# Mapping of the Sundhúkur eruptions with airborne photogrammetry

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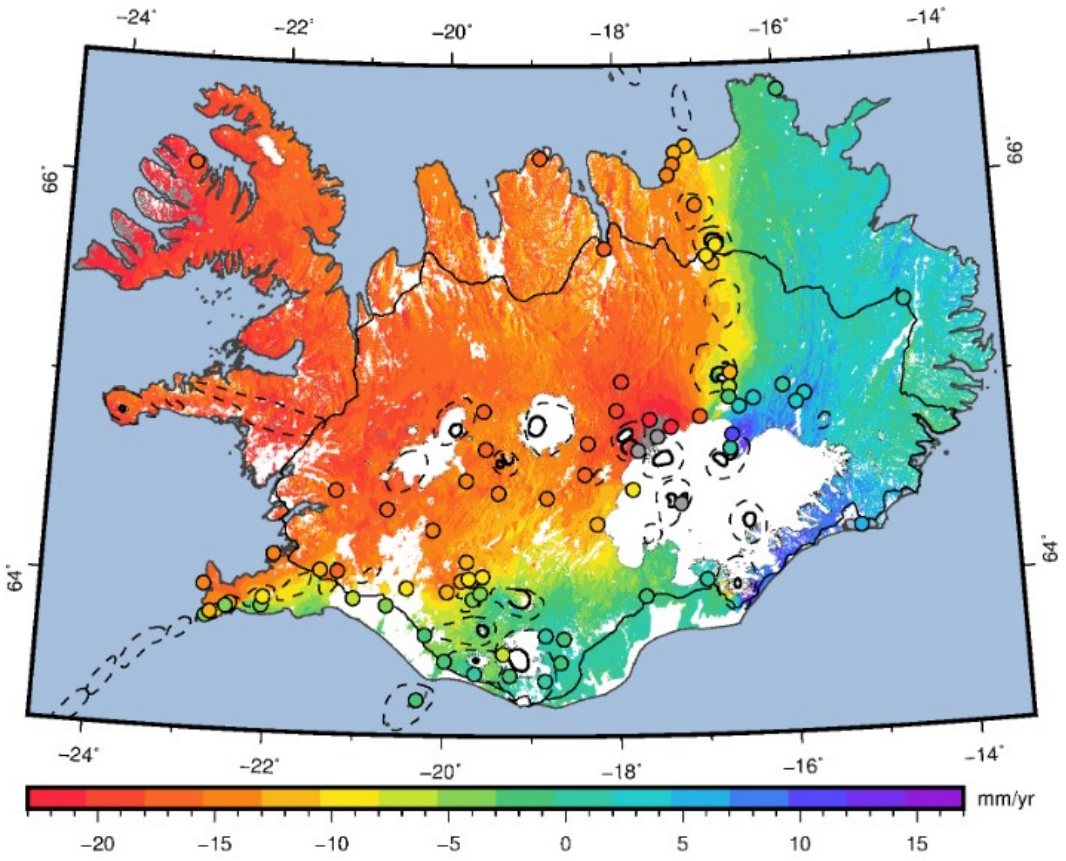
Veðurstofa
Íslands

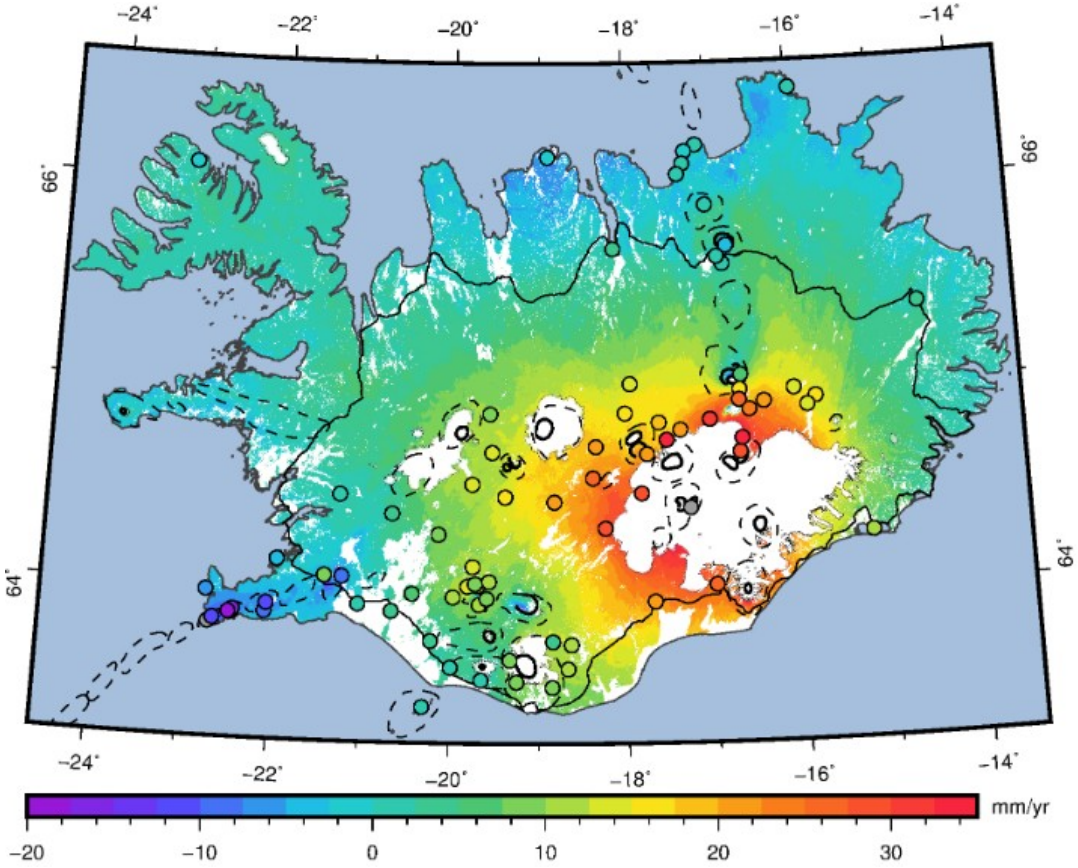
UNIVERSITY
OF ICELAND

# Crustal movements 2015-2020

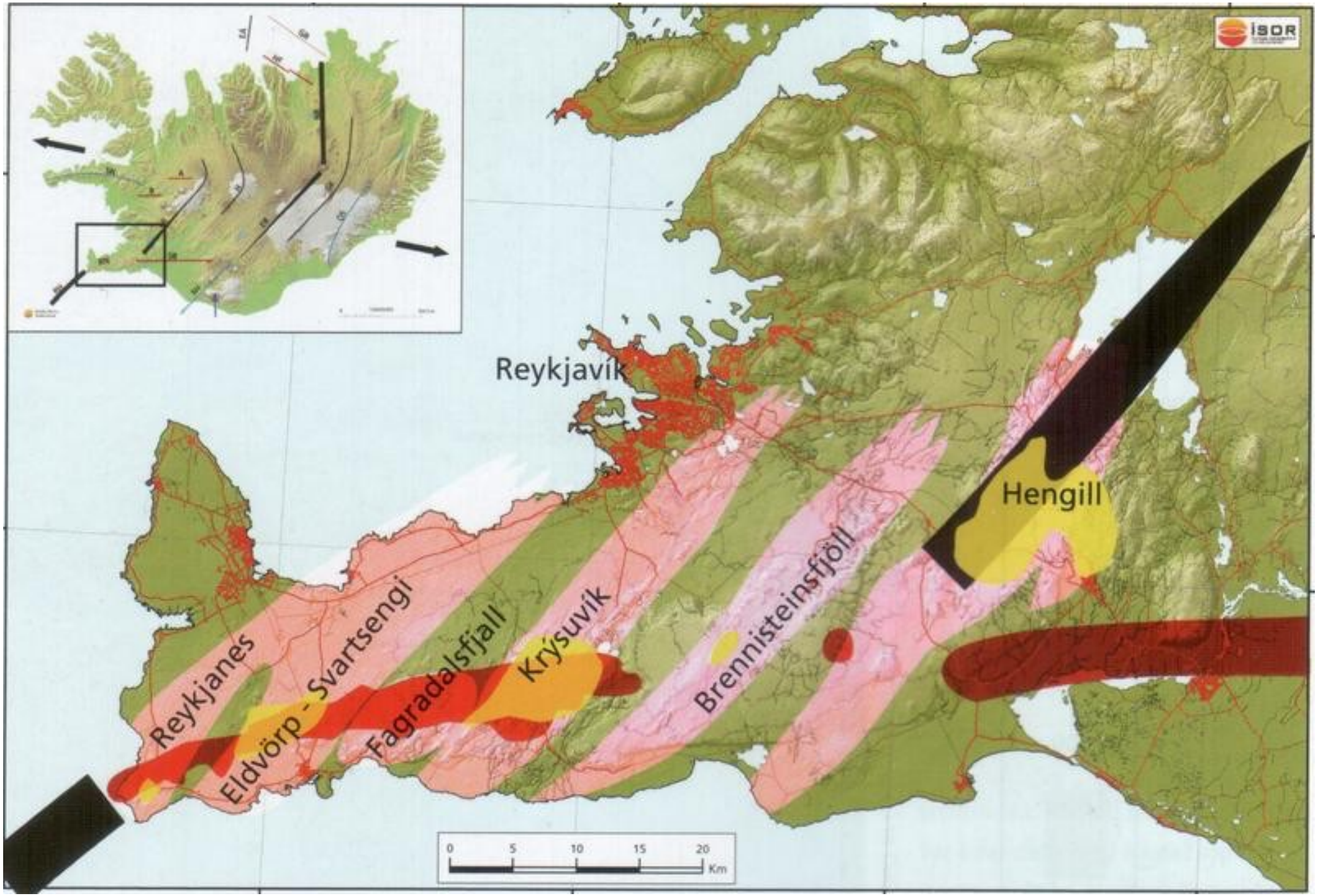
*East-West motion*




*Vertical motion*




*Drouin & Sigmundsson, GRL*


ÍSOR
Reykjavík
Hengill
Reykjanes
Eldvörp - Svartsengi
Fagradalsfjall
Krýsuvík
Brennisteinsfjöll
0
5
10
15
20
Km


