Veðurstofa Íslands

Vöktun á jarðvá með sérstöku tilliti til eldgosa

Steinunn S. Jakobsdóttir

Verkefnisstjóri jarðváreftirlits

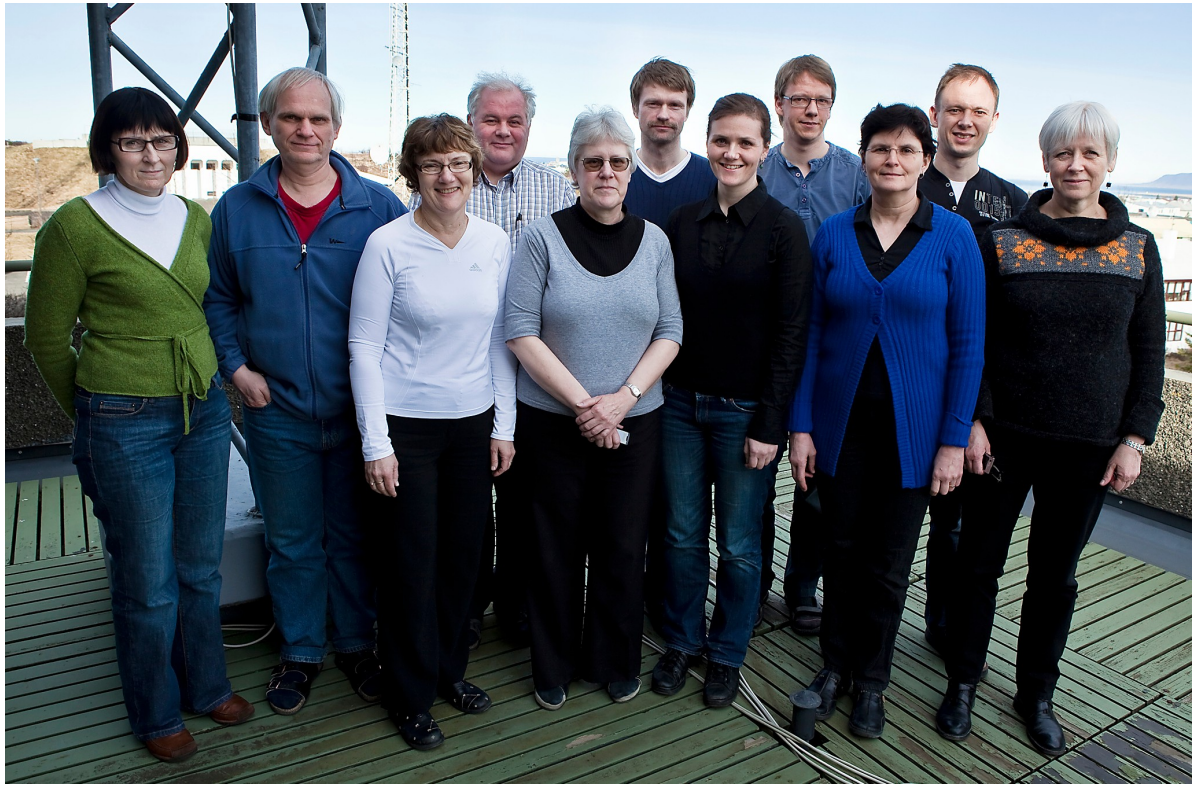
ssj@vedur.is

& jarðváreftirlitshópurinn

www.vedur.is

Jarðváreftirlitshópurinn

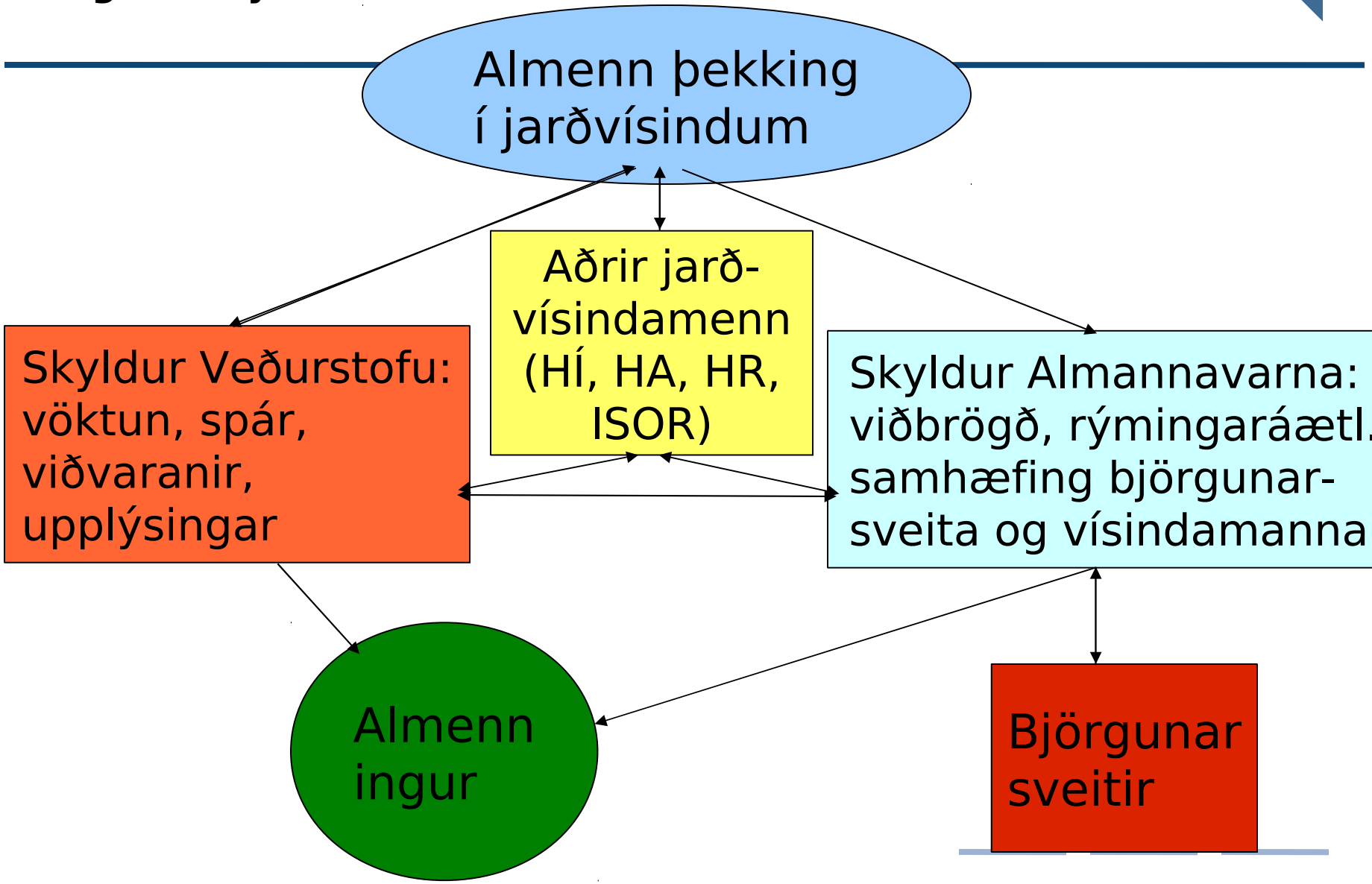
- Bergur H. Bergsson
- Bergþóra S. Þorbjarnardóttir
- Einar Kjartansson
- Gunnar B. Guðmundsson
- Hjörleifur Sveinbjörnsson
- Jósef Hólmjárn
- Kristín S. Vogfjörð
- Matthew J. Roberts
- Ólafur Stefán Arnarson
- Sighvatur K. Pálsson
- Sigurlaug Hjaltadóttir
- Sigþrúður Ármannsdóttir
- Þorgils Ingvarsson
- Þórunn Skaftadóttir



Jarðváreftirlit:

