Photo: Some 40 hours after the eruption started

Gylfi Páll Hersir, ÍSOR

WP8: MULTI-DISCIPLINARY INTER-PRETATION. (ÍSOR, IG, IRSM, CU)

NASPMON: Annual meeting
September 8th, 2021

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WP8: MULTI-DISCIPLINARY INTERPRETATION. (ÍSOR, IG, IRSM, CU)

Objective: Interpretation of all WPs with all existing geophysical and geological information at ÍSOR.

Taks 8.1: Results from all other WPs interpreted with all existing geophysical and geological information at ÍSOR.

- ÍSOR inhouse data: Resistivity, gravity, InSAR, geology, tectonic maps, surface manifestations of geothermal activity
- Drilling and injection data from the energy companies.
- Old active-source profiles (not very many exist)
- Other open data?

Task 8.2: Main conclusions of the project

- Main scientific results summarized.
- A new knowledge base set for Reykjanes peninsula
- Which can feed into hazard models/assessments

Task 8.3: Scientific paper on WP8 reflecting the main conclusions of the project.

Deliverable: Submit paper draft using multi-disciplinary data

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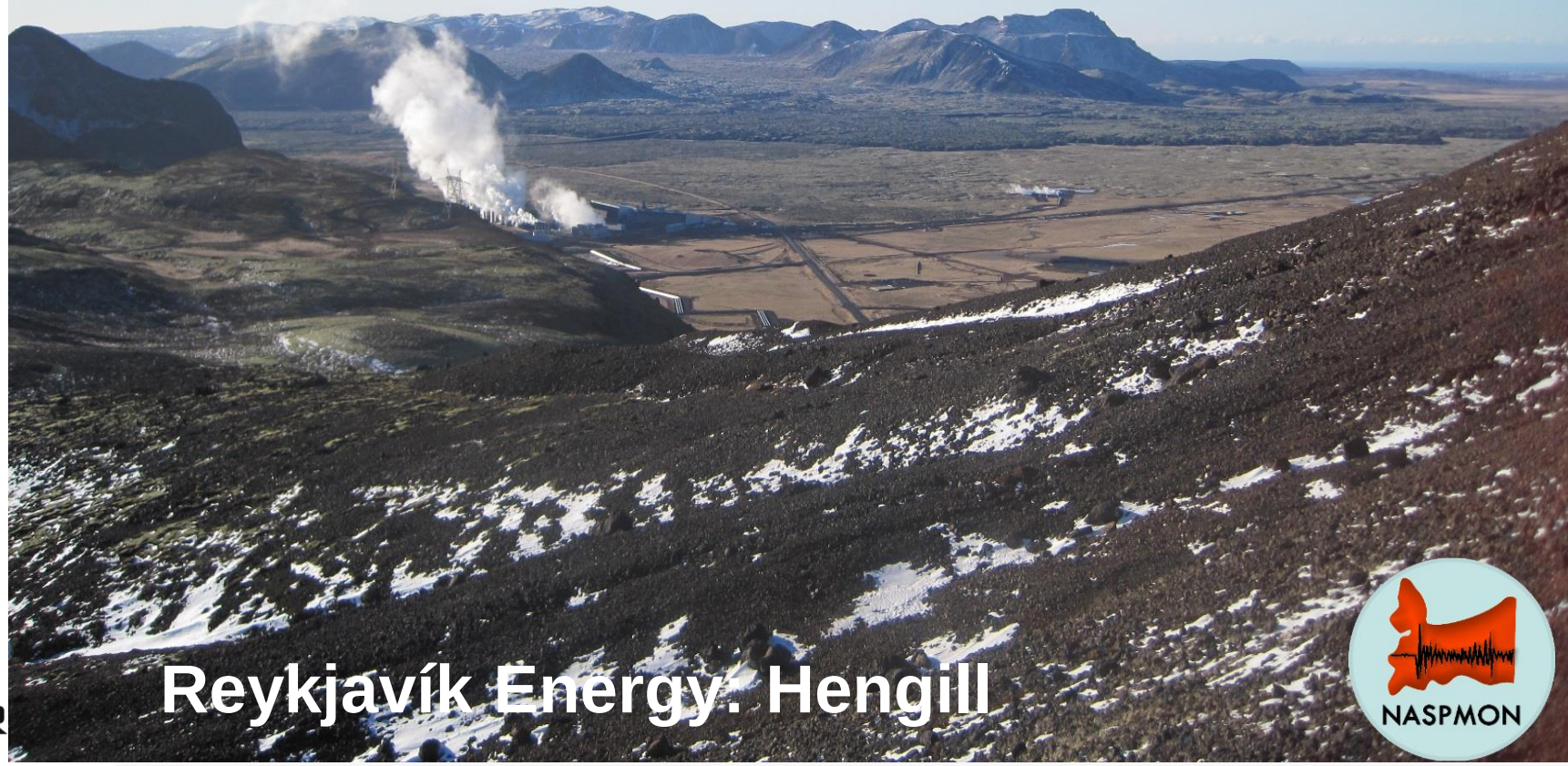
Extensive geothermal surface exploration studies exist from:
Hengill, Krýsuvík, Brennisteinsfjöll, Svartsengi/Eldvörp and Reykjanes

- Geological (1:100.000), geochemical and geophysical
- Resistivity - 3D models of MT data, gravity, aeromagnetics, seismics
- Within NASPMON we do want to add geophysical data in the study area