SUNDHJNÚKSGÍGAR
2023 and 2024
FAGRADALSFJALL
2021, 2022 and 2023
Fagradalshraun
Fagradalsfjall
Sýlingarfell
Bláa lónið
Sundhnúksgigar
Sundhnúkur
Hagafell
GRINDAVÍK


March 21,
2021


Flugfélag Austurlands

# Surveying in the Land of Fire and Ice

## The Implementation of Geodetic Datums in Iceland: A Challenging Journey

PREDICTING THE FUTURE BY MAPPING THE PAST

3D POINT CLOUD AEROTRIANGULATION FOR SMART CITY RECONSTRUCTION

INNOVATION DRIVES THE CONTINUOUS EVOLUTION OF DATA VISUALIZATION

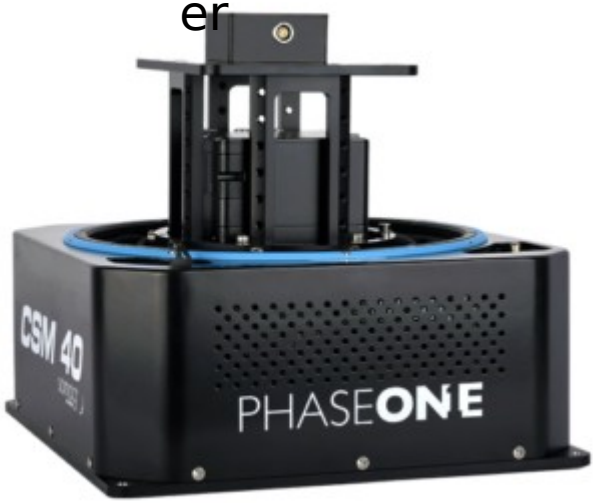
# PhaseOne Aerial System

Flight management system

CAMERAS

iXM-100 | iXM-50

Stabiliz er




applanix
A TRIMBLE COMPANY

AP180
IMU69

iX controller Mk5

iX Suite – Software for Aerial Systems

Phase One iX Suite is designed to handle all aspects of photogrammetric project workflows, from flight planning to the creation of commercial format images. The software includes iX Plan, iX Flight Pro, and iX Process.

IX SUITE


14.1.2024


8.2.2024

# Challenges

- Eruption plume
- Cloud cover
- Weather
- Loss of GCPs
- Air traffic
- Land movements

# General workflow

Photogrammetric survey & Measurement of GCPs

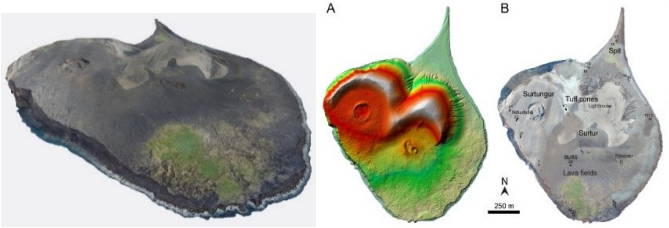
Applanix POSPac™

Image alignment and tie-point generation using photogrammetric software

Bundle adjustment

DEM, ortho, mesh

Metashape



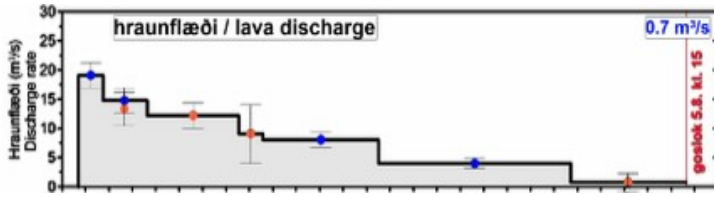

QGIS

python™

NASA ASP

Data delivery

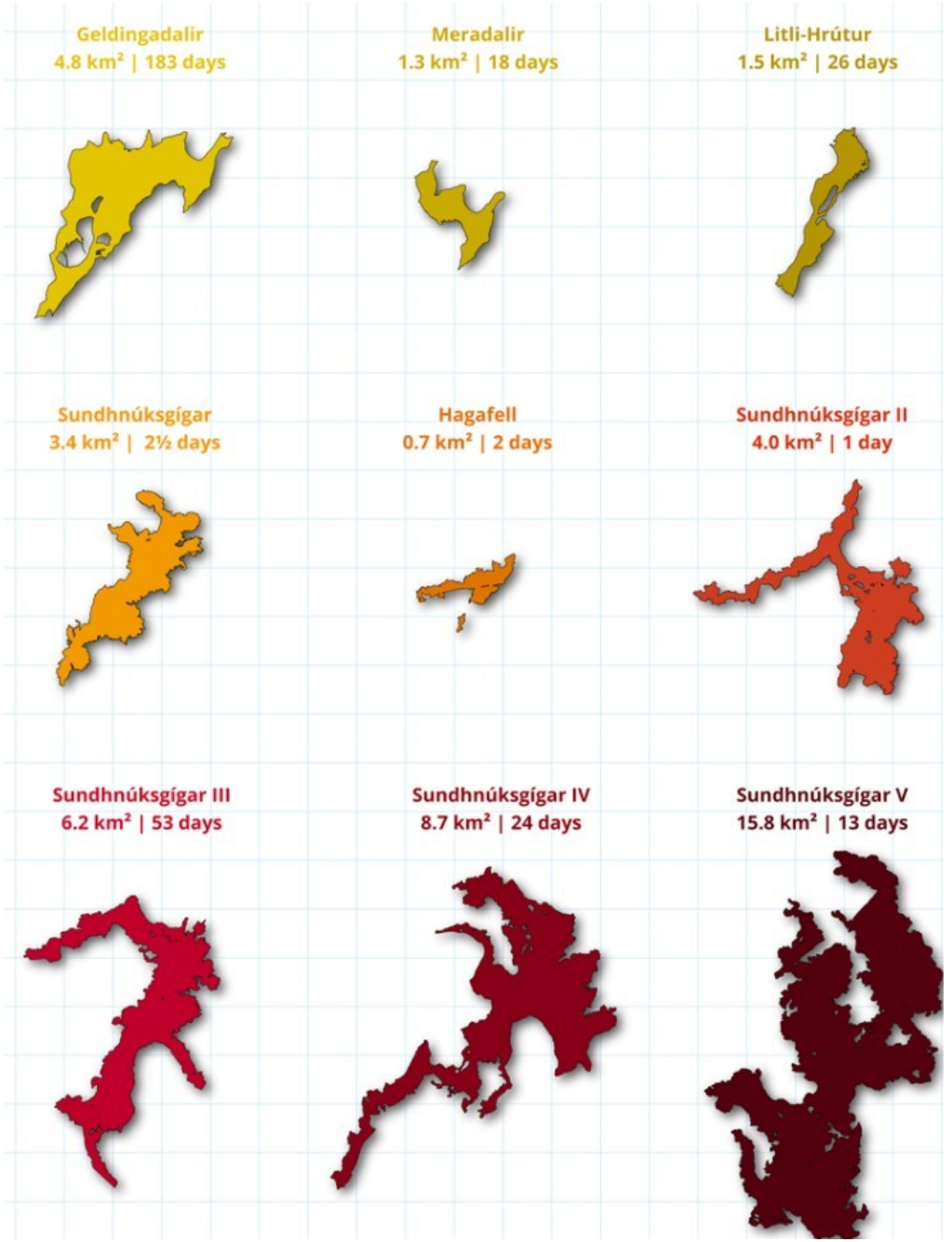
In-house analysis:
Area, volume, effusion rate
Ground deformation