Löng hefð fyrir samvinnu við aðrar stofnanir

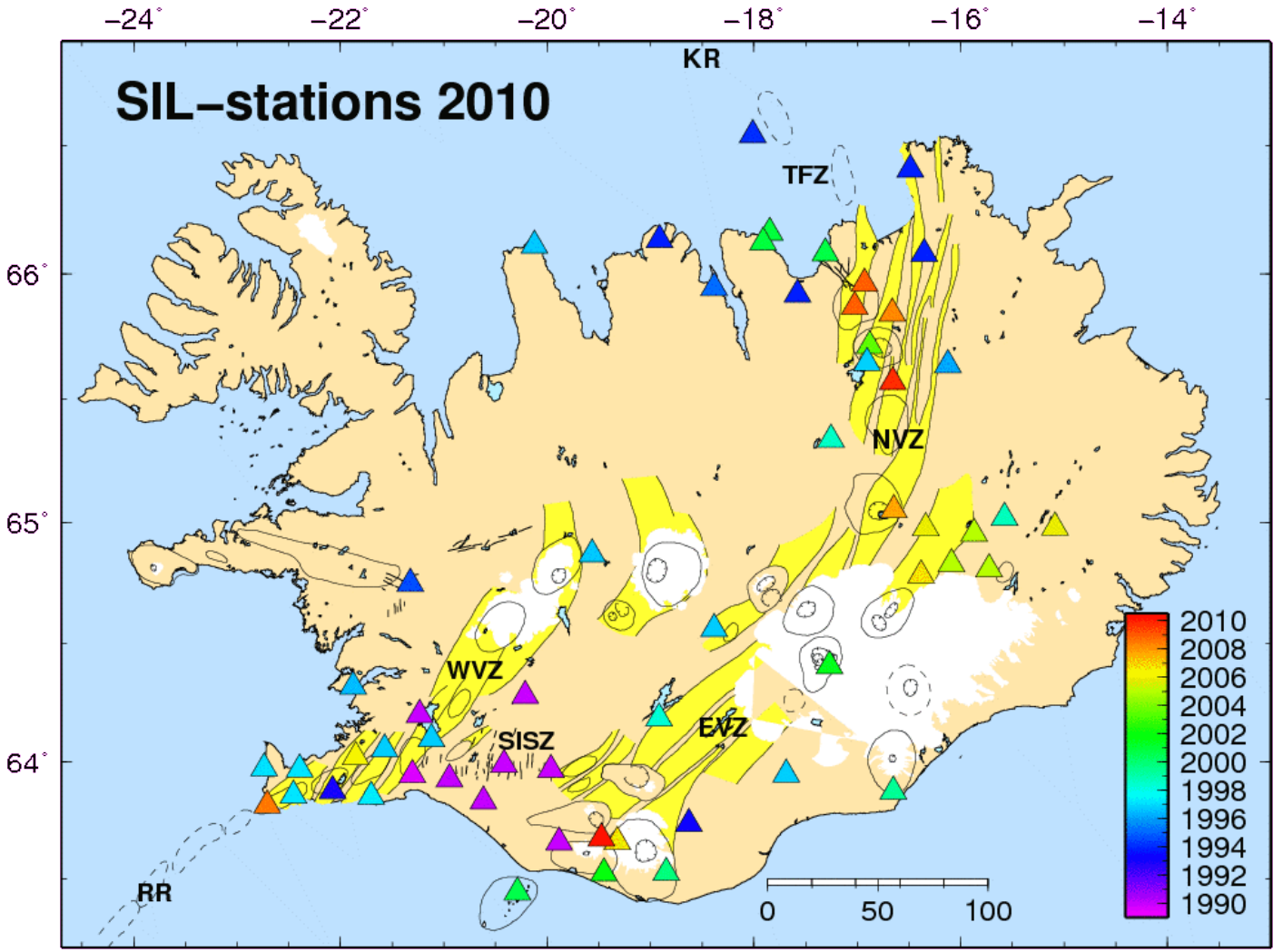
Veðurstofa Íslands



SIL-kerfið: net jarðskjálftamæla með sjálfvirkri úrvinnslu

Veðurstofa Íslands

57 stöðvar
2010



SIL-kerfið

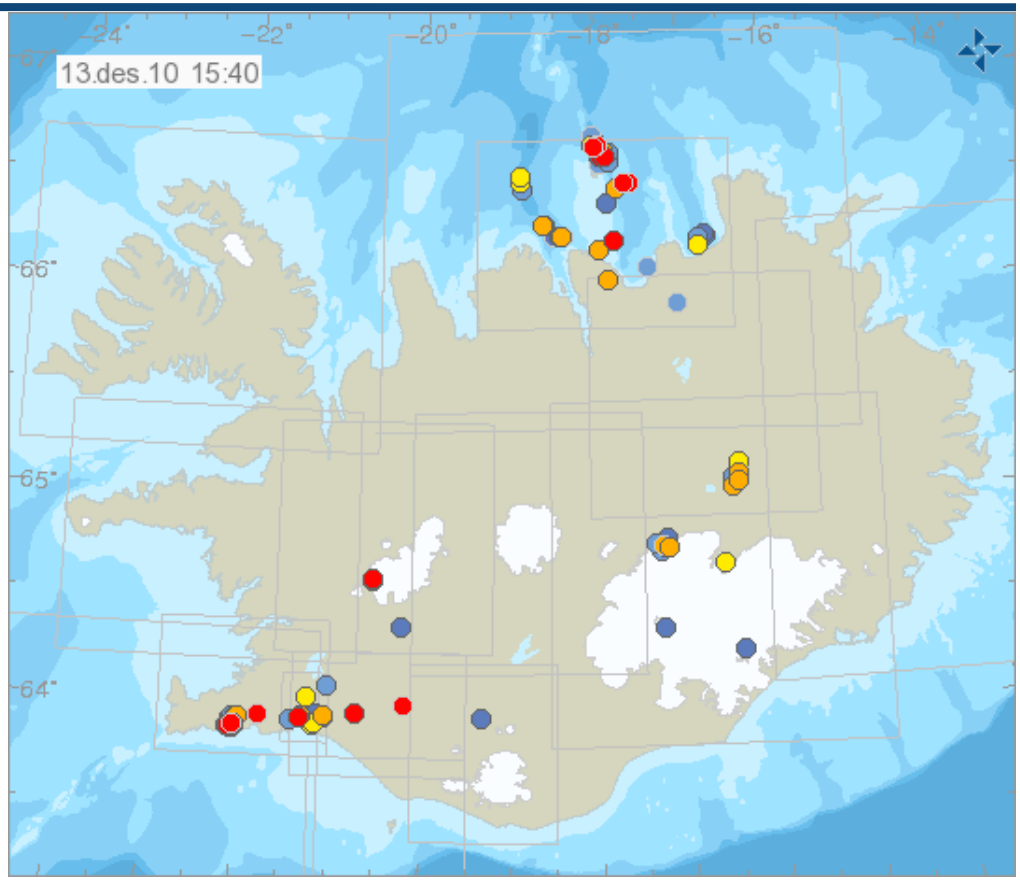
Veðurstofa Íslands

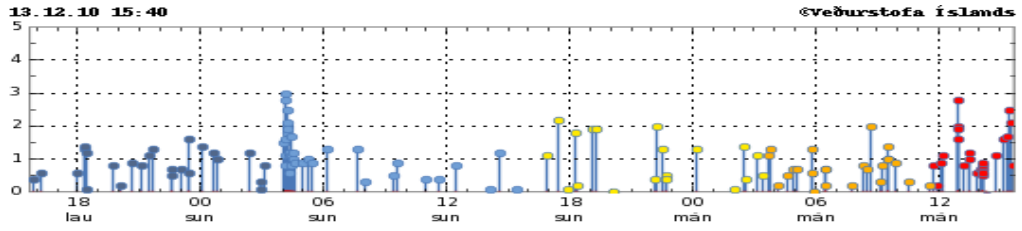
SJÁLFVIRKT:

- Finnur og staðsetur jarðskjálfta ~ > -1
- Metur stærð
- Reiknar brotlausnir
- Viðvörunarkerfi

HANDVIRKT:

- Kortlagning virkra jarðskjálftasprungna





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Sjálfvirkur jarðskjálftalisti

Veðurstofa Íslands

Nr.	Date	Time	Lat.	Lon.	Dep.	Ml	Quality
1	20051018	010440.6	63.920	-20.725	5.3	-0.2	16.65
2	20051018	012900.2	66.545	-17.667	16.7	2.1	90.01
3	20051018	022157.2	66.246	-16.669	2.9	1.2	15.67
4	20051018	032643.5	66.221	-17.431	10.7	1.5	90.01
5	20051018	054446.3	66.470	-17.588	0.2	1.0	65.53
6	20051018	085143.1	63.949	-21.284	6.4	1.3	61.57
7	20051018	103056.8	63.799	-20.378	7.0	0.9	82.14