Deep drilling: Hengill, Krýsuvík, Svartsengi/Eldvörp, Reykjanes



Reykjavík Energy: Hengill

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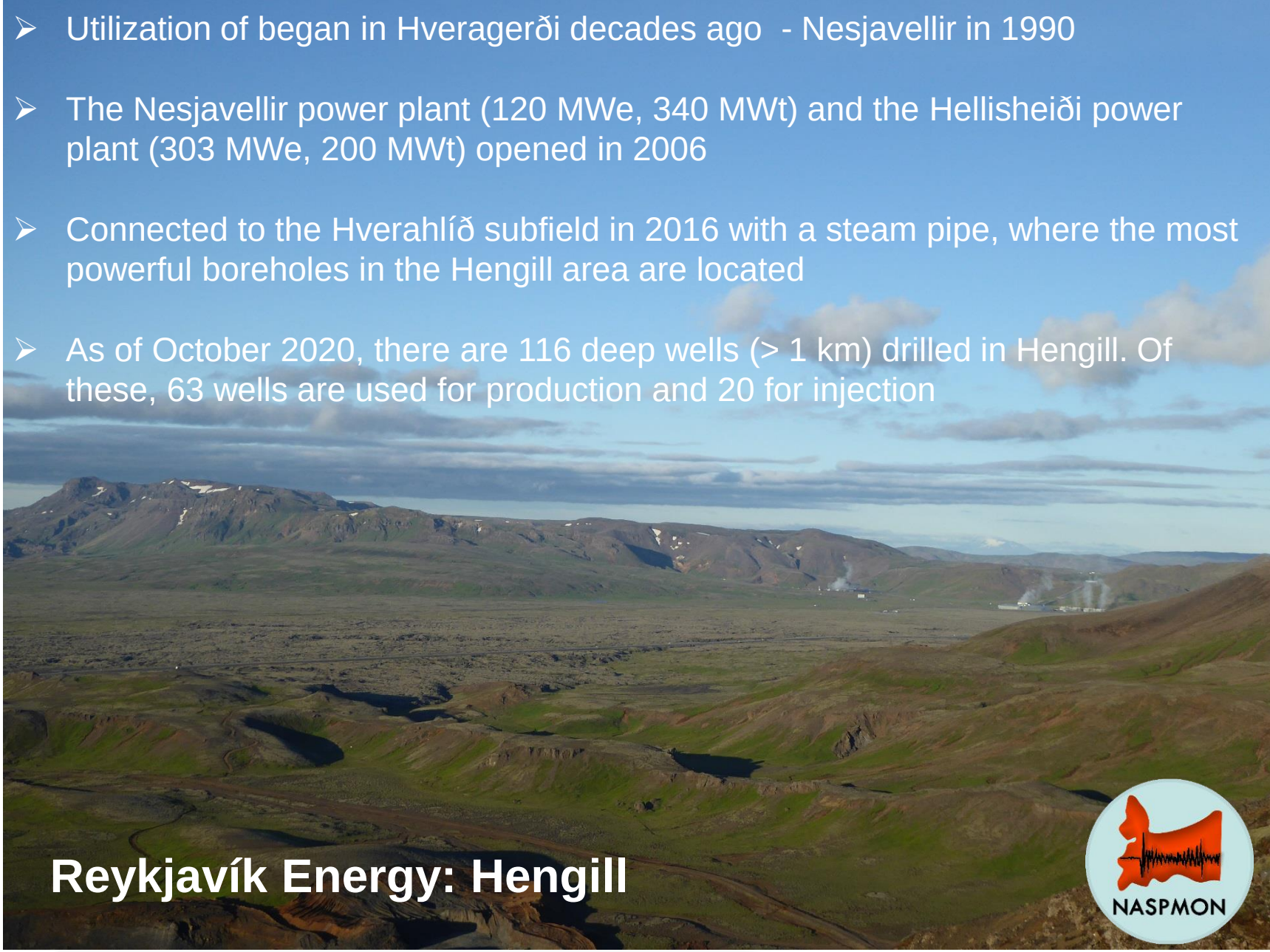
- Utilization of began in Hverageröi decades ago - Nesjavellir in 1990
- The Nesjavellir power plant (120 MWe, 340 MWt) and the Hellisheiði power plant (303 MWe, 200 MWt) opened in 2006
- Connected to the Hverahlíð subfield in 2016 with a steam pipe, where the most powerful boreholes in the Hengill area are located
- As of October 2020, there are 116 deep wells (> 1 km) drilled in Hengill. Of these, 63 wells are used for production and 20 for injection



Reykjavík Energy: Hengill

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HS Orka: Reykjanes Power Plant

Operating since 2006: 2 x 50 MWe

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Svartsengi:
Beginning in 1976: 150 MWth
Beginning in 1978: 74 MWe