# Time series of eruptions on Reykjanes

FAGRADALSFJALL
2021, 2022 and 2023

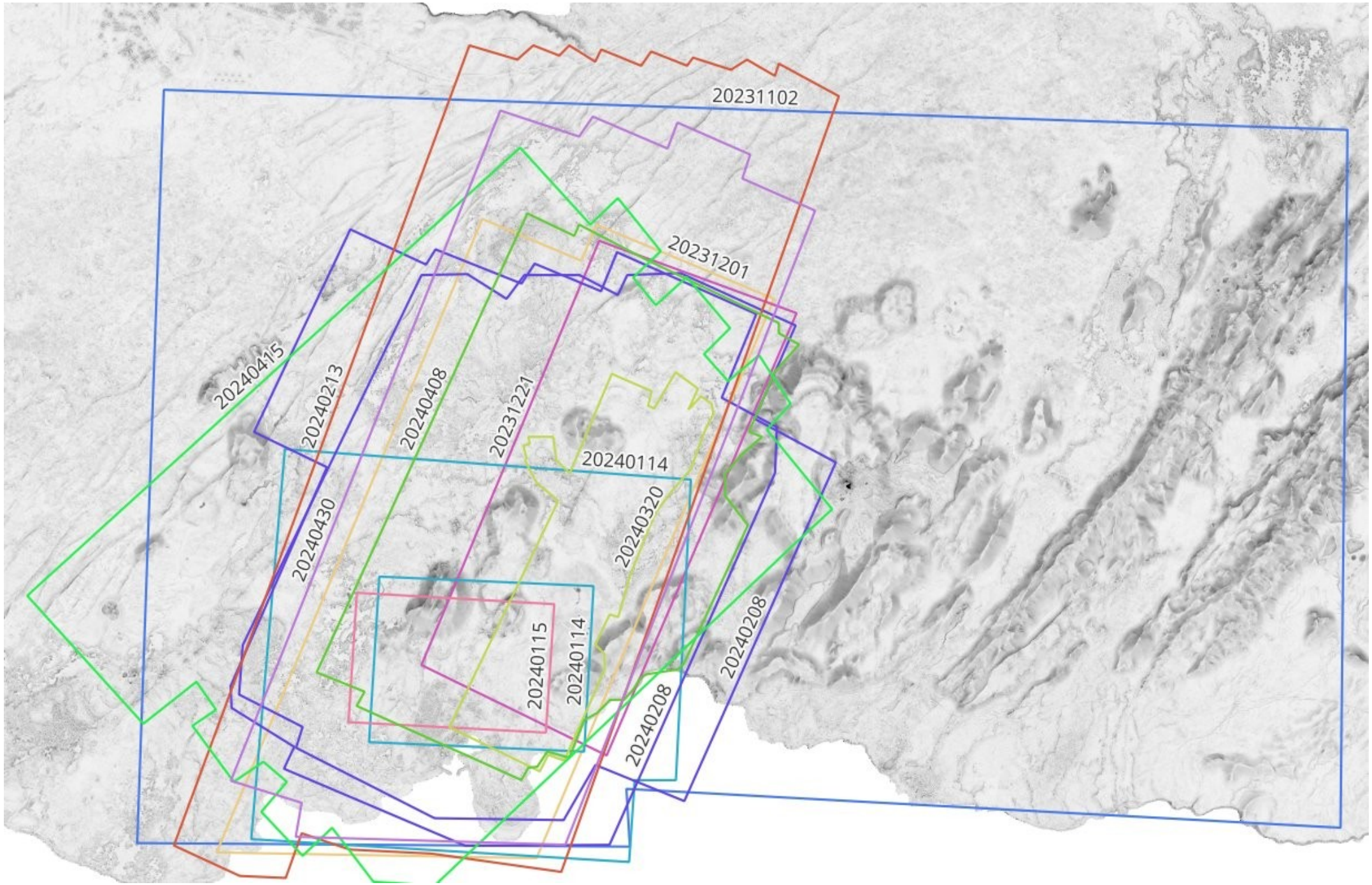
SUNDHJÚKSGÍGAR
2023 and 2024

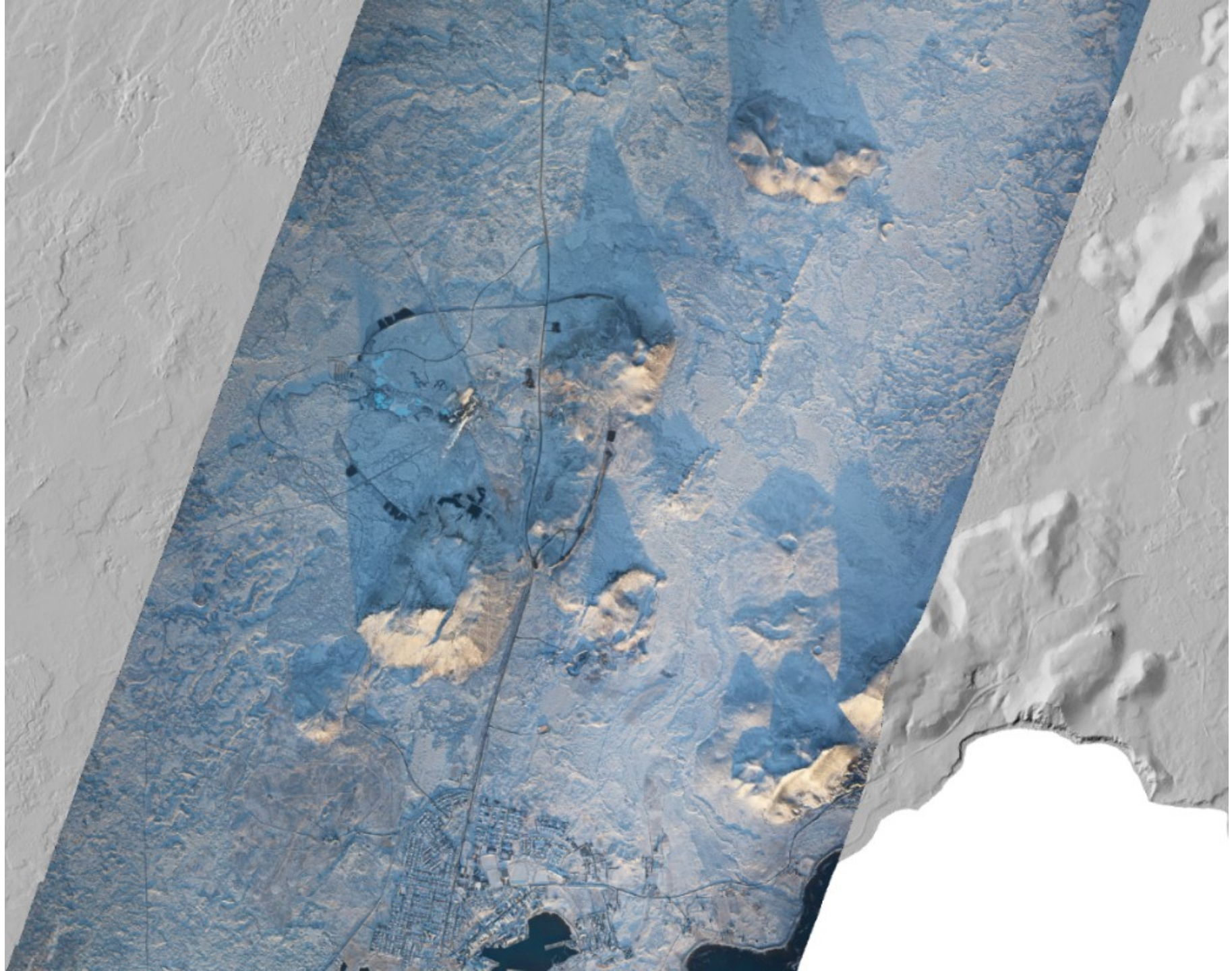


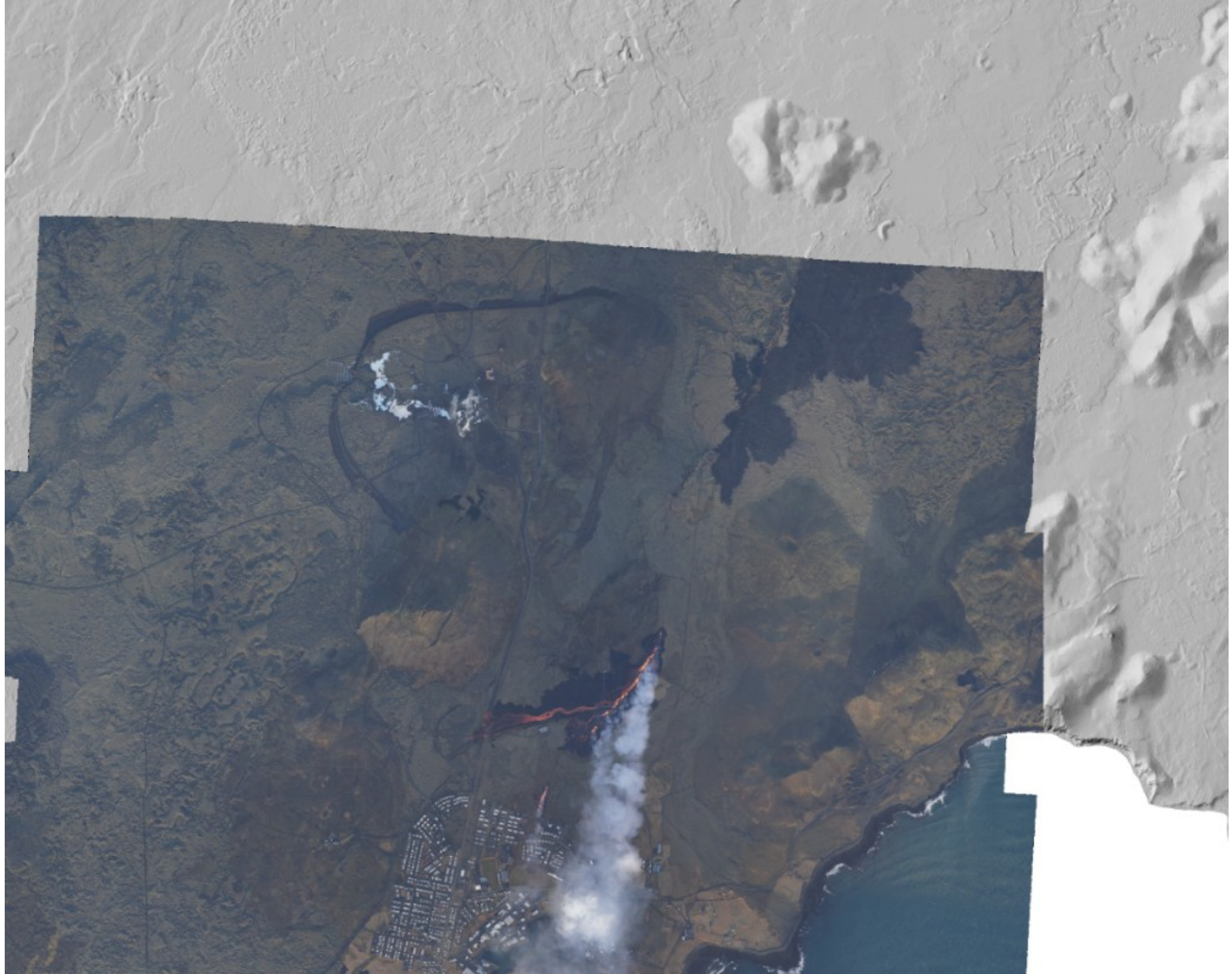

*Ragnar H. Þrastarson*

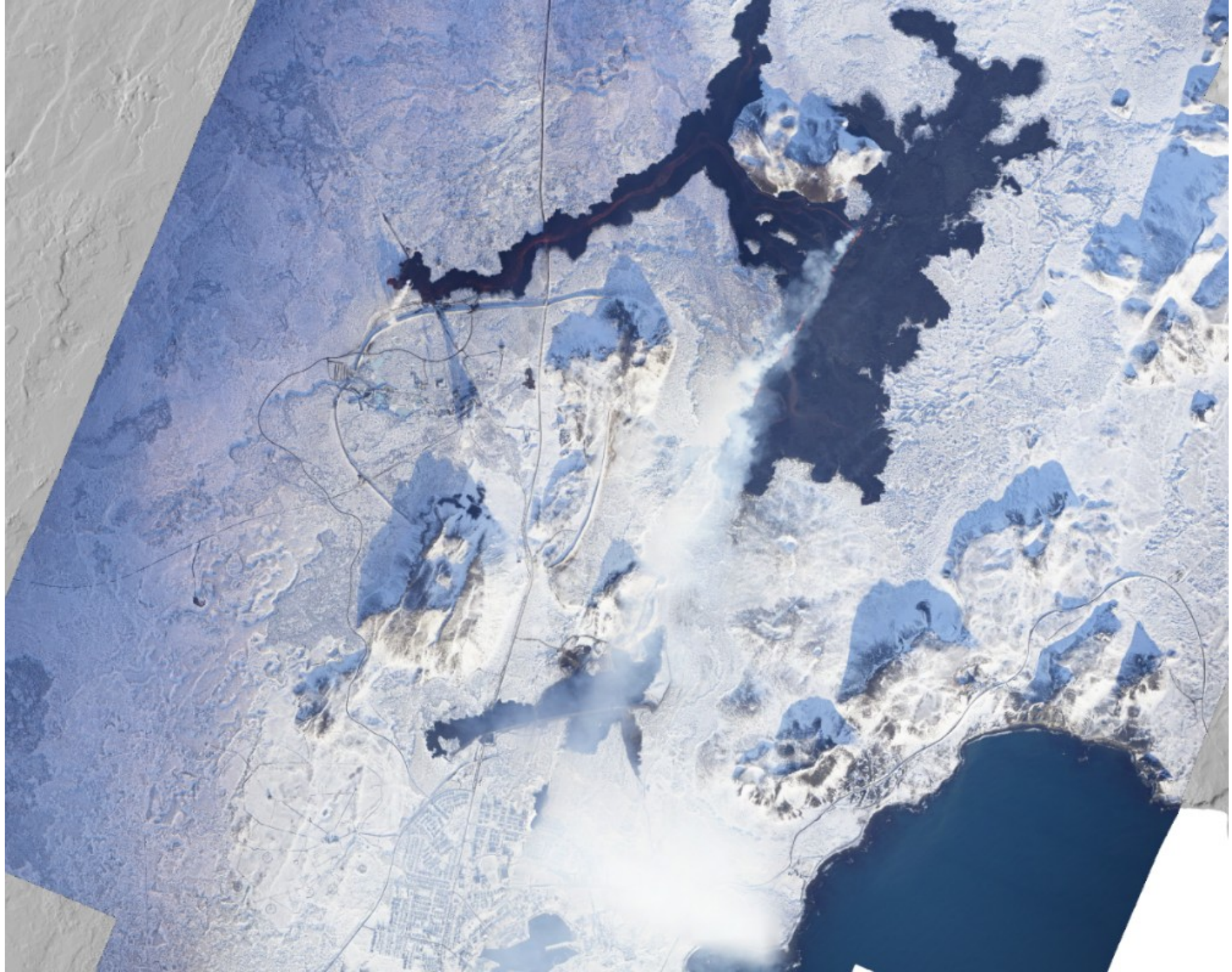
**Data collected**
2.11.2023
1.13.2023
14.1.2024, 13:50
14.1.2024,16:15
15.1.2024
8.2.2024, 13:00
8.2.2024, 17:00
13.2.2024
17.2.2024
20.3.2024
8.4.2024
15.4.2024
30.4.2024
29.5.2024
30.9.2024
23.11.2024
28.11.2024