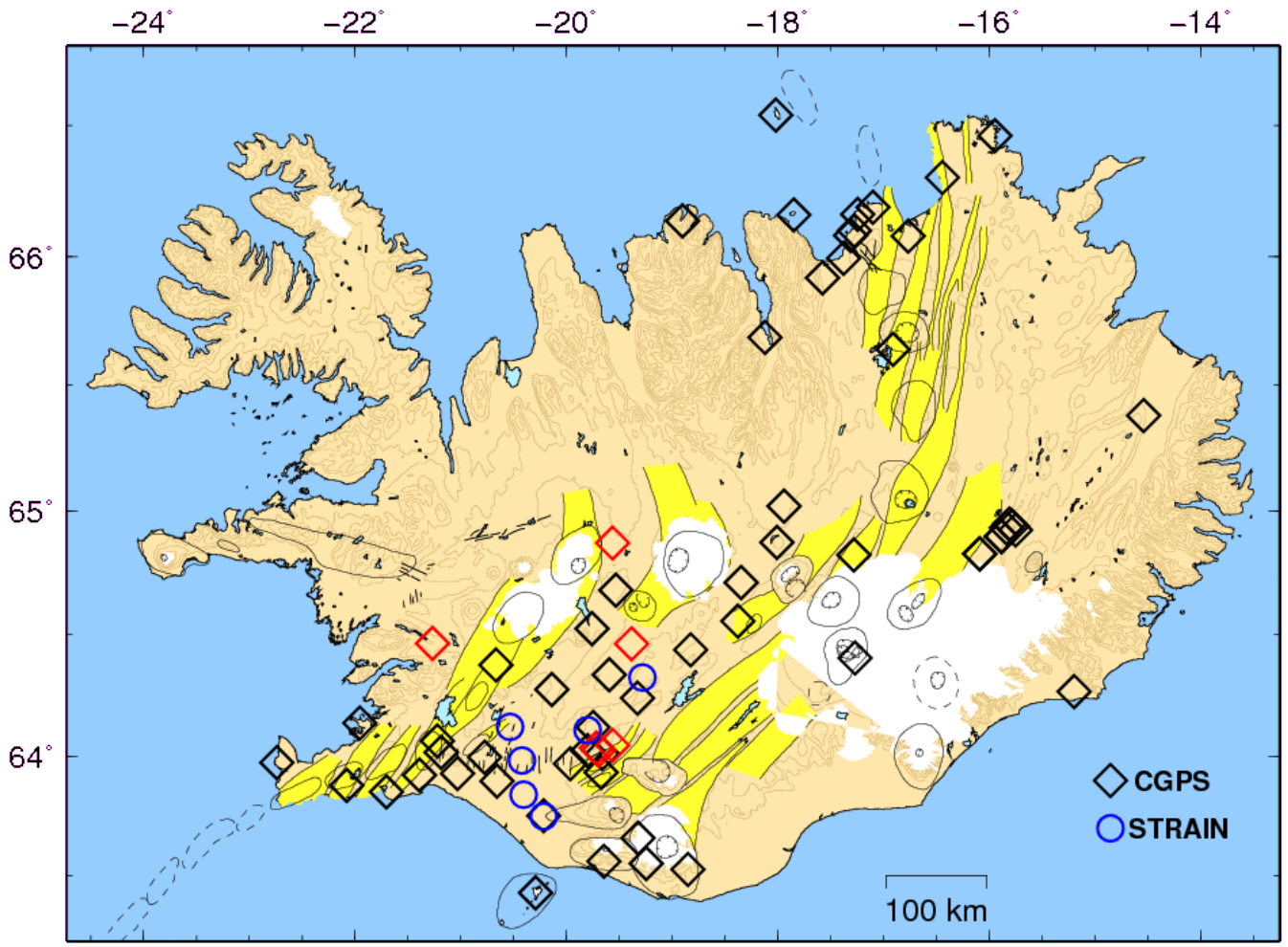
Stöðvar í GPS netinu - sískráning

Veðurstofa Íslands

CGPS senda gögn daglega

CGPS safna gögnum á staðnum

Þenslumælar

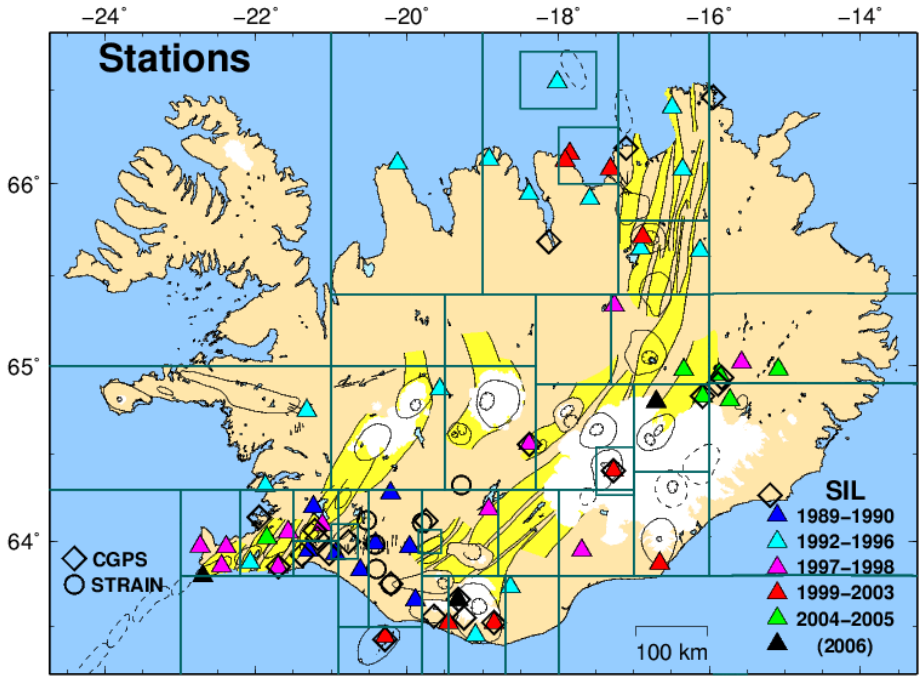


Viðvörunarkerfi

Veðurstofa Íslands

ALERT LEVEL	1	2	3	4	5	
MAGNITUDE	0.1	0.5	1.0	1.5	2.5	1
NUMEROFEQ	1	2	3	4	5	1
STRAINRATE	1.0e+04	5.0e+04	1.0e+05	5.0e+05	1.0e+07	1
NUMBERWEI	28	40	58	100	200	1
STRAINWEI	5.0e+05	1.0e+06	5.0e+06	1.0e+07	5.0e+07	1

-23.0	63.8	-22.2	64.3	0	25	Reykjanes
-22.2	63.8	-21.5	64.3	0	25	Kleifarvatn
-21.5	64.0	-20.9	64.3	0	25	Hengill
-21.5	63.8	-20.9	64.0	0	25	Olfus
-20.9	63.5	-20.5	64.3	0	25	Arnessysla
-20.5	63.5	-19.8	64.3	0	25	Rangarvalla
-19.8	63.9	-19.5	64.0	0	25	Hekla
-19.8	63.8	-18.8	64.3	0	25	Torfajokull
-19.8	63.2	-19.45	63.8	0	25	Eyjafjallajok
-18.8	63.8	-18.0	64.3	0	25	Veidivotn
-19.45	63.2	-18.8	63.8	0	25	Myrdalsjoku



Vöktunarstig:

1) Langtíma viðvörun: Tímaskali ár/mánuðir .

Auka við vöktun og rannsóknir. Styrkja byggingar.

2) Viðvörun um auknar líkur: Vikum/dögum fyrir atburð..

Almannavarnir dusta rykið af viðbúnaðar- og rýmingaáætlunum. Almenningur beðinn um að kynna sér viðbrögð við yfirvofandi náttúruvá.

3) Skammtíma viðvaranir: Klukkutímun/mínútum fyrir atburð.

Allir sem hlut eiga að máli búa sig undir að yfirvofandi vá bresti á. Almannavarnir opna stjórnstöð og vísindamenn vakta svæðið og sinna ráðgjöf. Björgunarsveitir settar í viðbragðsstöðu og hættusvæði rýmd.

4) Rauntíma viðvörun: Jarðskjálfti/eldgos hefst.

Framkvæmt rauntíma mat á staðsetningu og umfangi jarðvár og á mögulegu umfangi skemmda út frá þessum upplýsingum. Við matið er einnig byggt á þekkingu og reynslu frá eldri atburðum. Fyrsta skipulag björgunarstarfs byggir á þessu mati.

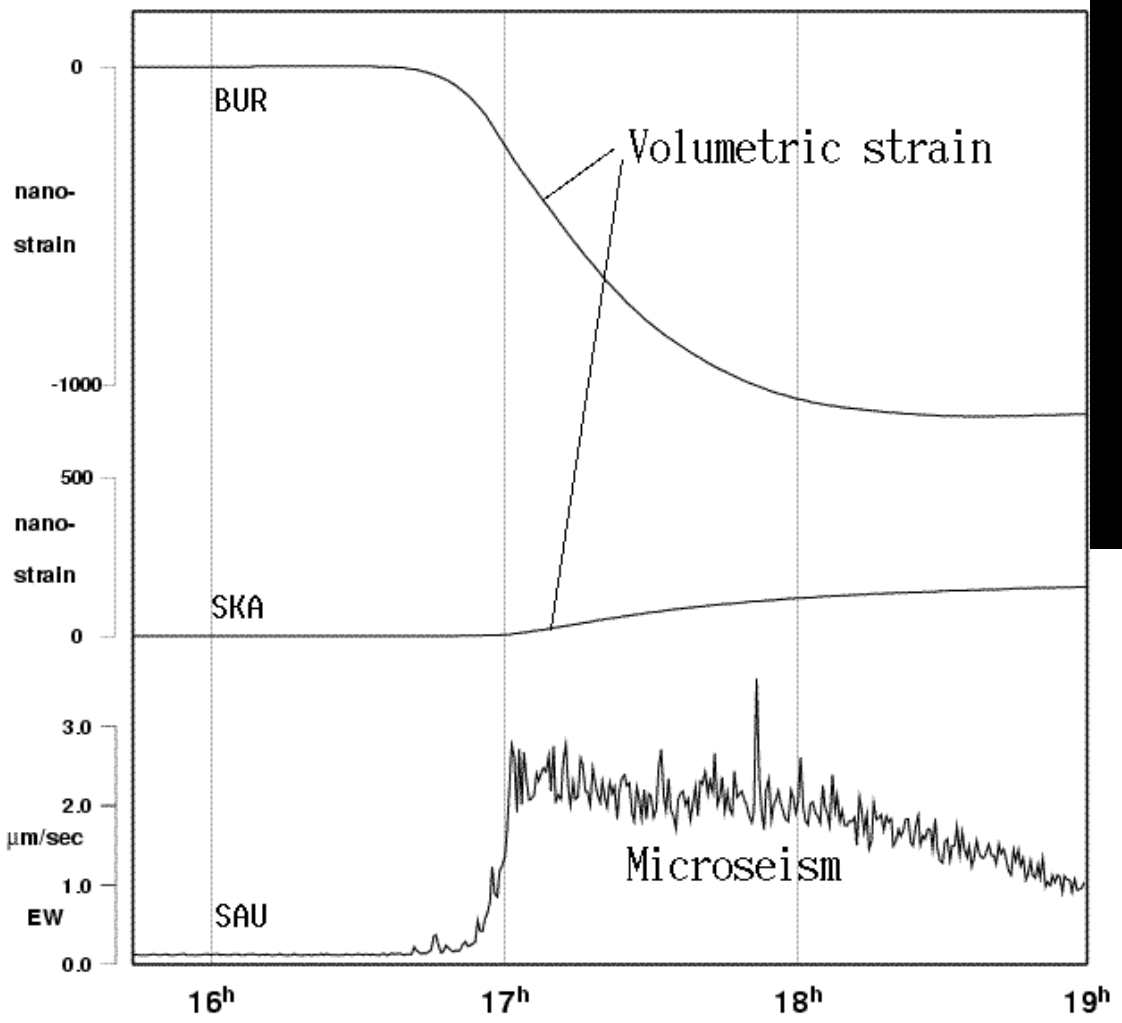
5) Eftirvinnsla.