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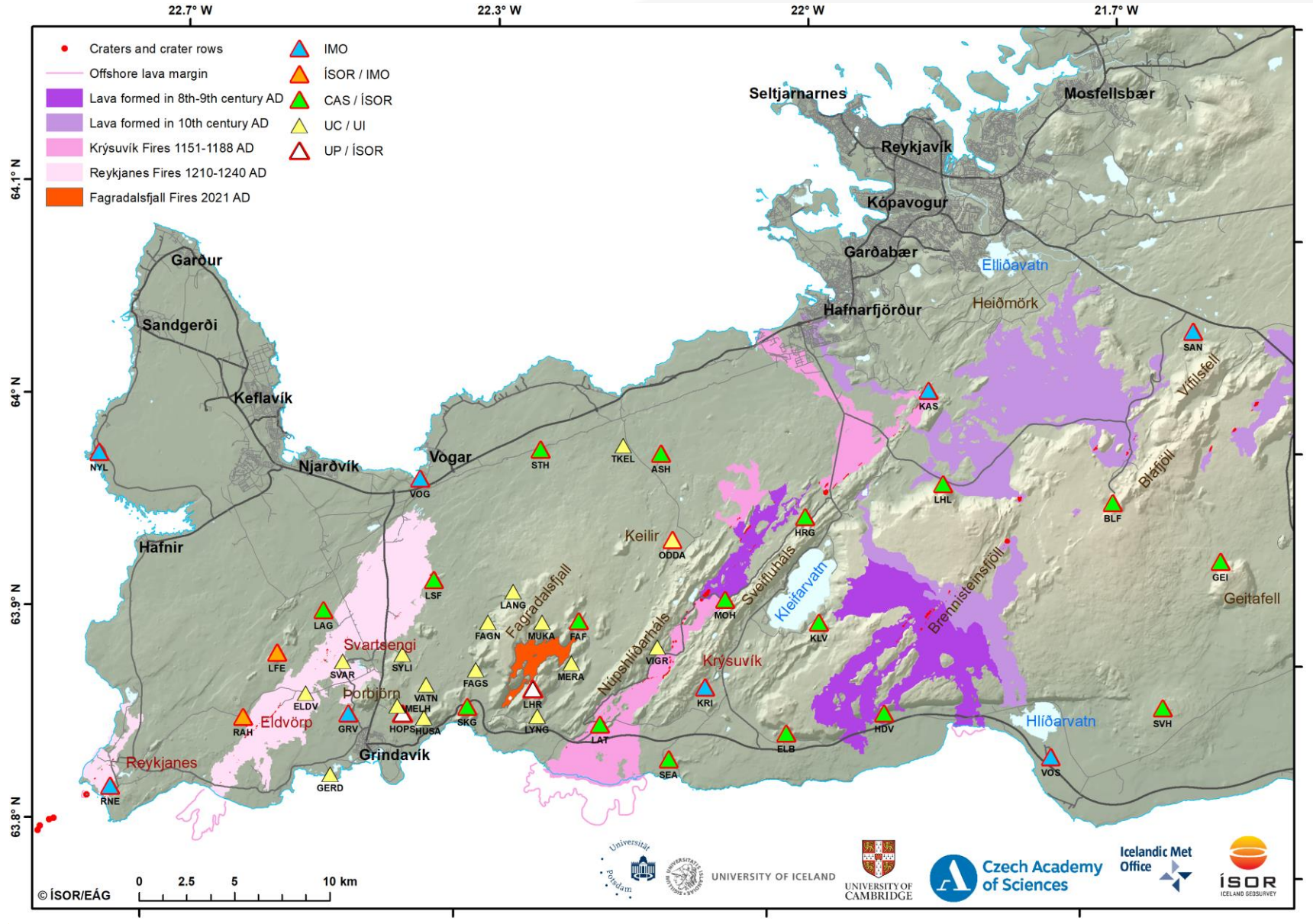
22.7° W
22.3° W
22° W
21.7° W
64.1° N
64° N
63.9° N
63.8° N
Craters and crater rows
Offshore lava margin
Lava formed in 8th-9th century AD
Lava formed in 10th century AD
Krýsuvík Fires 1151-1188 AD
Reykjanes Fires 1210-1240 AD
Fagradalsfjall Fires 2021 AD
IMO
ÍSOR / IMO
CAS / ÍSOR
UC / UI
UP / ÍSOR
Seltjarnarnes
Mosfellsbær
Reykjavík
Kópavogur
Garðabær
Hafnarfjörður
Garður
Sandgerði
Keflavík
Njarðvík
Vogar
Hafnir
Reykjanes
Eldvörp
Svartsengi
Þorbjörn
Grindavík
Keilir
Krýsuvík
Núpshlíðarháls
Fagradalsfjall
Sveifluháls
Kleifarvatn
Brennisteinsfjöll
Geitafell
Heiðmörk
Elliðavatn
Hlíðarvatn
Vífilsfell
Bláfjöll
NYL
VOG
STH
TKEL
ASH
LSF
LAG
LFE
SVAR
SYLI
ELDV
RAH
GRV
HOPS
VATN
MELH
HUSA
GERD
RNE
FAGN
LANG
MUKA
FAF
FAGS
MERA
LHR
SKG
LYNG
LAT
SEA
ODDA
VIGR
KRI
MOH
HRG
KLV
ELB
HDV
KAS
LHL
SAN
BLF
GEI
SVH
VOS
0
2.5
5
10 km
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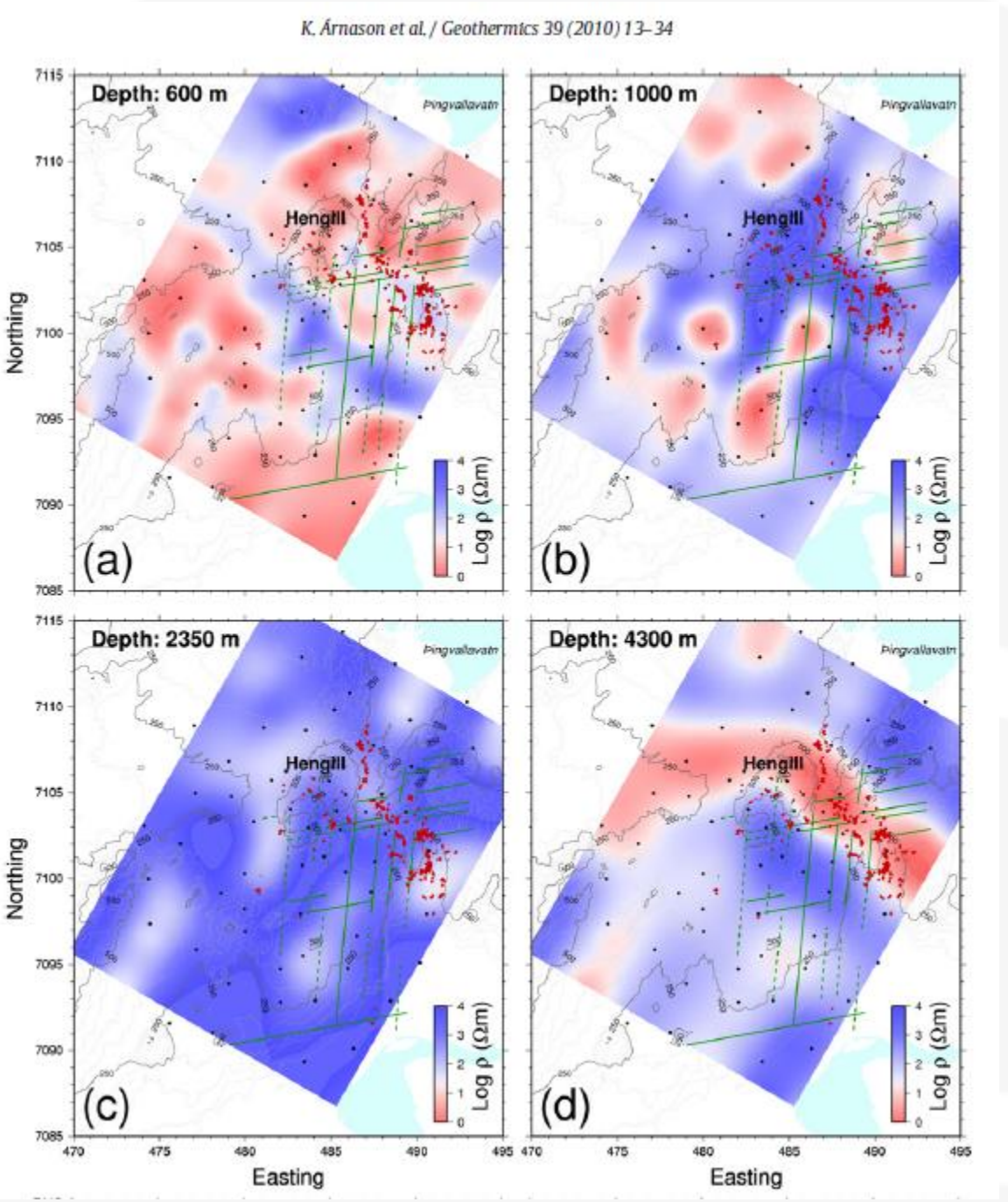
Hengill