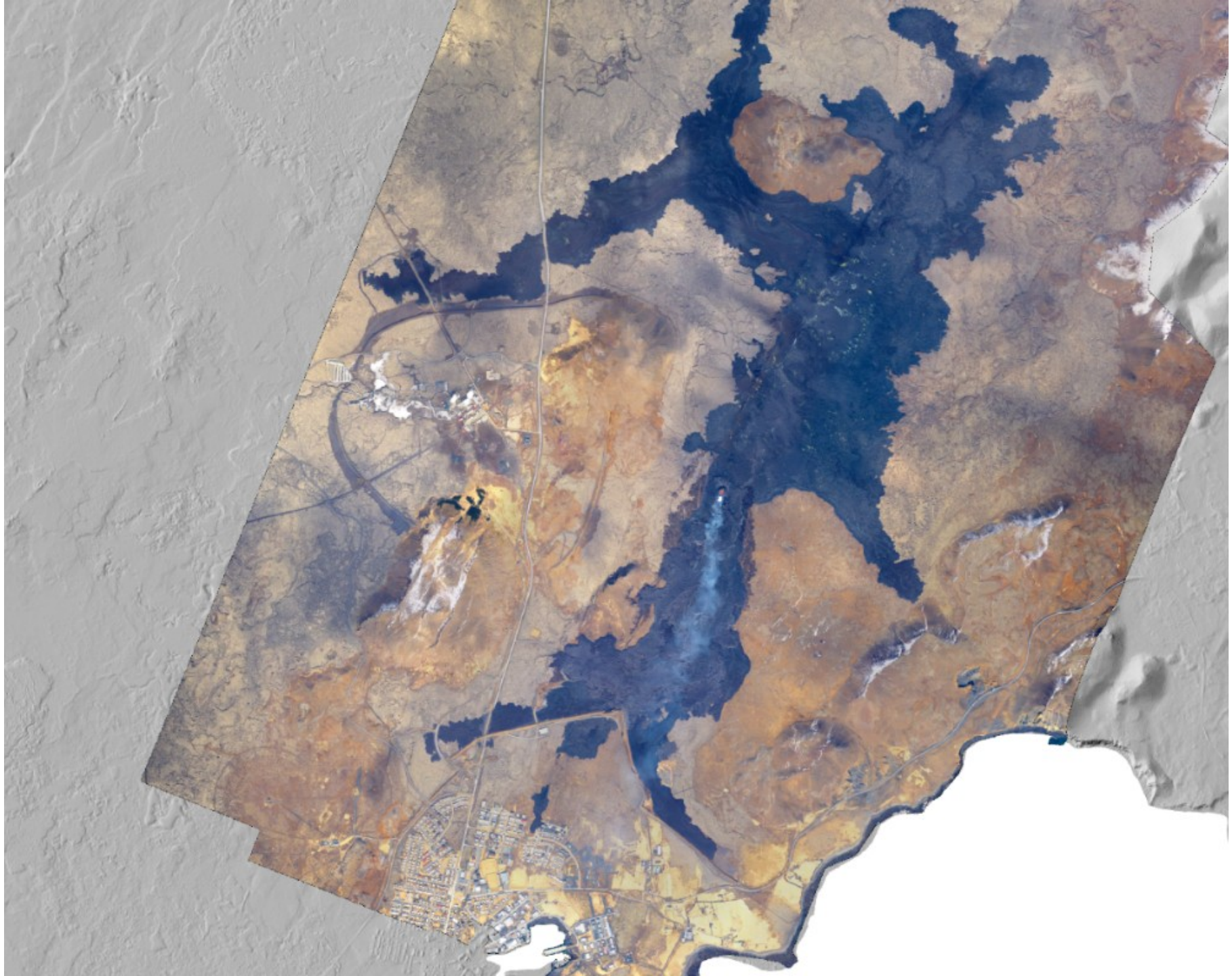
**Total:**
~19 flying hr
~2000 km$^2$

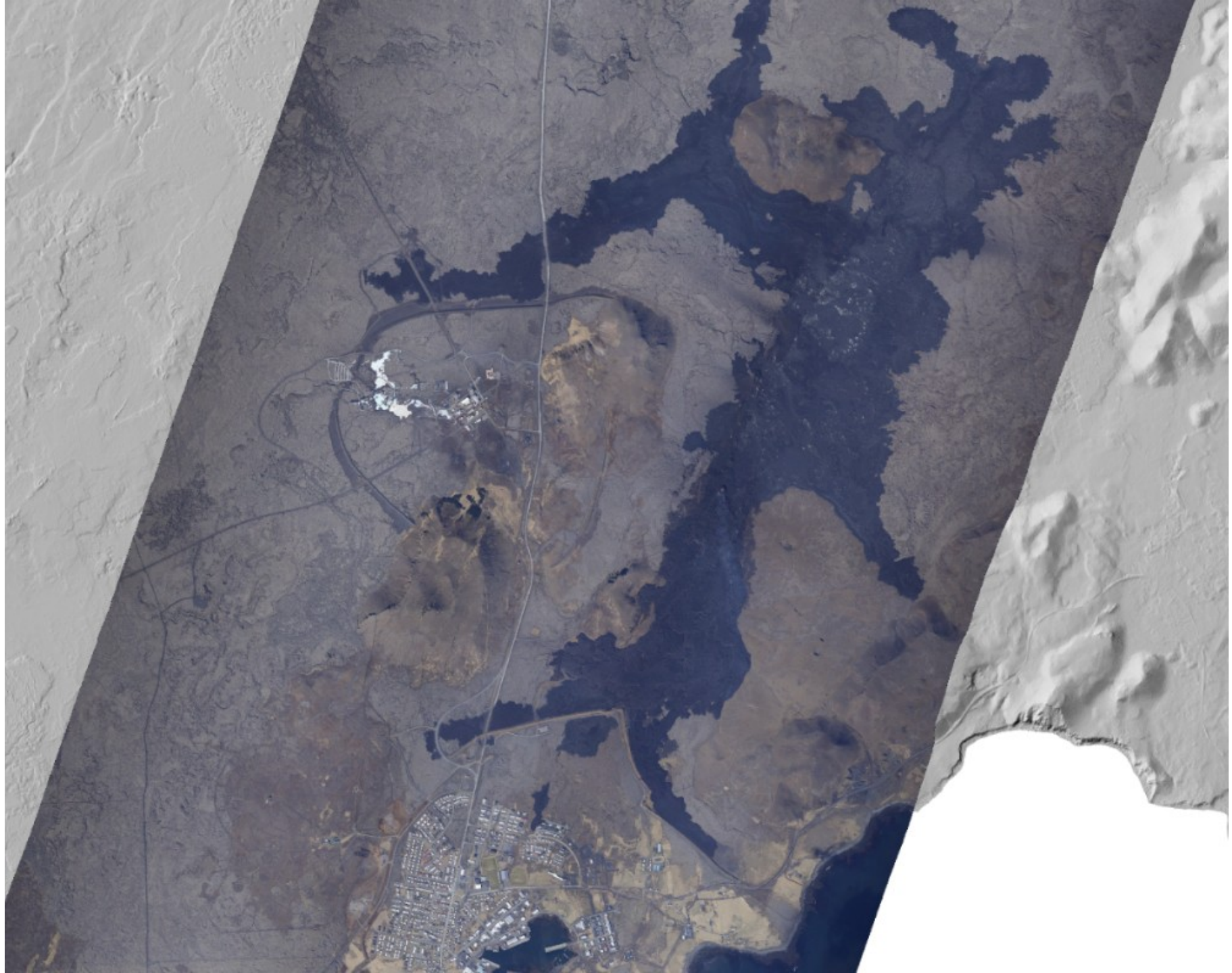


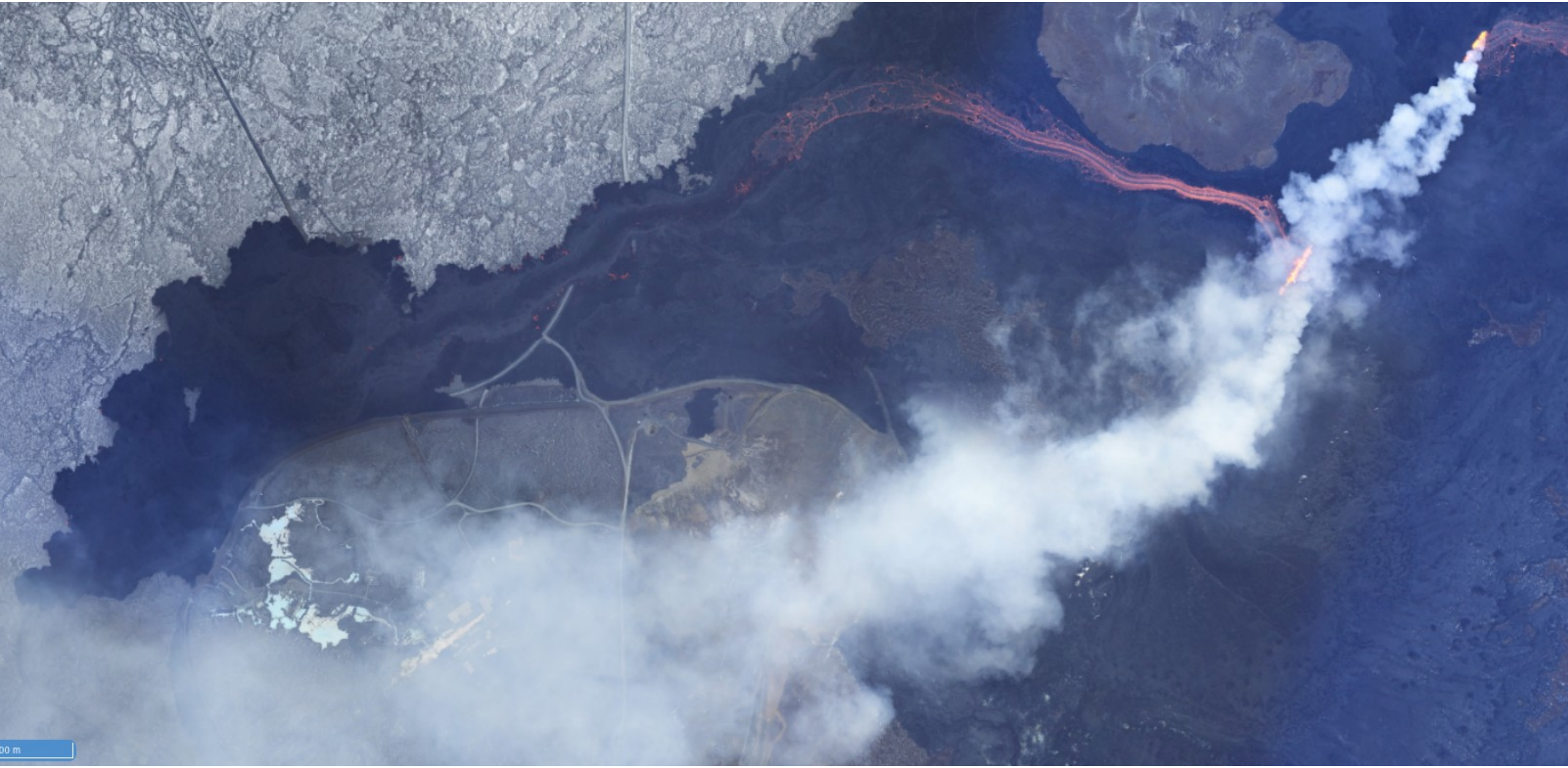