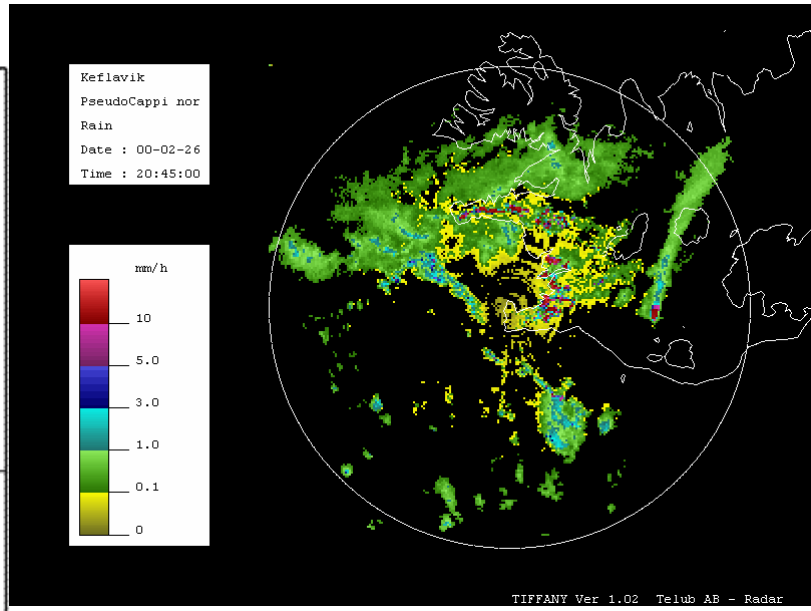
Eftir að atburður er yfirstaðinn er hann rannsakaður til að reynslan nýtist við næsta atburð.

Atburðir síðan 2000

Heklugos, 26. febrúar 2000	~ 1 klst
M~ 6,6 jarðskjálfti, 17. júní 2000	Lang tíma
M~ 6,6 jarðskjálfti, 21. júní 2000	~26 klst
Skeiðarárhlaup, 29. október 2004	~24 klst
Grímsvatnagos, 1. nóvember 2004	~ 2 vikur
Skaftárhlaup, 1. Ágúst 2005	~ 60 klst
Krossskjálfti, 29. maí 2008	Lang tíma
Fimmvörðuháls, 20. mars 2010	~ 2 vikur
Eyjafjallajökull, 14. apríl 2010	~ 1 klst