Seismic surveys - RE

Resistivity – horizontal slices at different depths, based on 3D inversion of MT data

Red dots: geothermal surface manifestations
Black dots: MT soundings;
Green lines: faults inferred from seismic data

Taken from Árnason et al., 2010



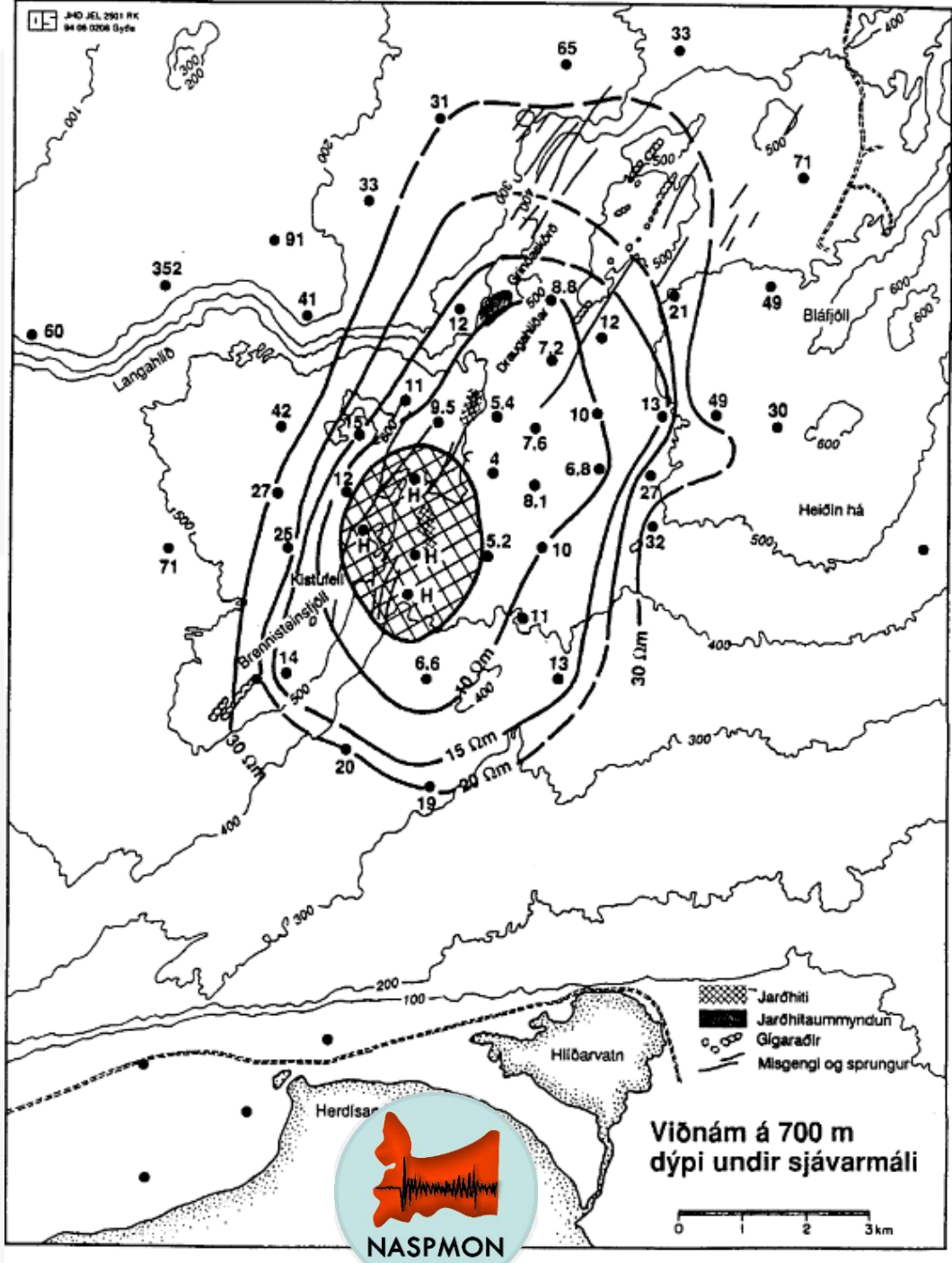
Brennisteinsfjöll:

Resistivity at 700 m below sea-level, based on TEM soundings

Geothermal surface manifestations and alteration are shown as well

No wells exist

Taken from: Karlsdóttir R., 1995



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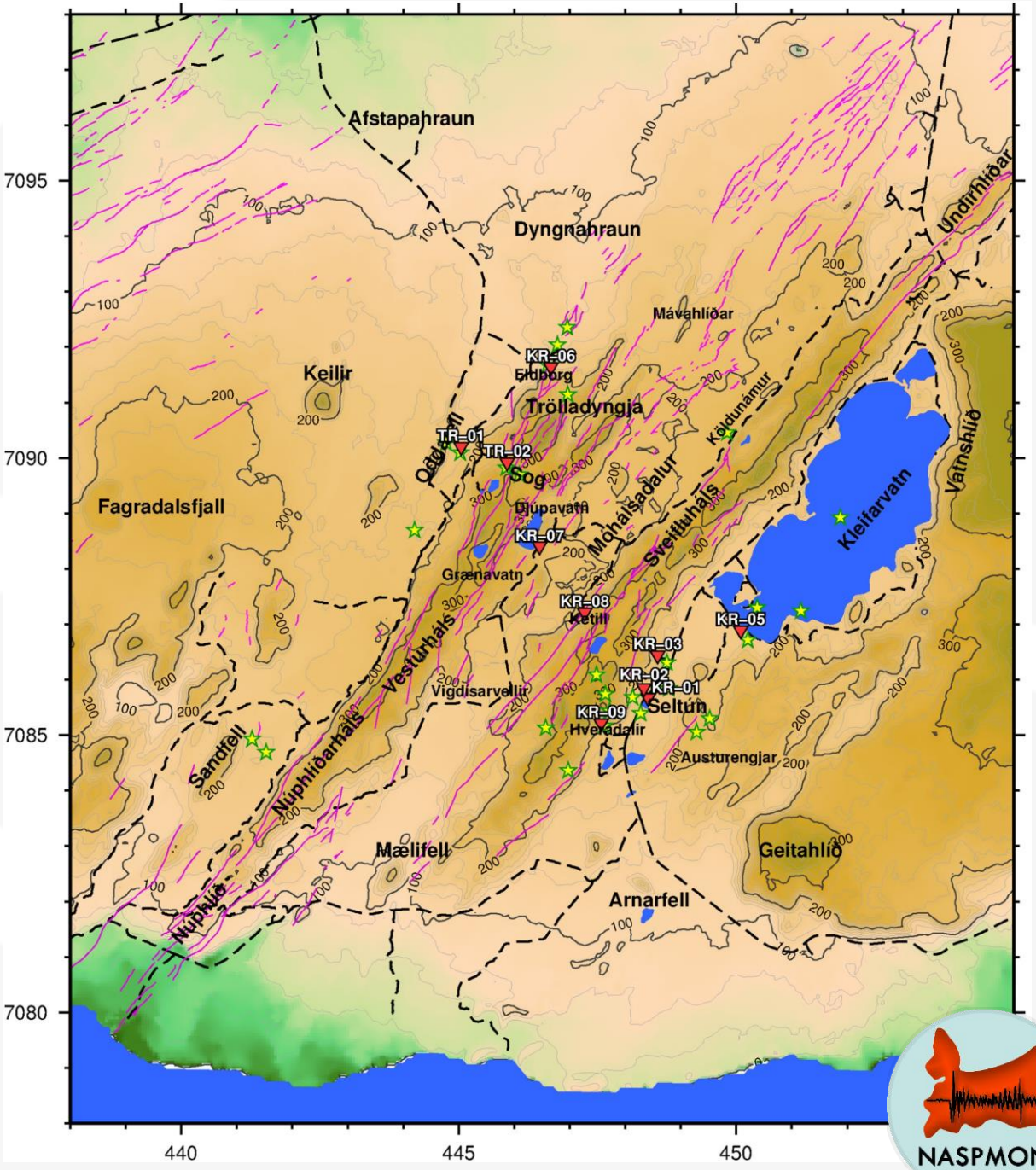
Krýsuvík:

Big plans for years

Resistivity model (3D), gravity, seismic studies



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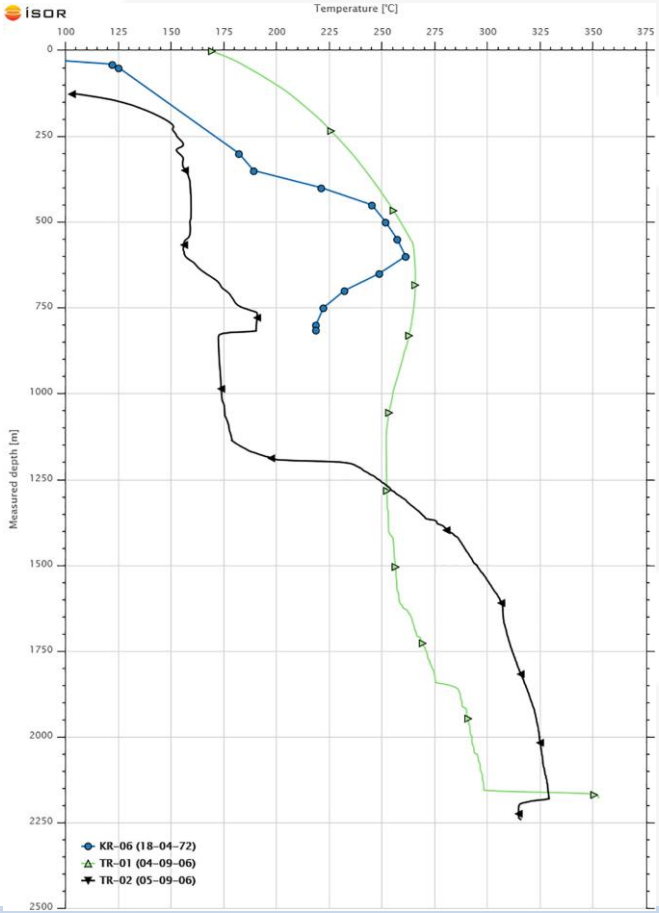
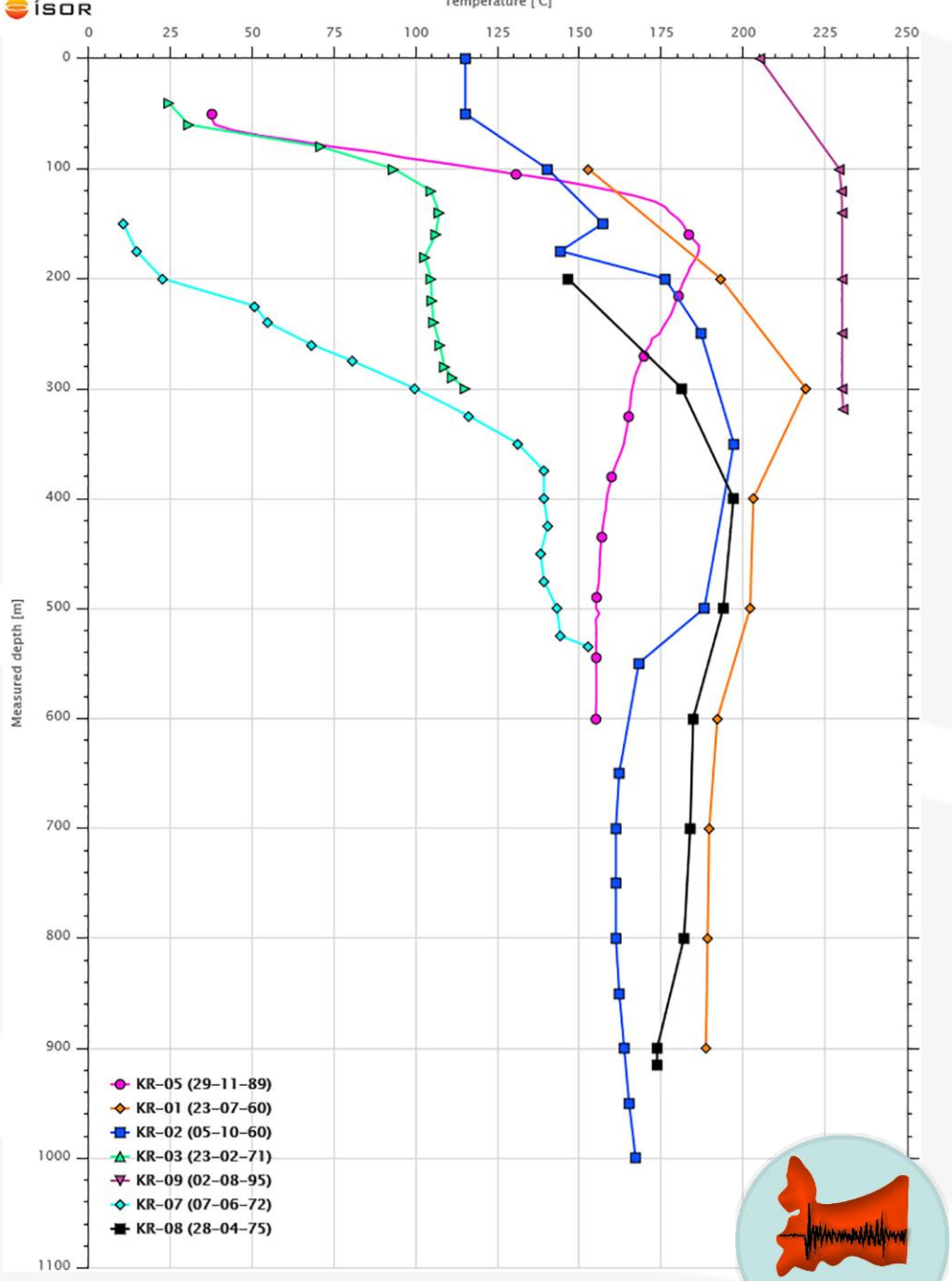
Krýsuvík:

Since 1941 some 34 boreholes have been drilled in the area until 2007, ranging in depth from < 100 m to 2307 m. Taken from Hersir et al., 2018





