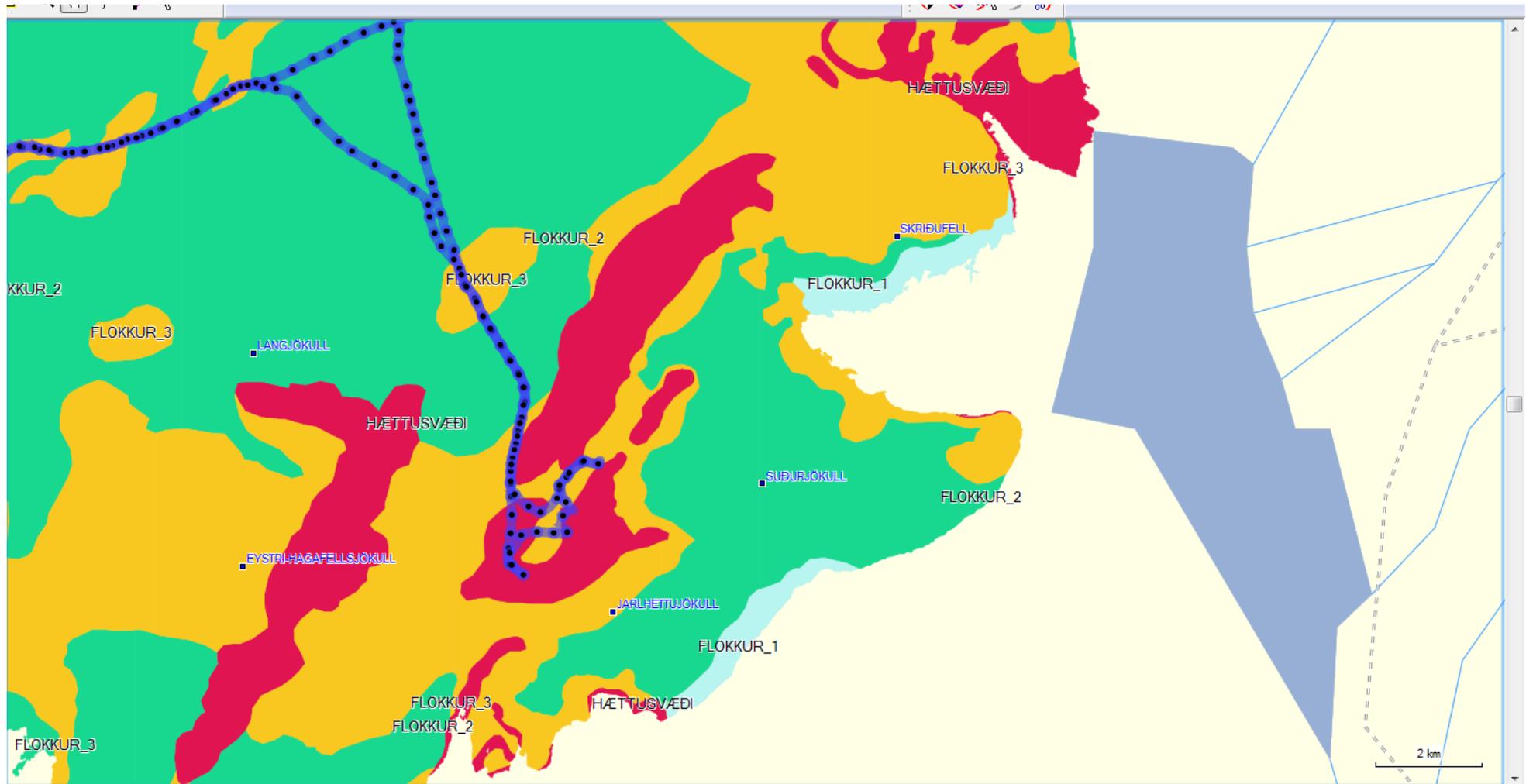


www.vefsja.iskort.is





Travellers not using the crevasse maps



Conclusion

For further information:
agust@vedur.is or
agustth@gmail.com

www.safetravel.is



- The maps have been proven very useful for glacier travel in Iceland.
- The multiple platforms is a key for the distribution of the maps to as many users as possible.