Heklugosið 17. janúar 1991

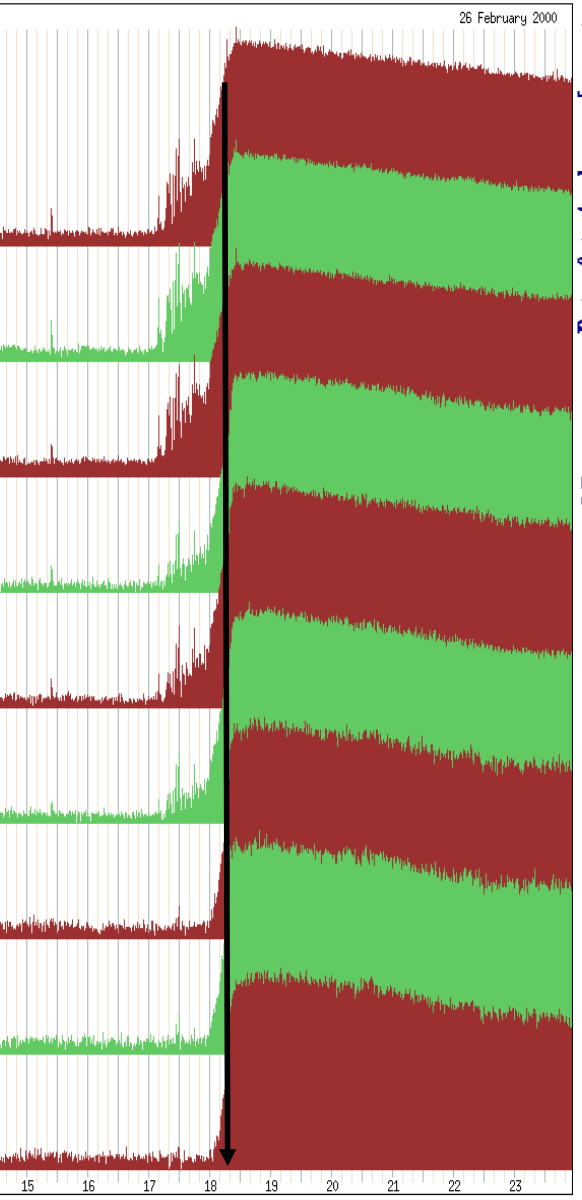


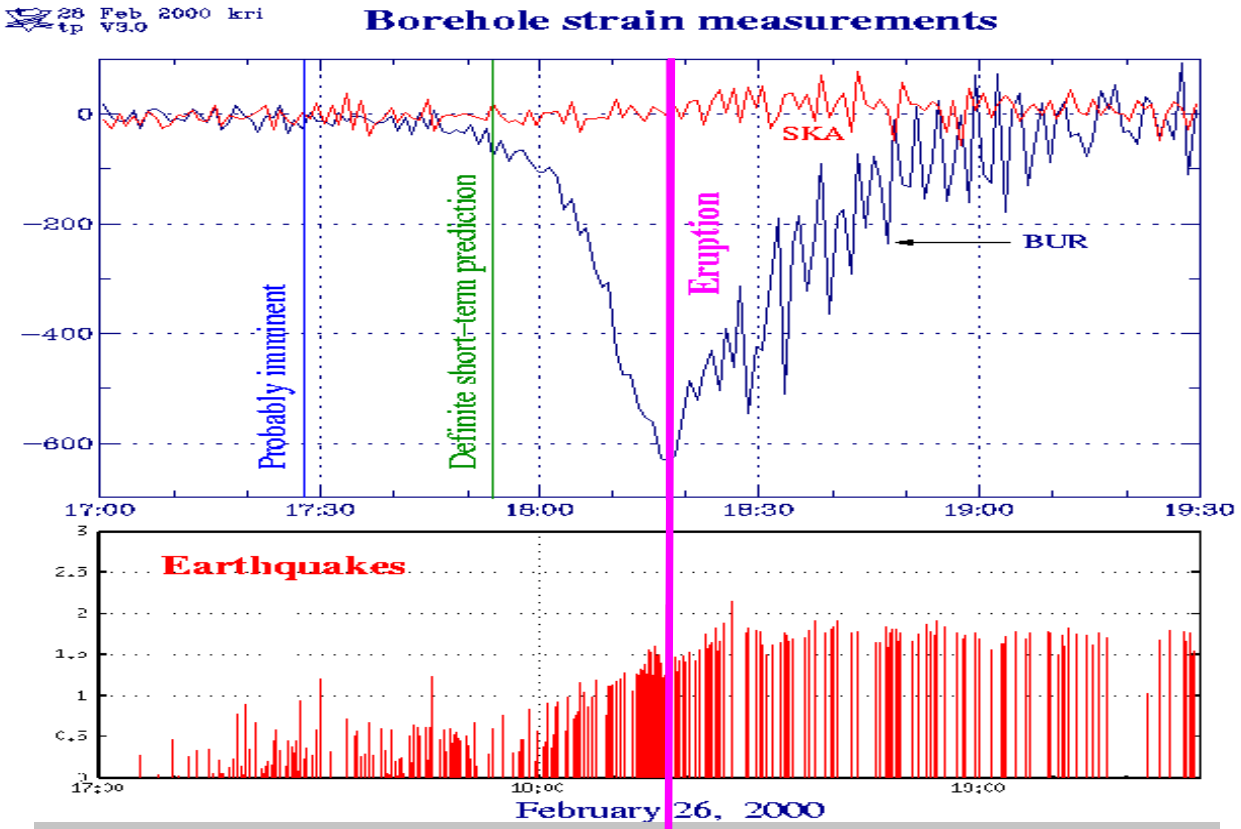


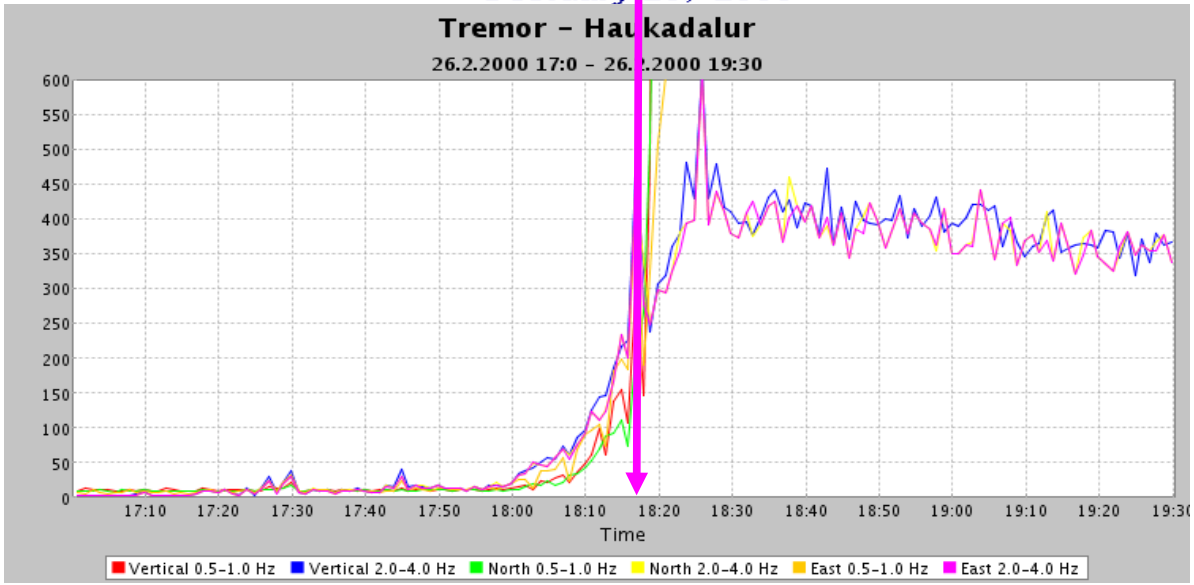
þenslumælar við Búrfell og Geldingaá

austur-vestur hreyfing á jarðskjálftamæli í 35 km fjarlægð frá Heklu.

Hekla 2000

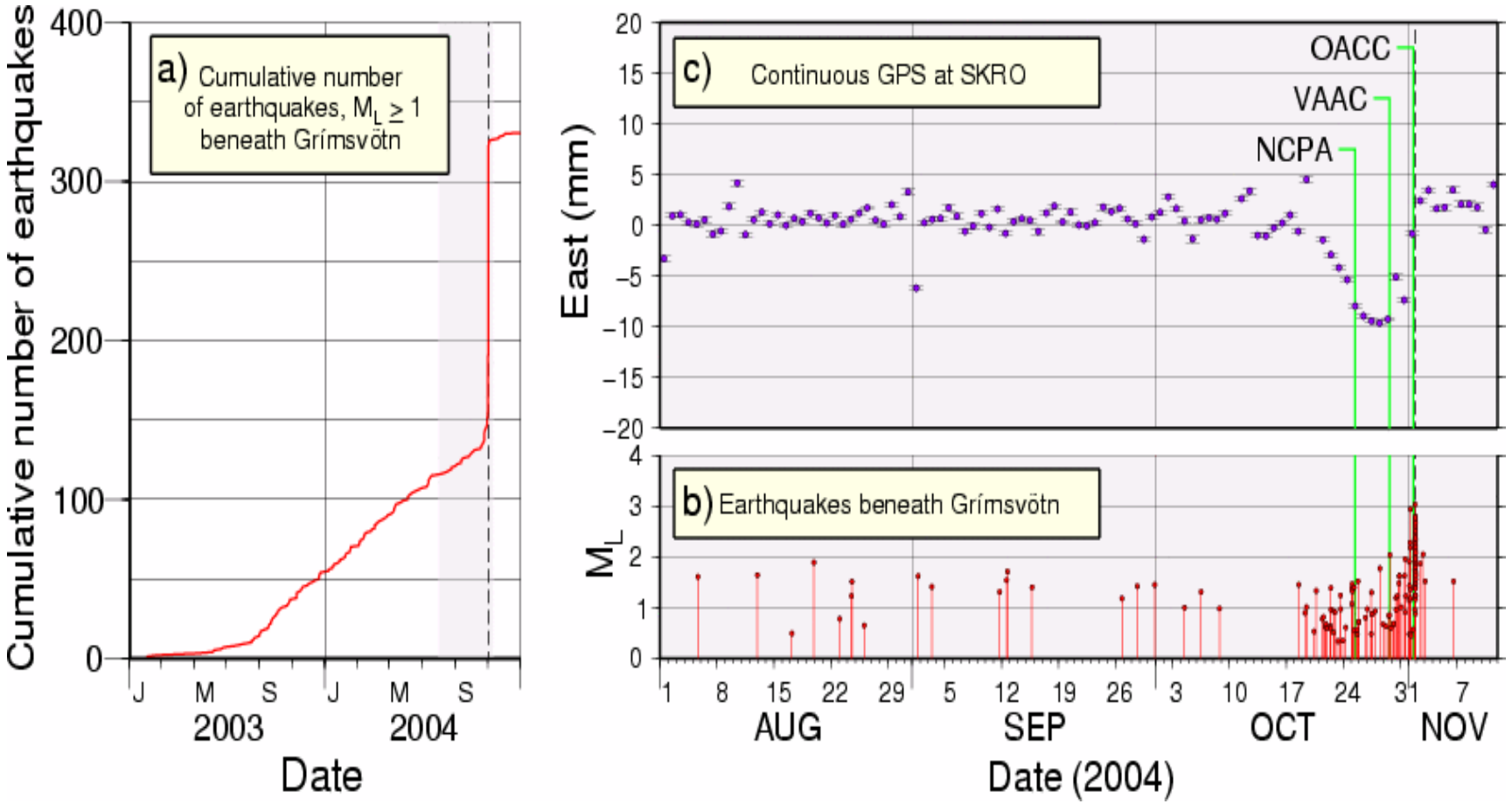

26 February 2000
Rate of strain changes [nanostrain/hour]
15
16
17
18
19
20
21
22
23


28 Feb 2000 kri
tp V3.0
Borehole strain measurements
SKA
BUR
Probably imminent
Definite short-term prediction
Eruption
0
-200
-400
-600
17:00
17:30
18:00
18:30
19:00
19:30
Earthquakes
MI
February 26, 2000


Tremor - Haukadalur
26.2.2000 17:0 - 26.2.2000 19:30
600
550
500
450
400
350
300
250
200
150
100
50
0
17:10
17:20
17:30
17:40
17:50
18:00
18:10
18:20
18:30
18:40
18:50
19:00
19:10
19:20
Time
Vertical 0.5-1.0 Hz
Vertical 2.0-4.0 Hz
North 0.5-1.0 Hz
North 2.0-4.0 Hz
East 0.5-1.0 Hz
East 2.0-4.0 Hz