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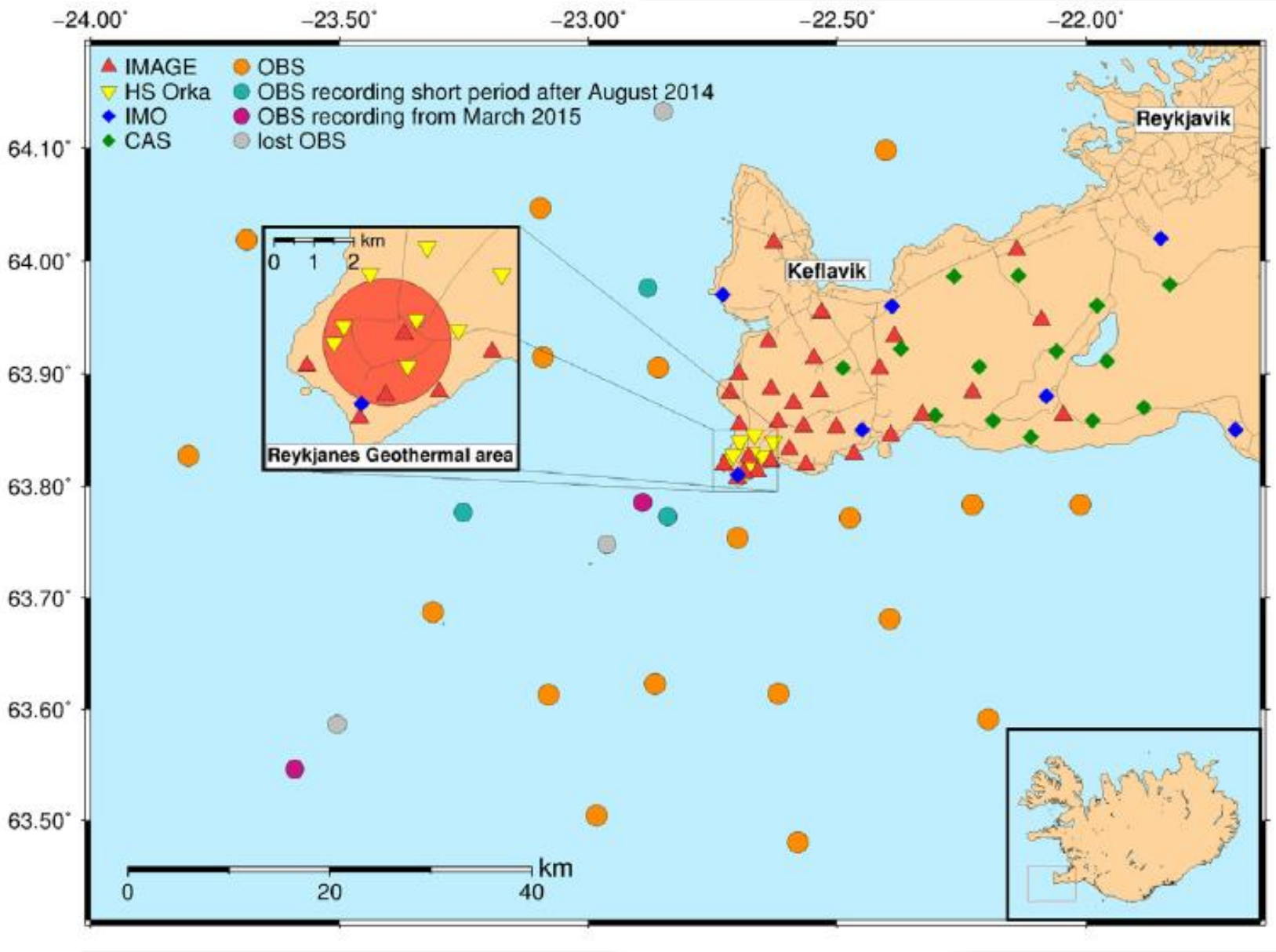

IMAGE: 30 (20 Trillium (120 s) + 10 Mark (1 Hz)) + 24 OBSs (30 s), 8 ISOR/HSOrka (Lennartz (5 s)), 7 IMO (Lennartz (5 s)), 15 CAS (Güralp (120 s)) – Recording: March/April 2014 – August 2015 (2000)

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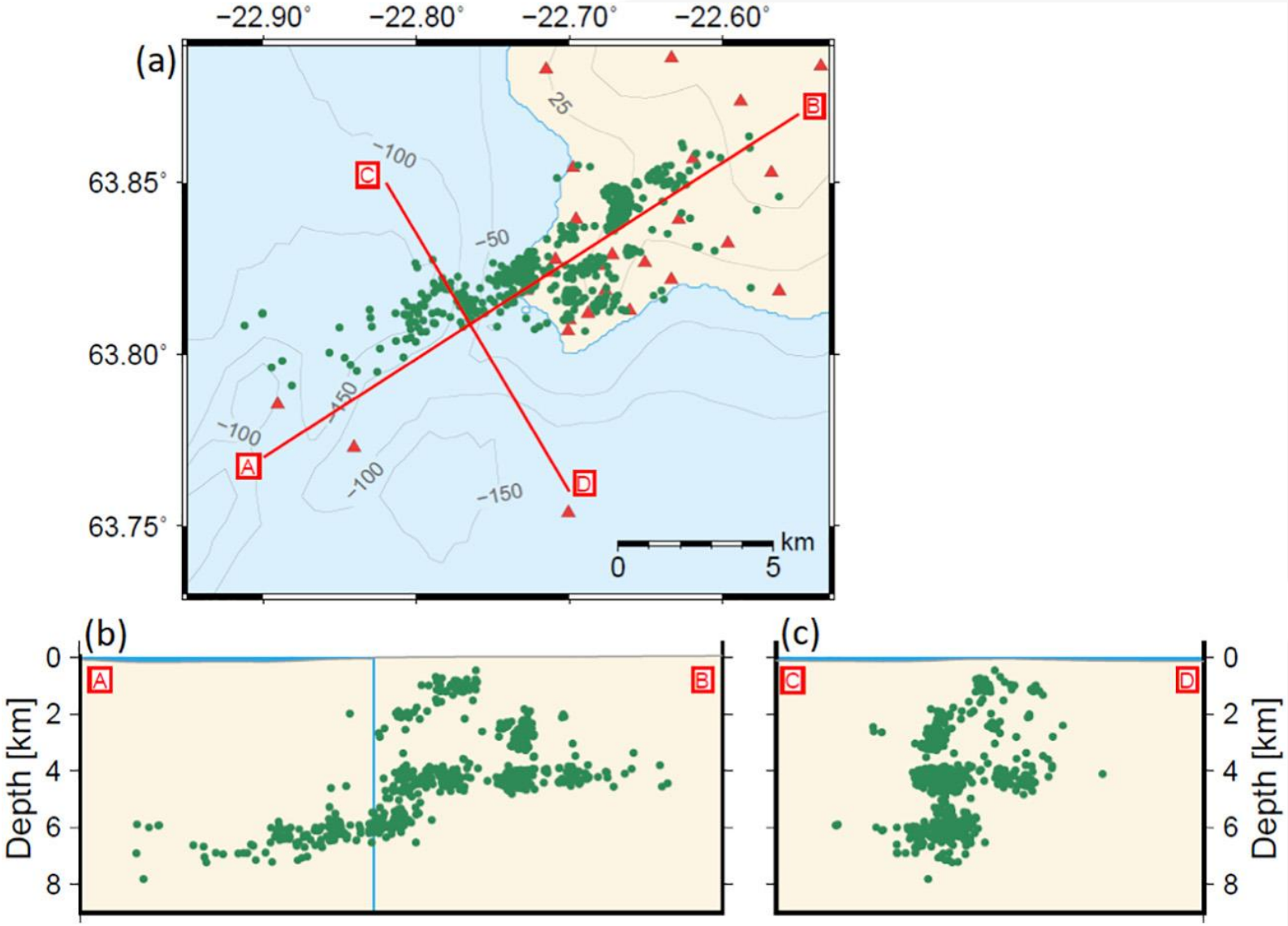