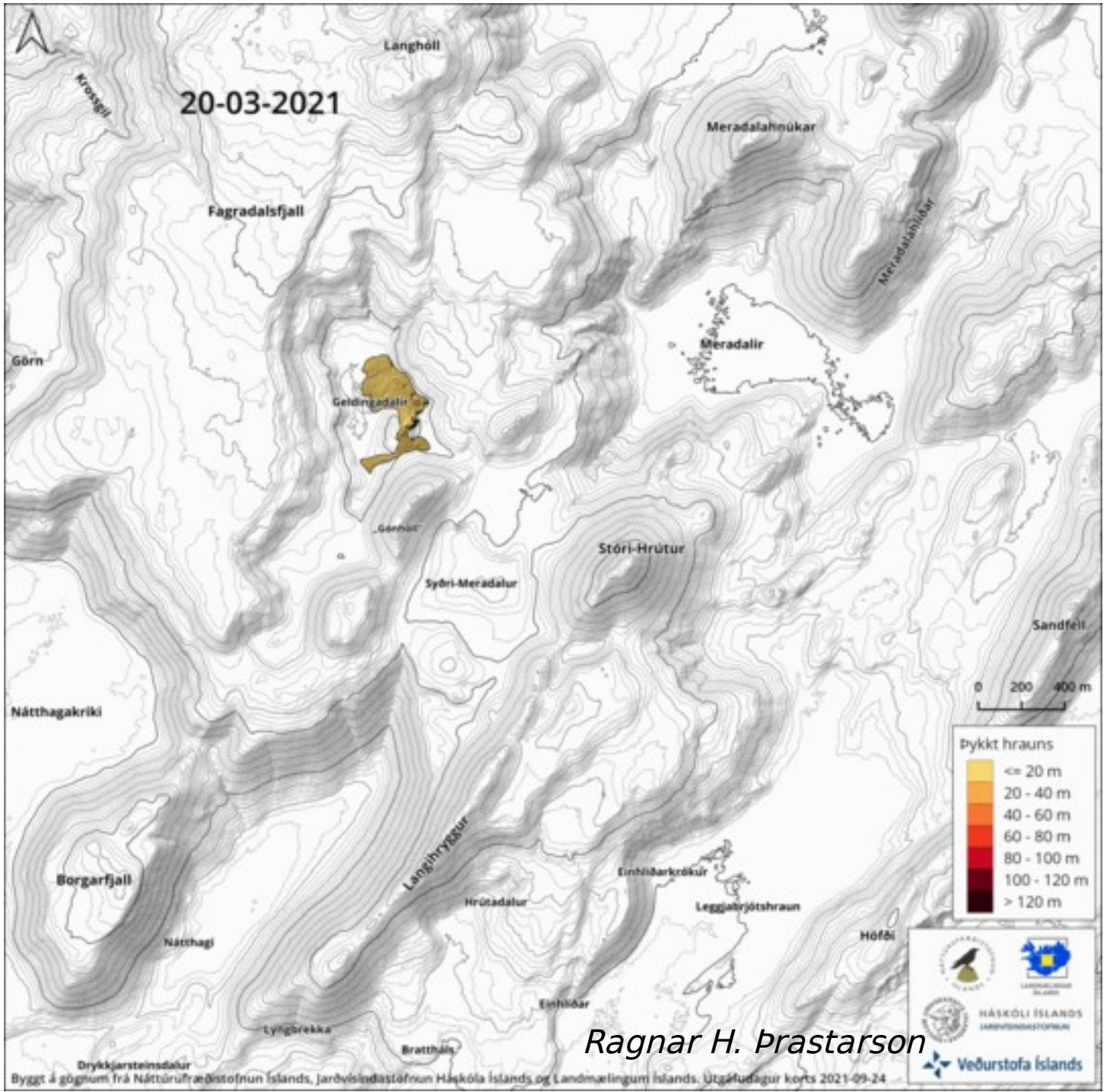




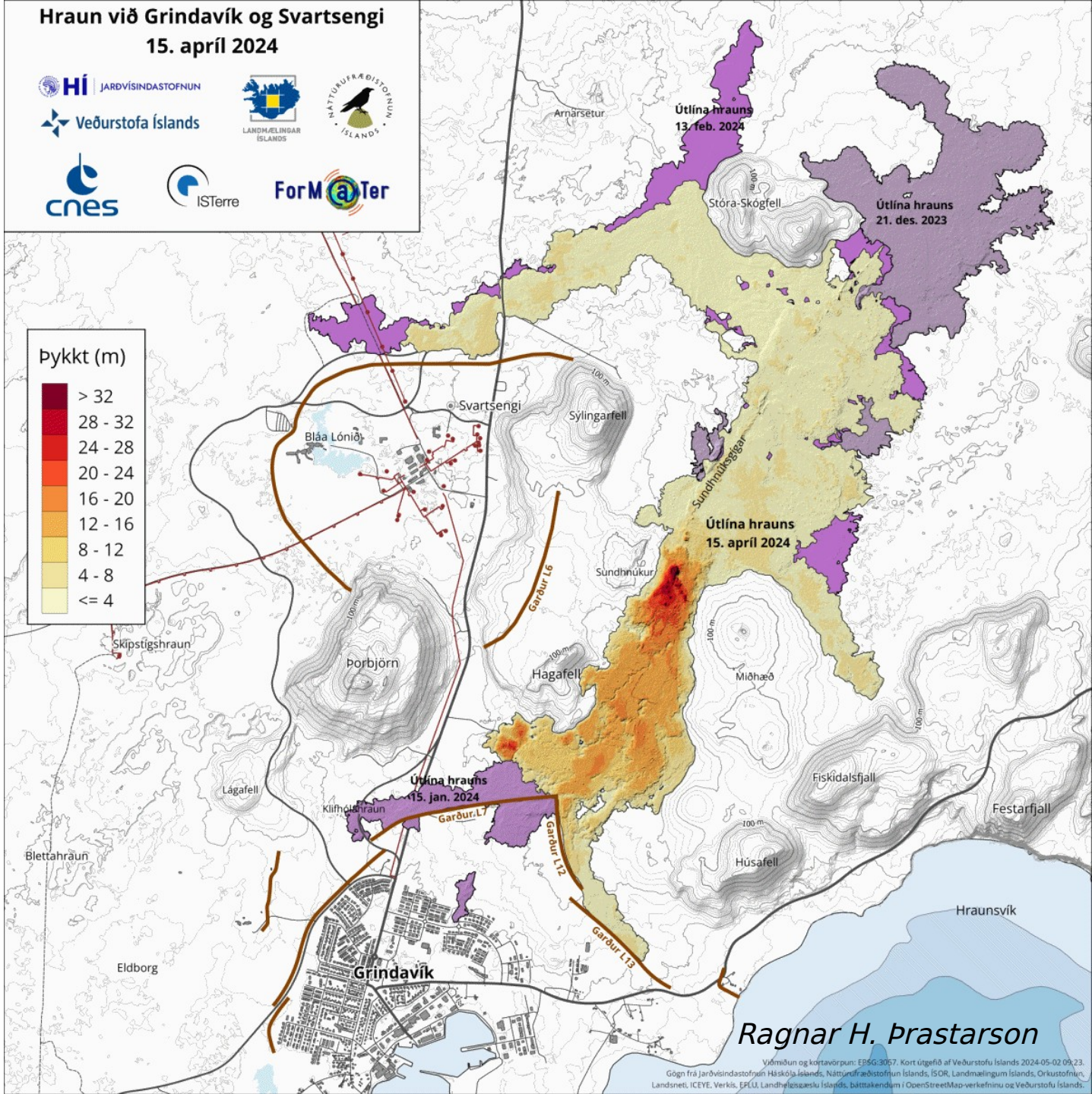


Full time series:
https://atlas.lmi.is/mapview/?application=umbrotasja