GPS á Skrokköldu - skjálftavirkni í Grímsvötnum 2003 - 2004

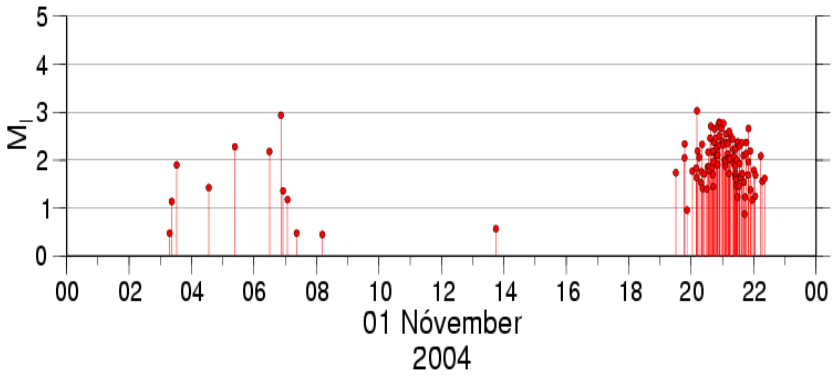
Veðurstofa Íslands

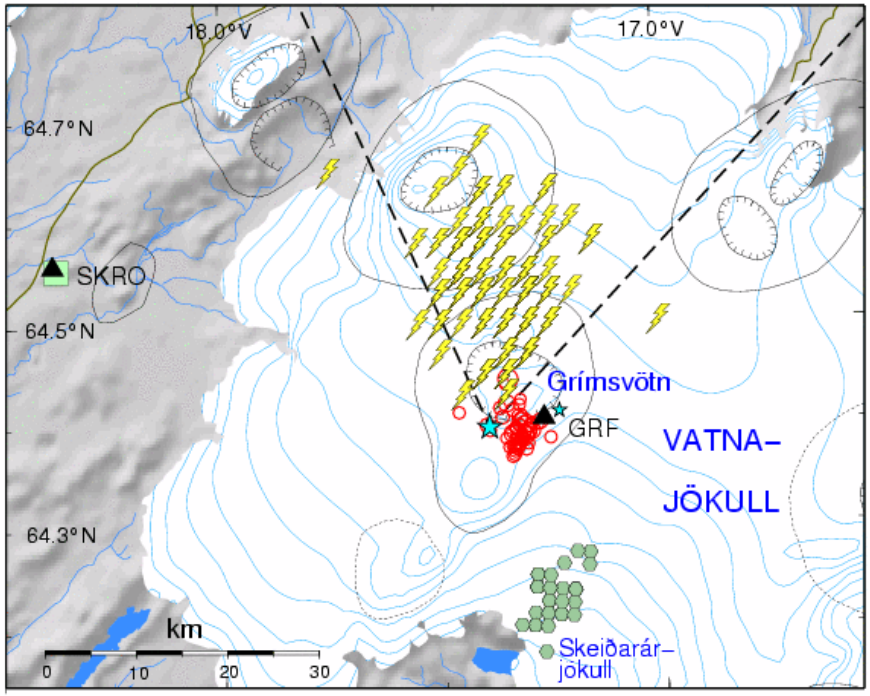


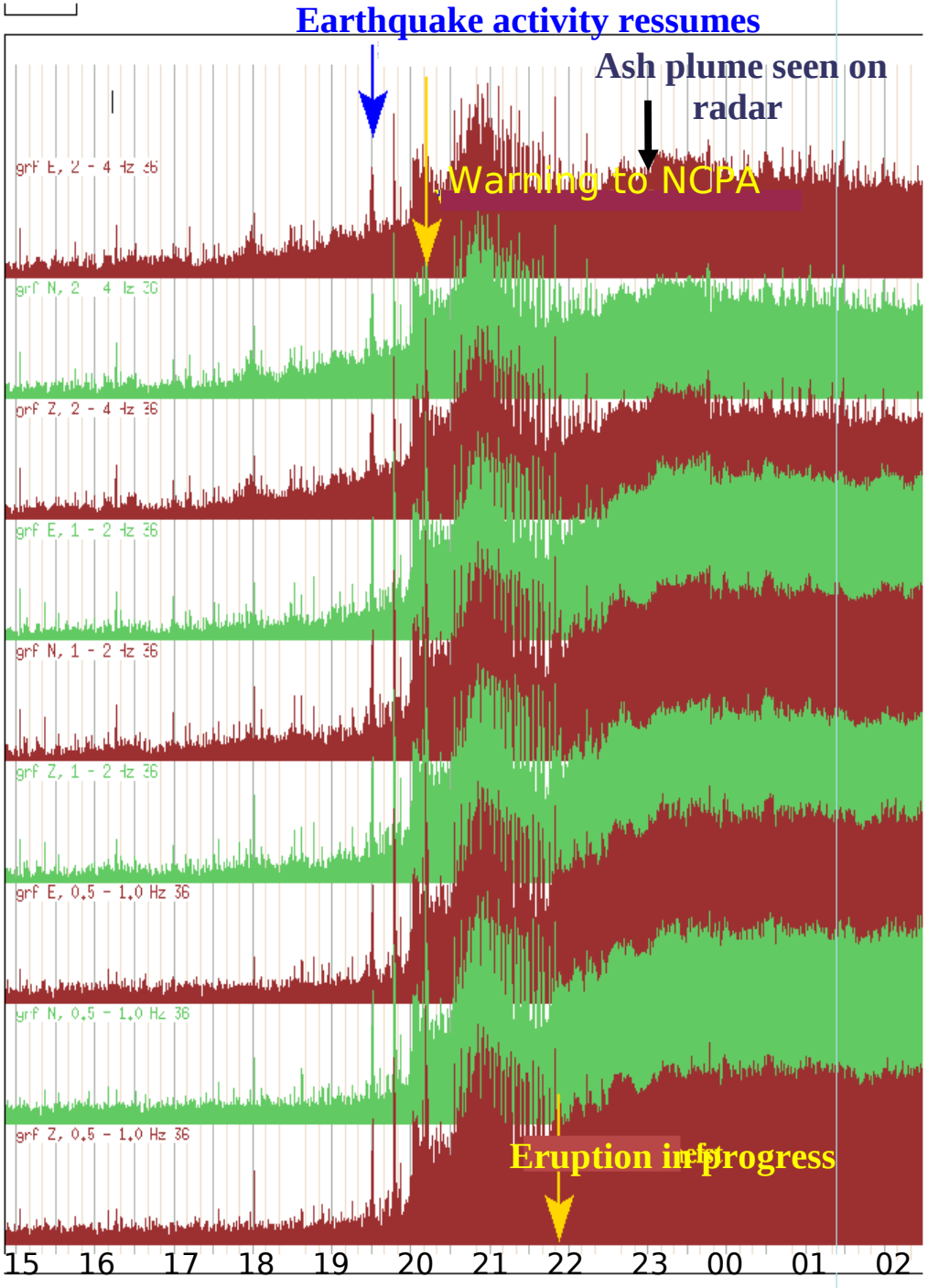
Calling:

NCPA - National Civil Protection Agency
VAAC - Volcanic Ash Advisory Center (London)
OACC - Oceanic Area Control Center (Reykjavík)