IMAGE:Distribution of the earthquakes, taken from Blanck et al., 2018

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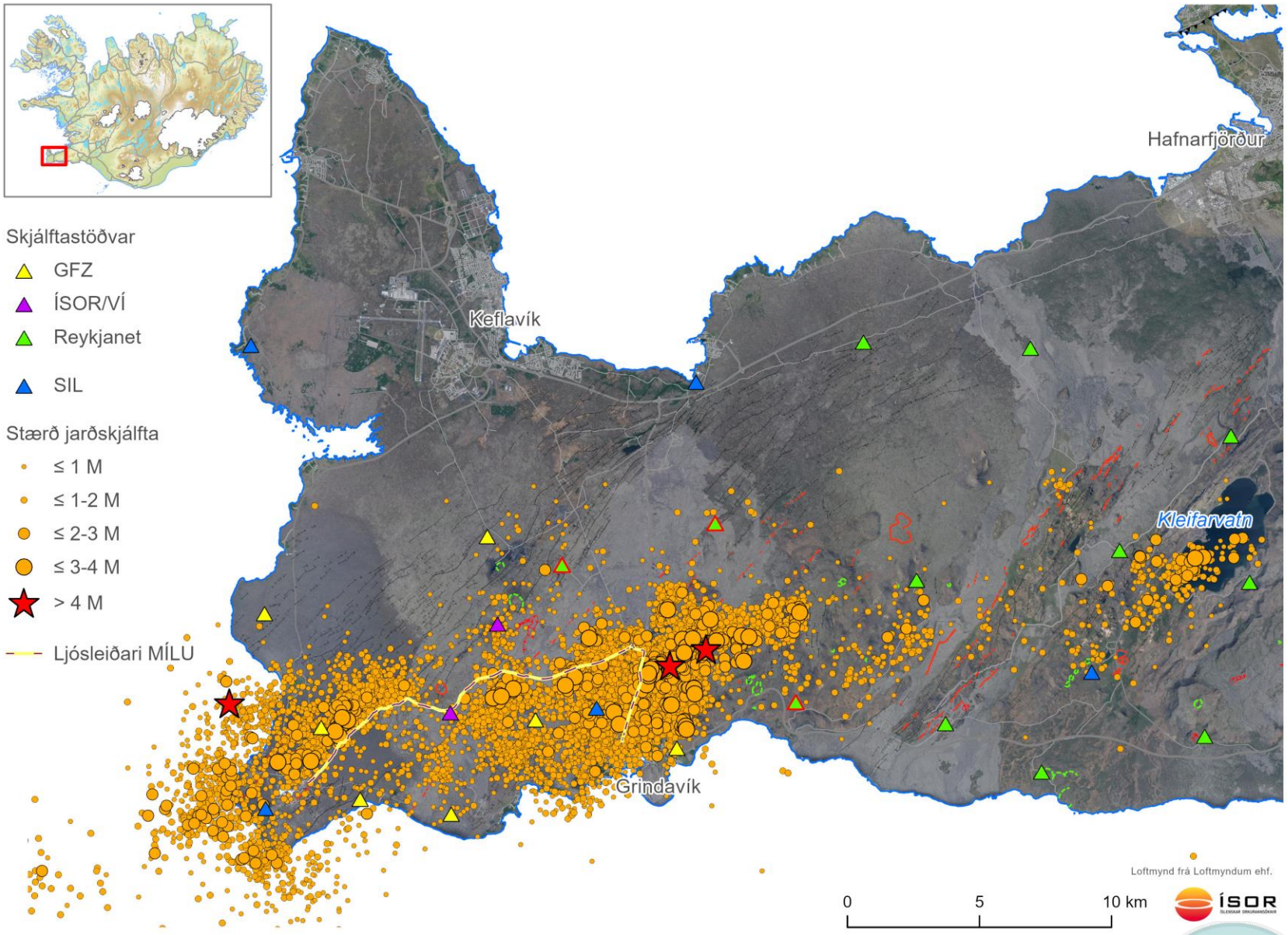

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Red triangels: ÍSOR/HS Orka – blue triangels DEEP-EGS
Running for one year 2016-2017:

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This was it - Thanks for the attention!

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