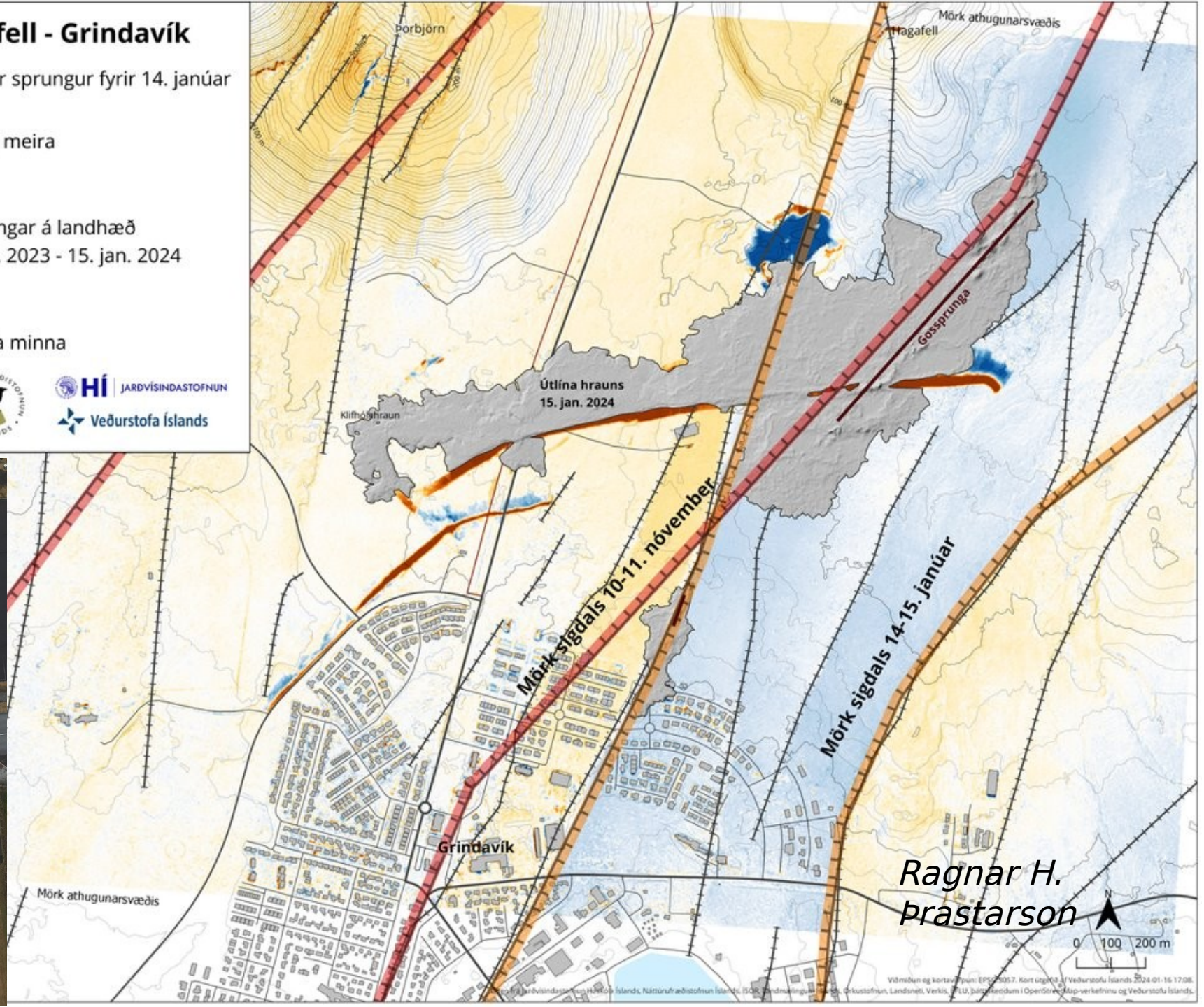
# Lava thickness: Fagradalsfjall 2021



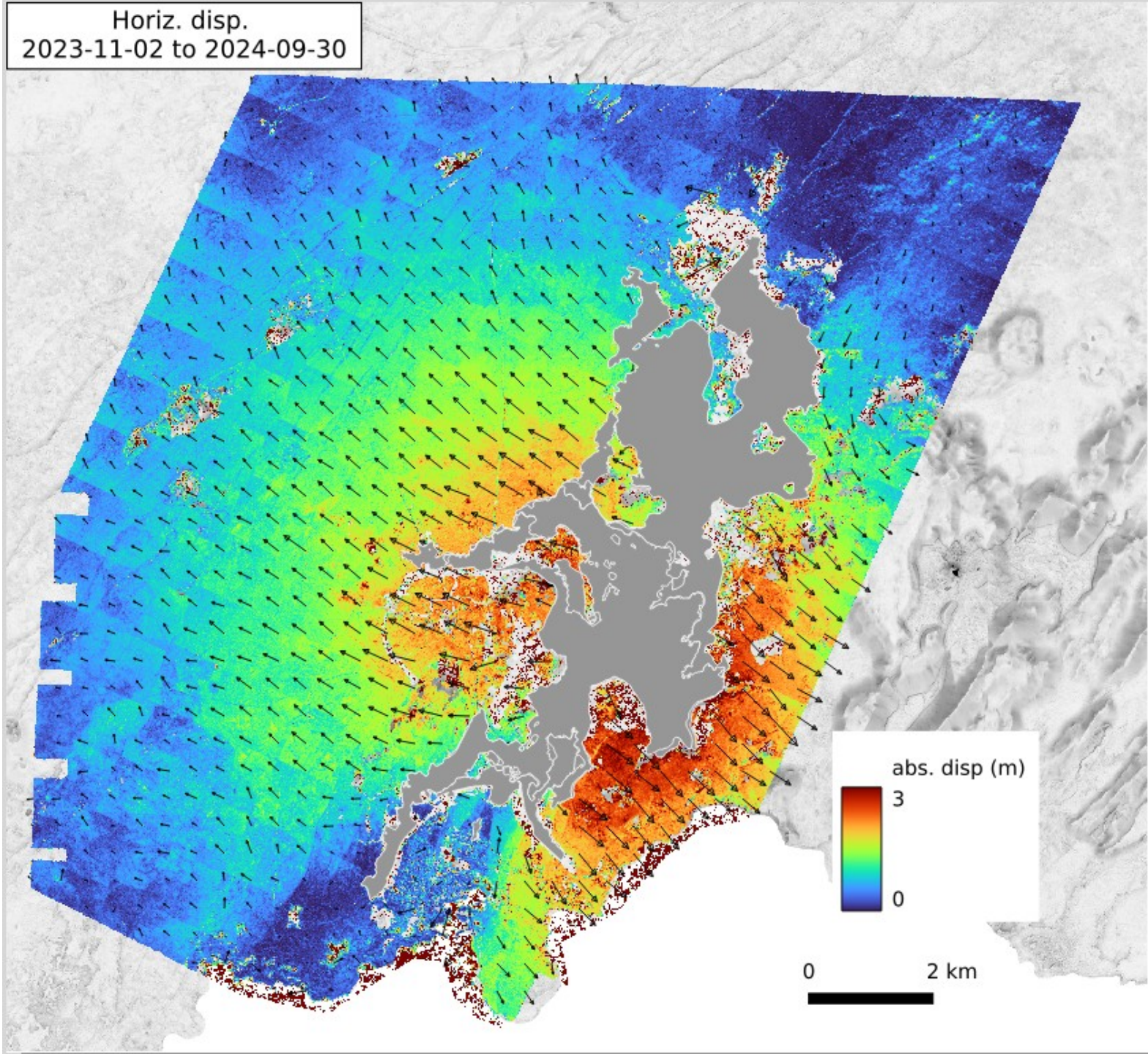
# Lava thickness: Sundhnjúksgígar 2023-2024