Eldgos í Grímsvötnum 2004

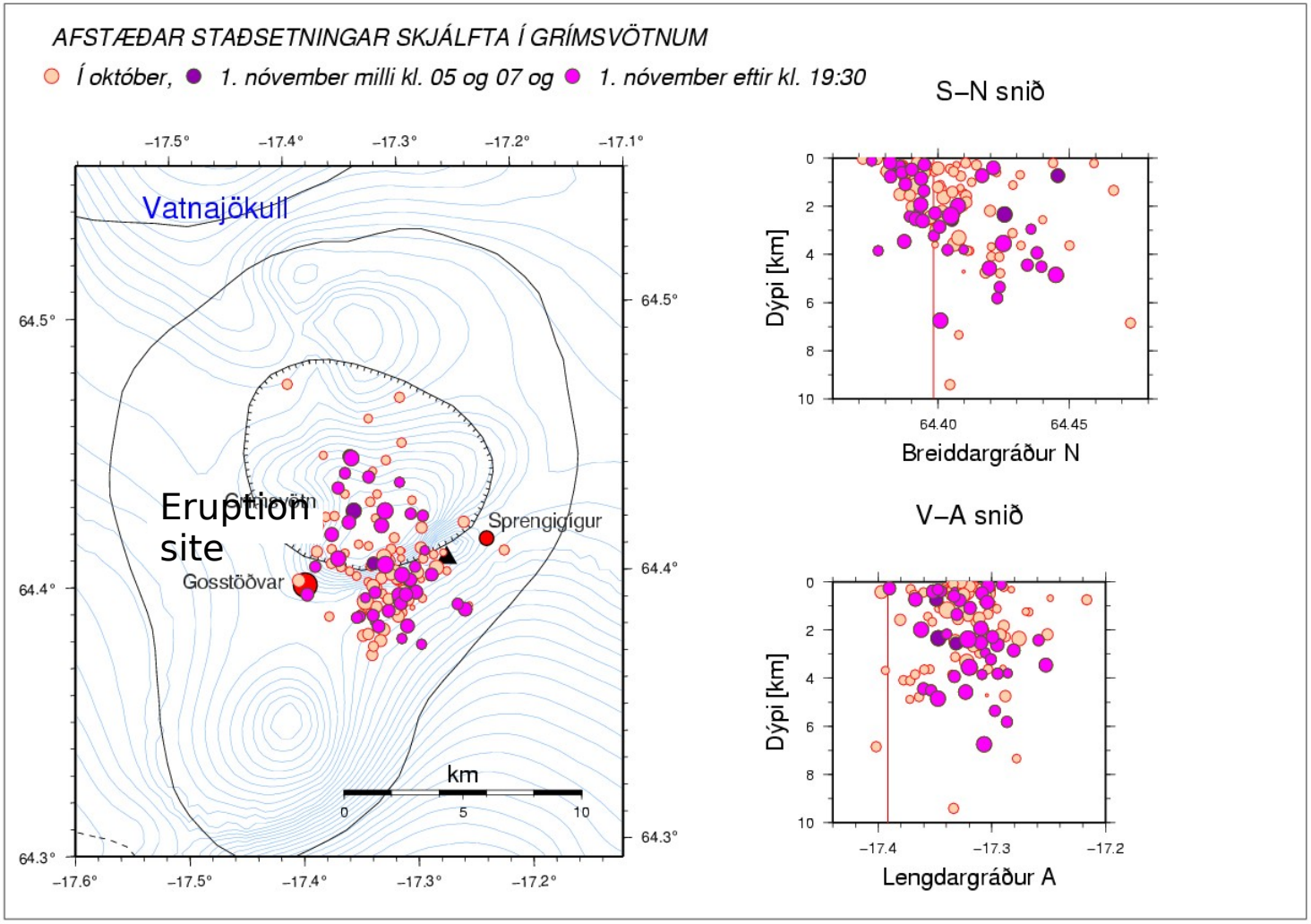






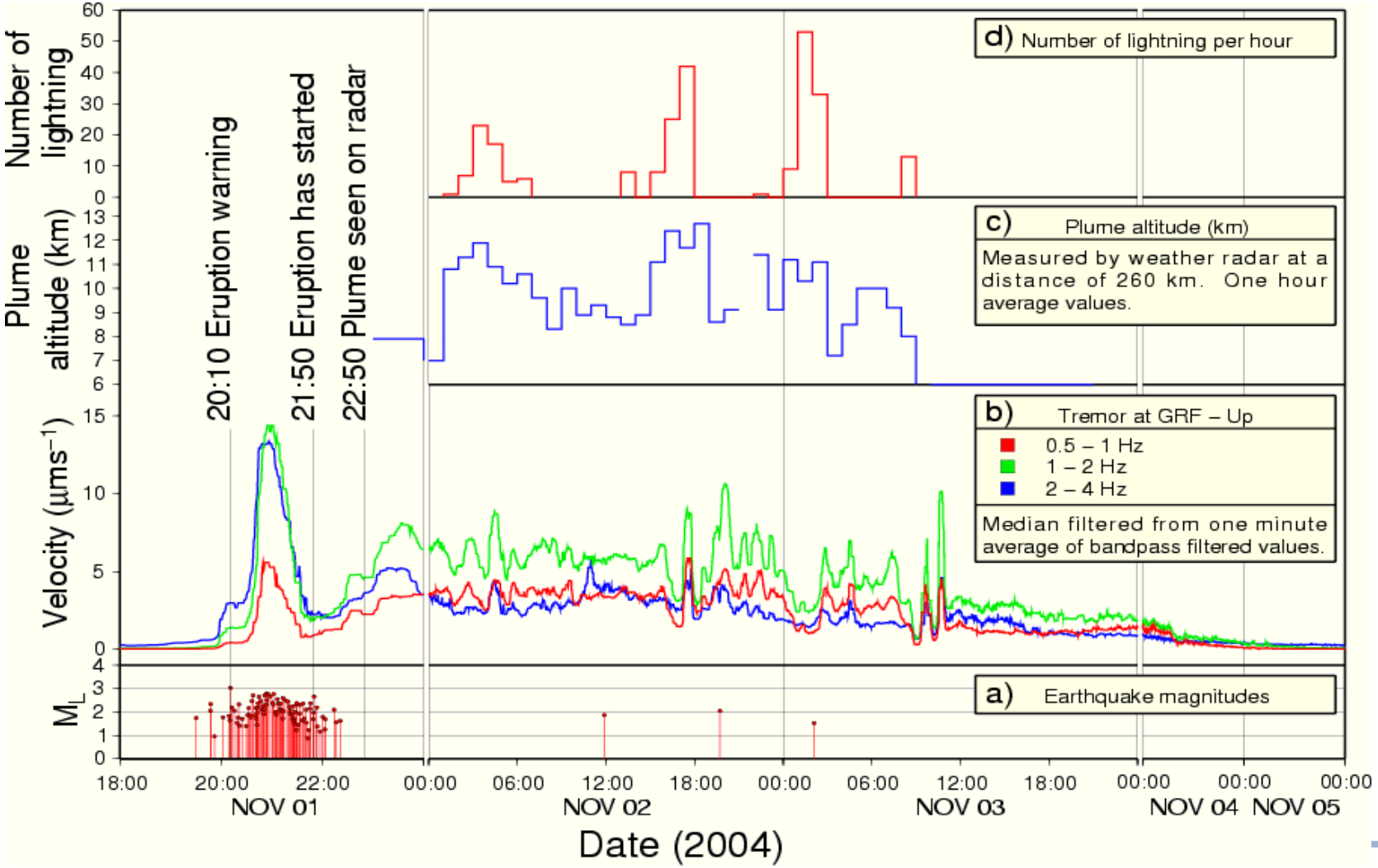
Jarðskjálftar í Grímsvötnum: 1. október - 1. nóvember 2004

Veðurstofa Íslands



Vöktun eftir að eldgos hófst: eldingar, hæð öskustróks á ratsjá og órói

Veðurstofa Íslands



Forboðar eldgossins í Eyjafjallajökli

- Seismic unrest and crustal deformation in 1994 :

  modeled as a sill intrusion at

  4.5 km depth

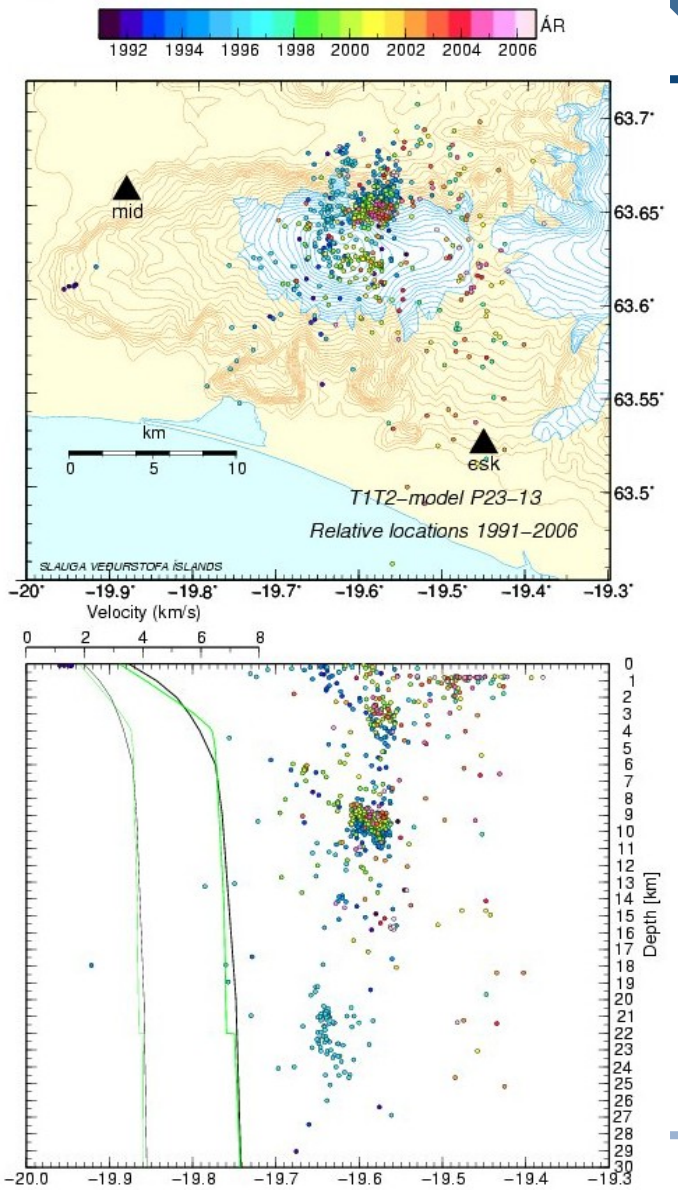
  (Pedersen & Sigmundsson 2004)

- Seismic unrest in 1996
- Seismic unrest and crustal deformation in 1999 :

  modeled as a sill intrusion at

  6.3 km depth

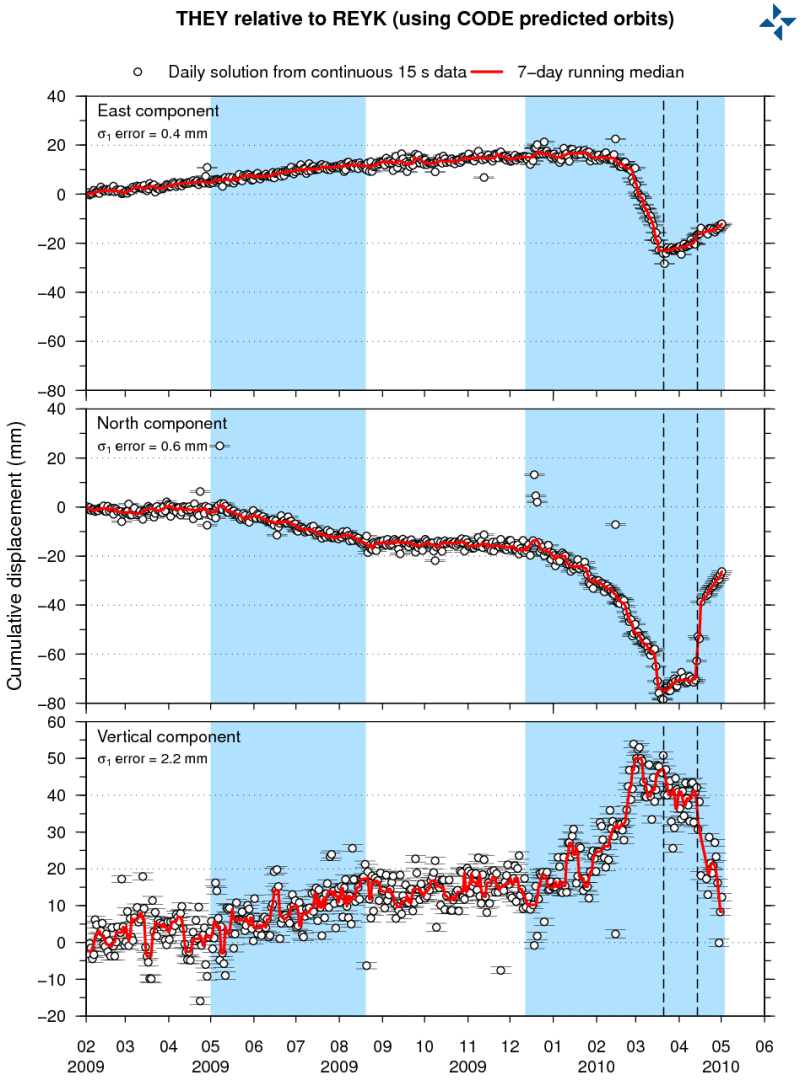
  (Pedersen & Sigmundsson 2006)