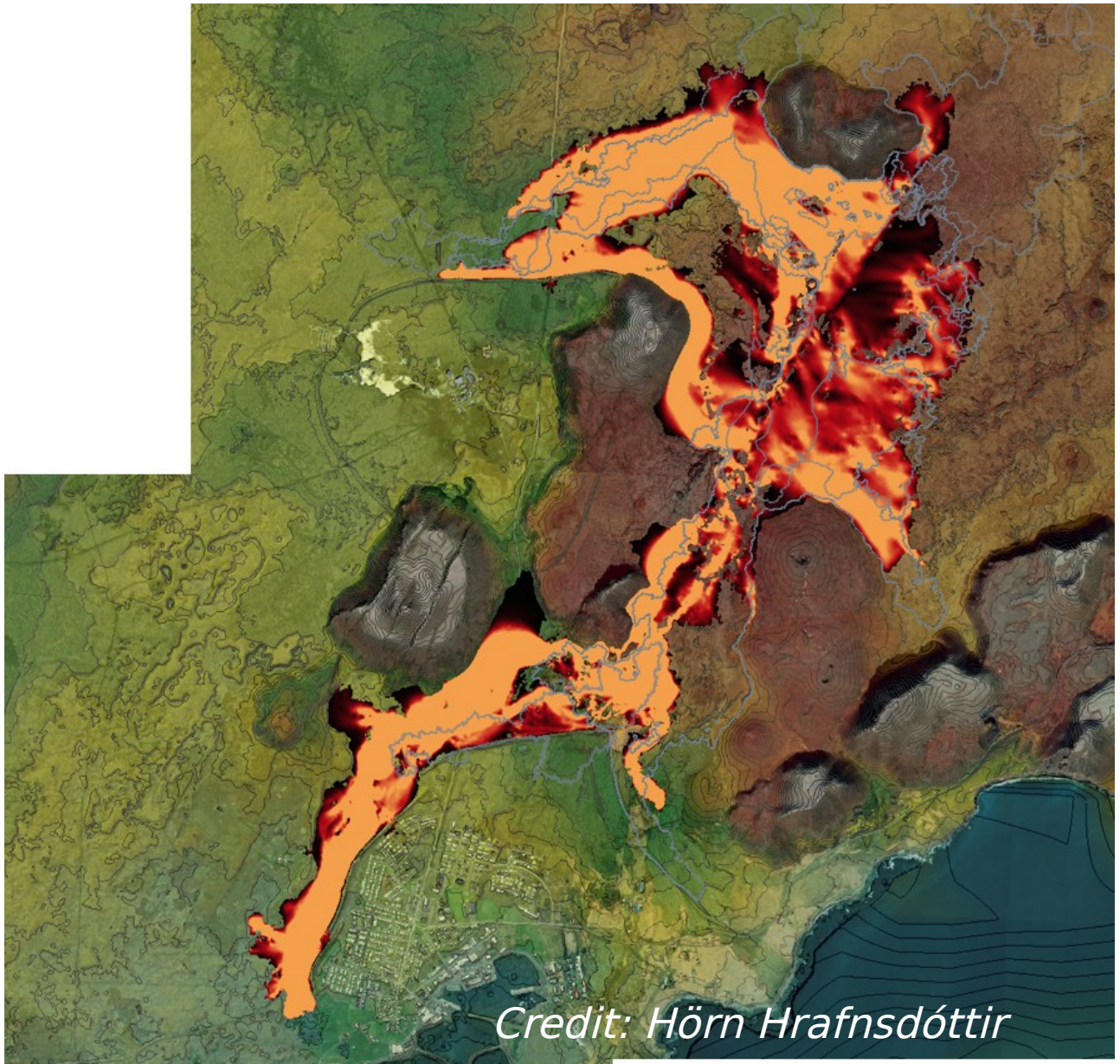
# Graben formations



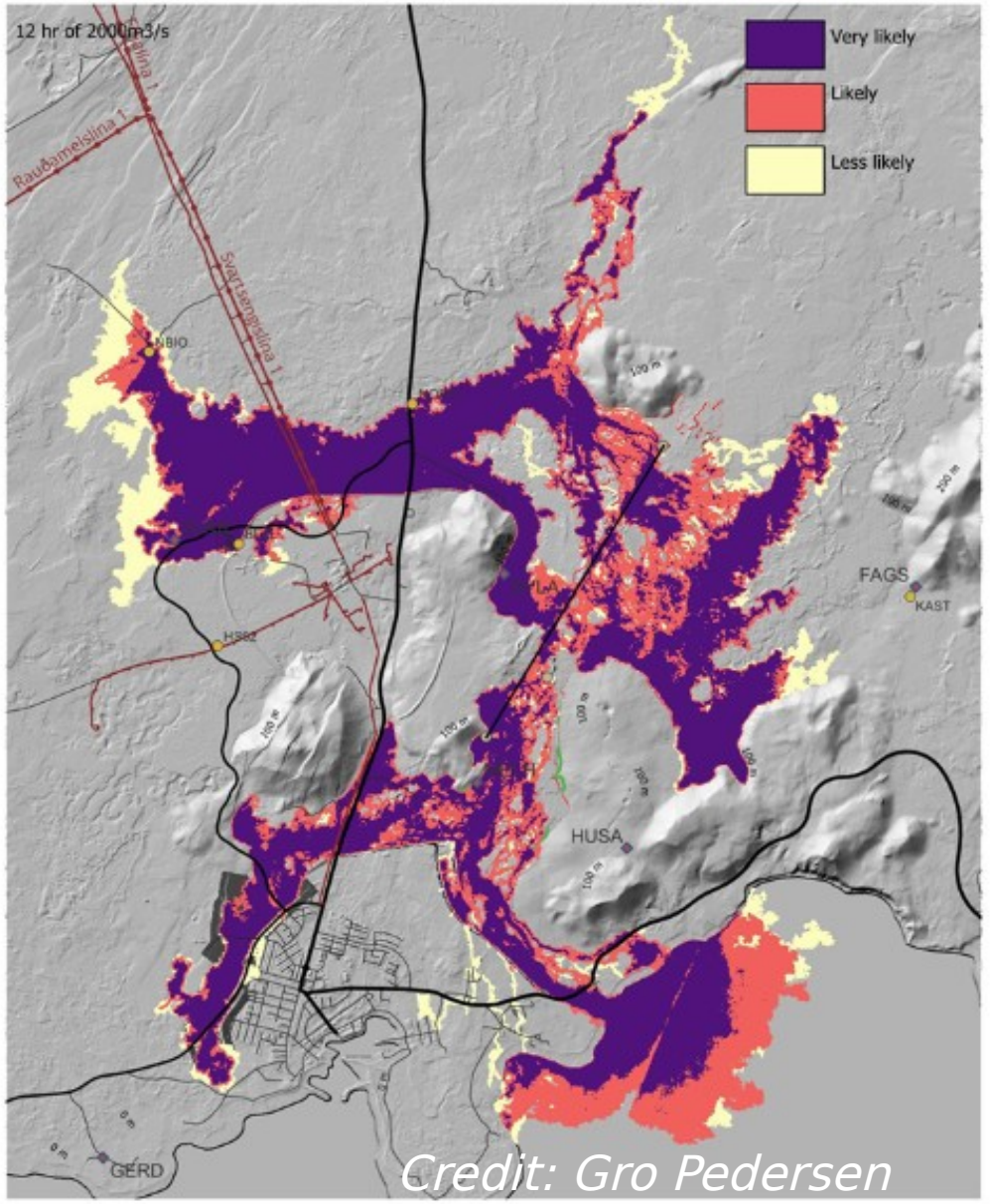
# Horizontal displacements from feature-tracking between two orthos



# Lava flow simulations

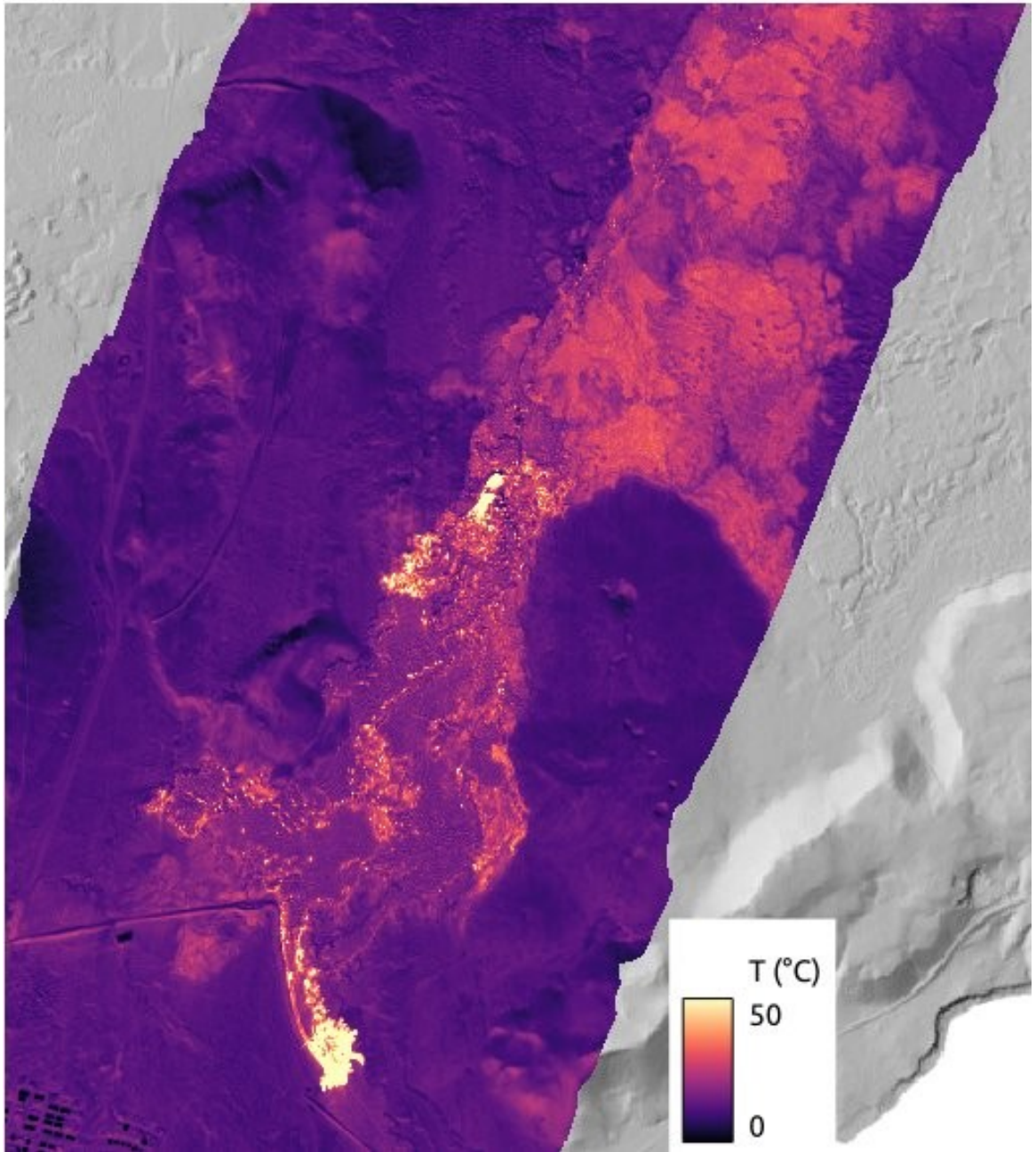


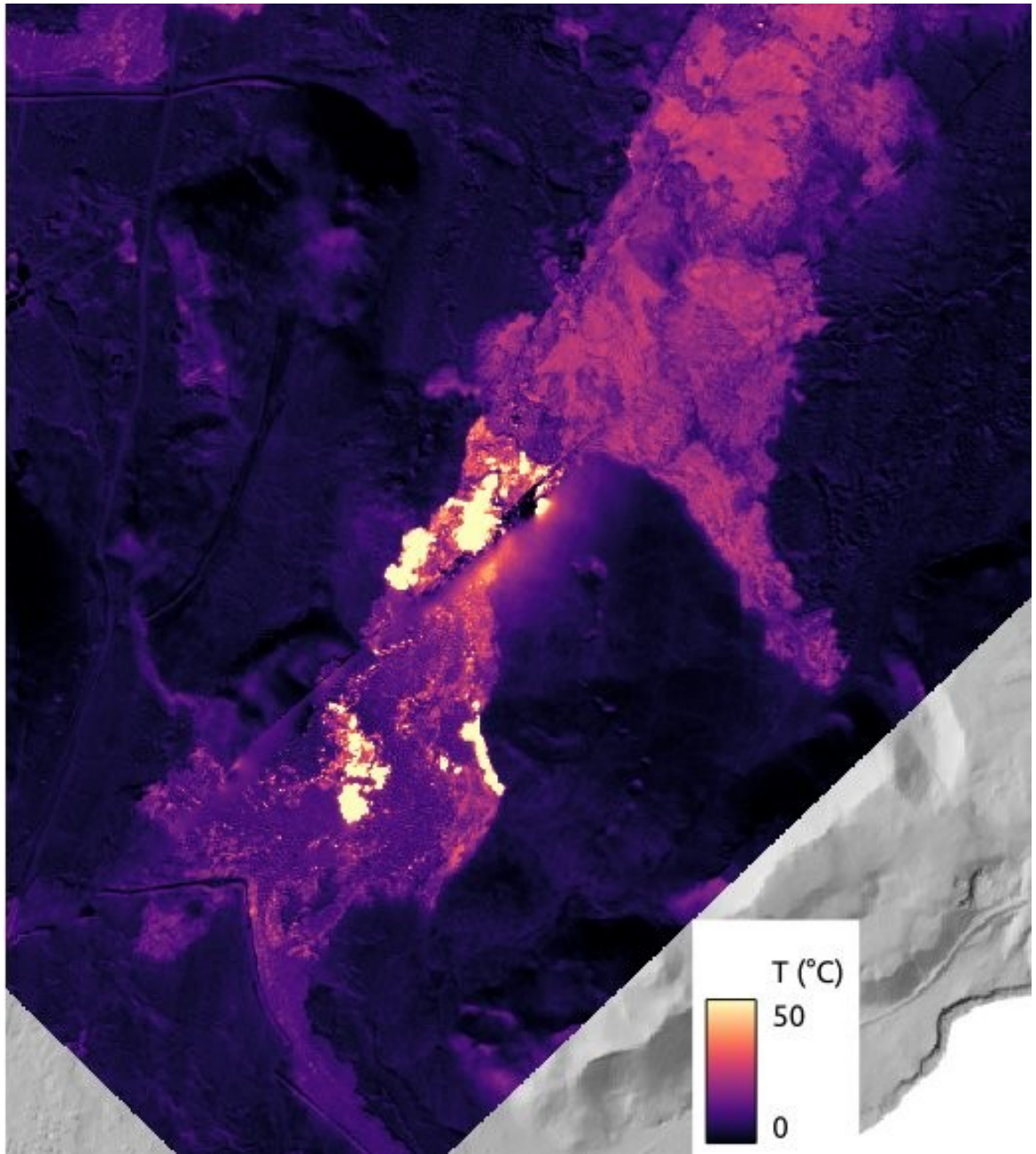
*Credit: Hörn Hrafnsdóttir*



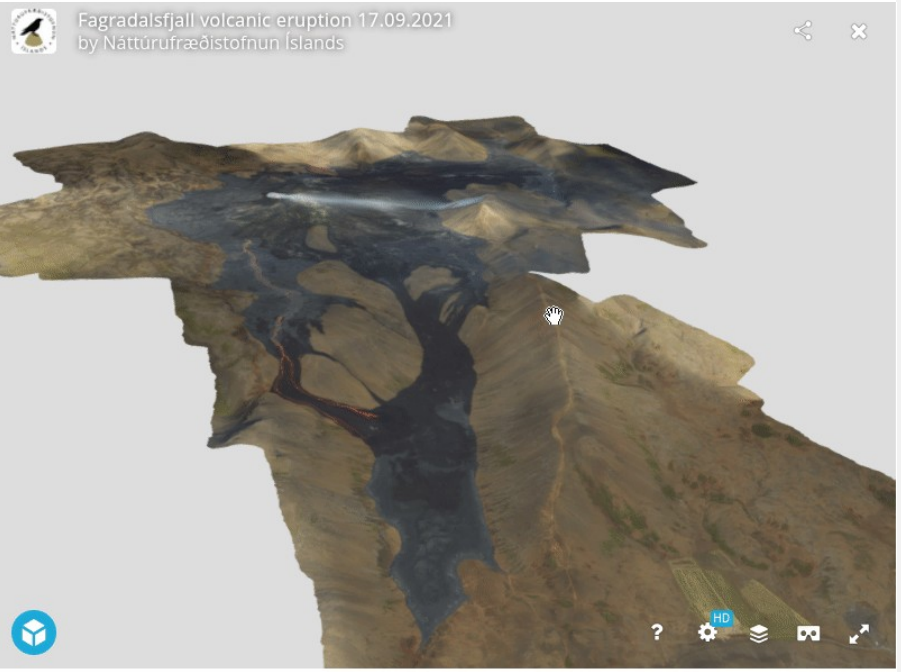

*Credit: Gro Pedersen*

# Thermal images



# Interactive 3D maps

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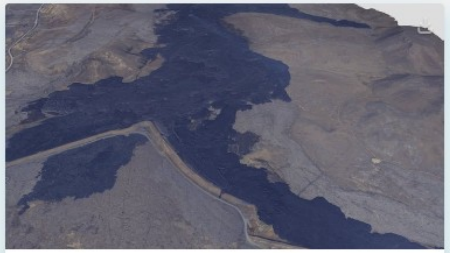
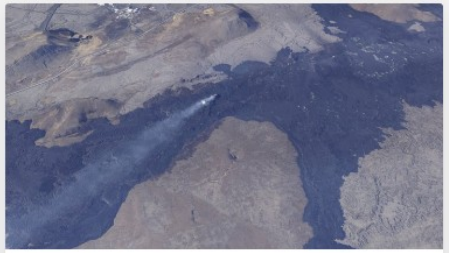
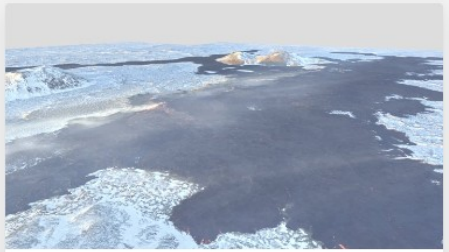
Sundhnúksgígar eruption (29.05.2... 627 0 1


Sundhnúksgígar eruption 7-30.04.... 324 0 0

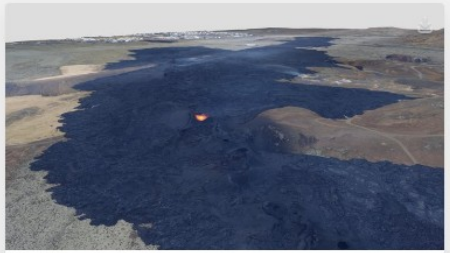

Sundhnúksgígar eruption 7-15.04.... 255 0 0


Sundhnúksgígar eruption 7-08.0... 12.8k 1 2


Sundhnúksgígar eruption -7- 20.0... 1.4k 0 1


Sundhnúksgígar eruption 08.02.2... 519 0 4


Sundhnúksgígar eruption 08.02.... 18.1k 0 3


Sundhnúksgígar eruption 15.01.2... 500 0 2


Sundhnúksgígar eruption 14.01.2... 821 0 1

# Thank you!