Yfirborðsfærsla mæld með GPS-mæli við Þorvaldseyri 2009 - 2010

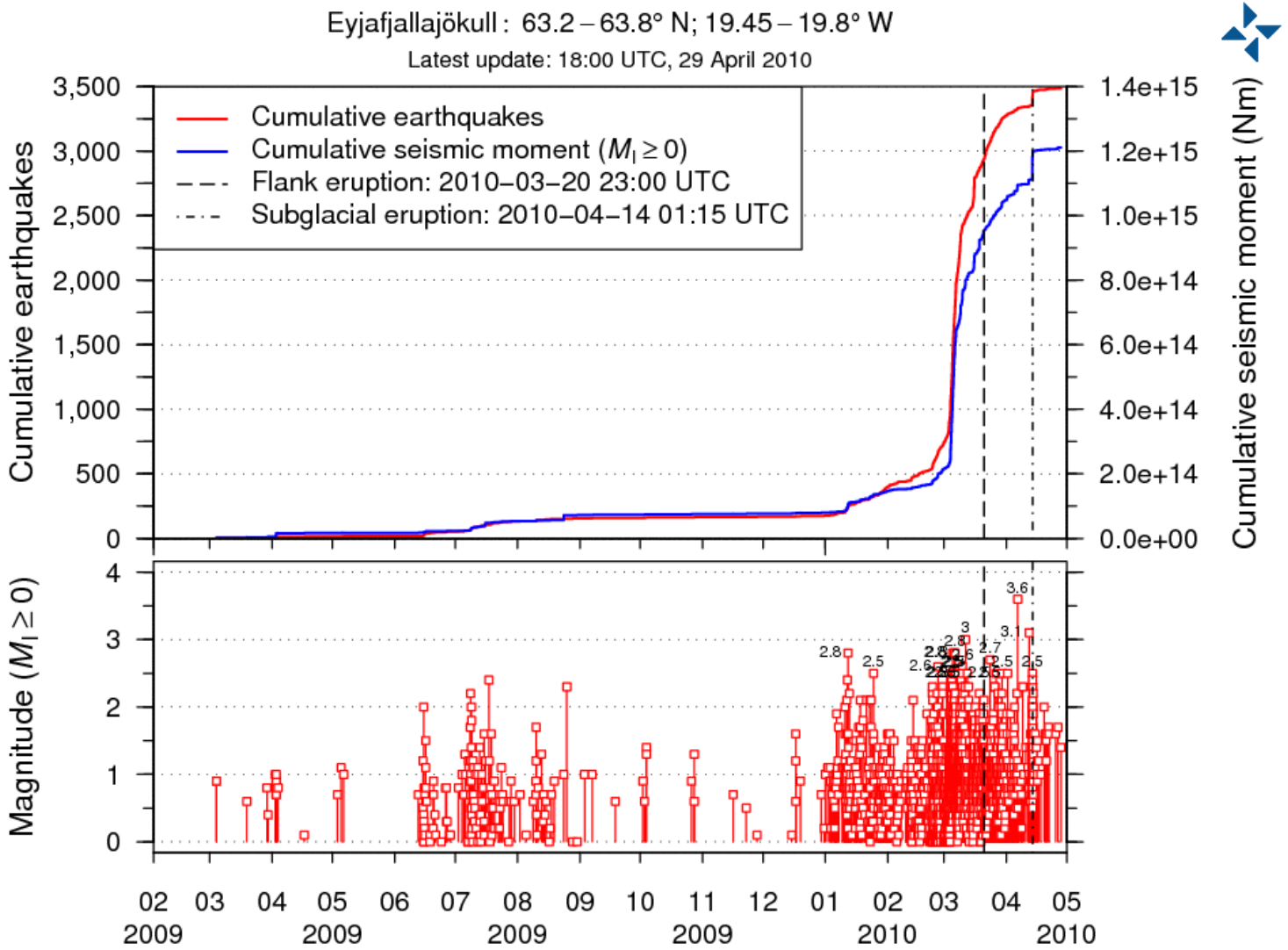
Veðurstofa Íslands

- Southward movement - May to August 2009
- Nothing from August to December 2009
- Southward again from December 2009
- Westward movement starts in February
- Eruption at Fimmvörðuháls starts 20 March 2010
- Eruption in Eyjafjallajökull starts 14 April 2010



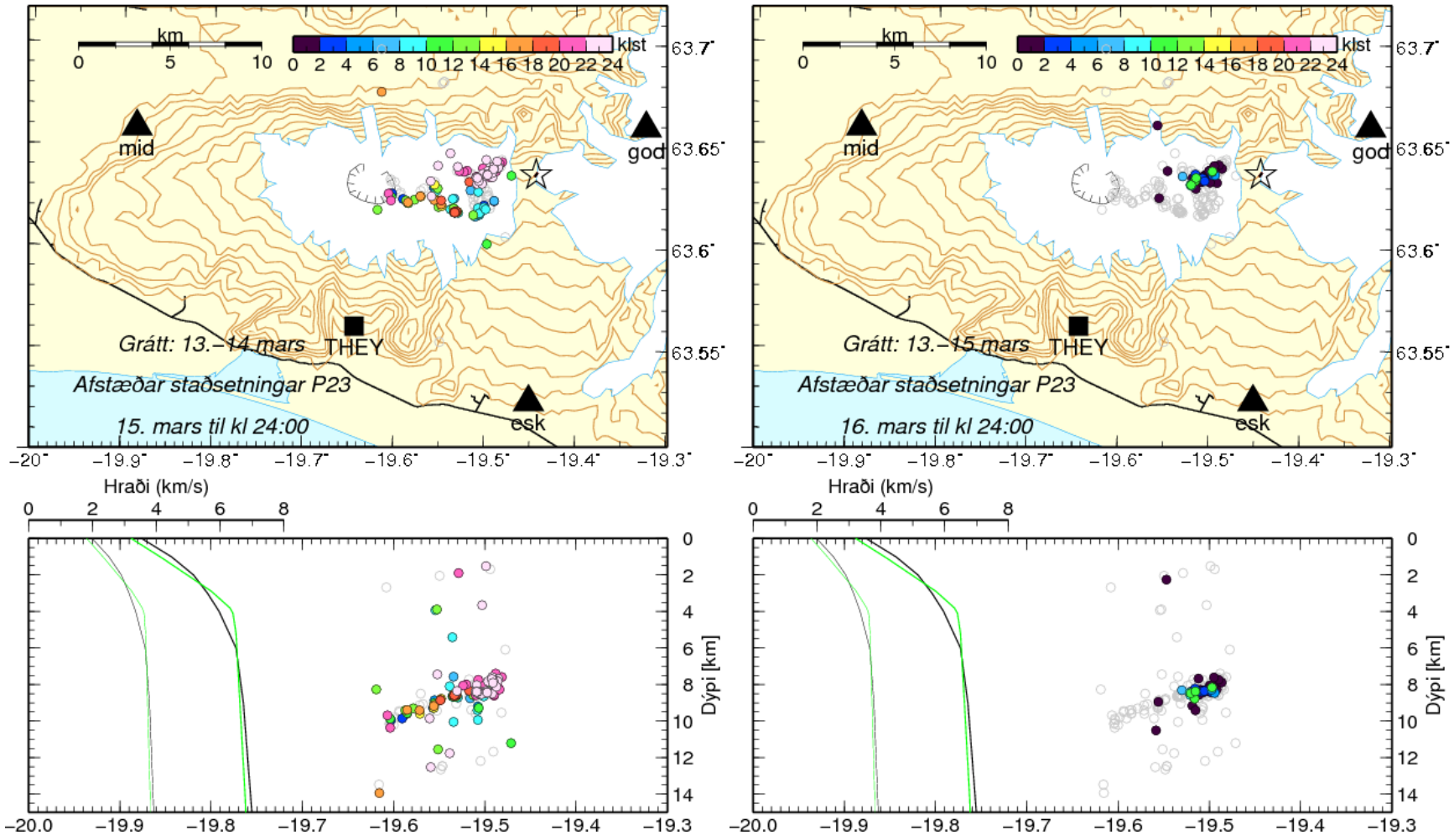
Jarðskjálftar undir Eyjafjallajökli 2009 - 2010

Veðurstofa Íslands



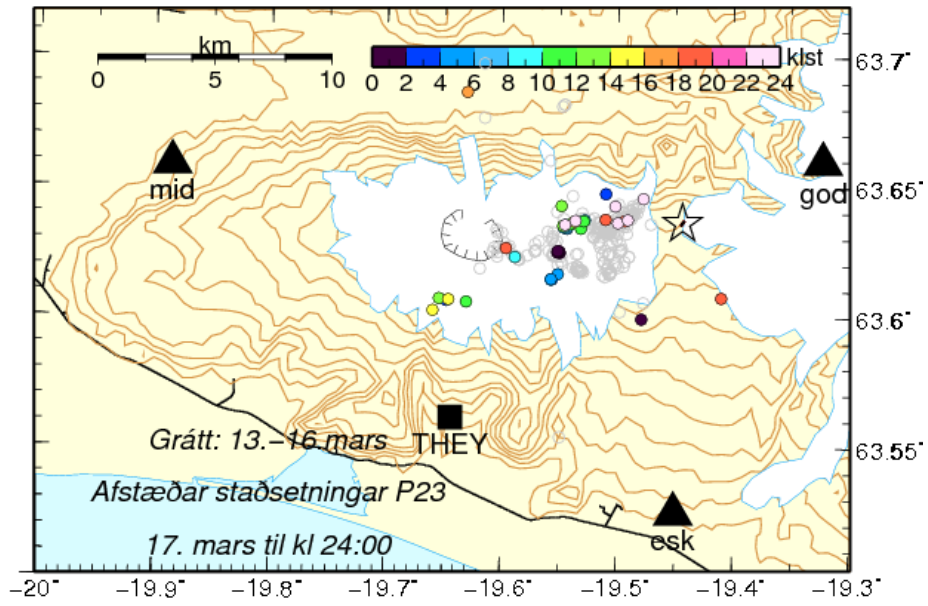
Skjálftar 15. & 16. mars 2010, afstæðar staðsetningar

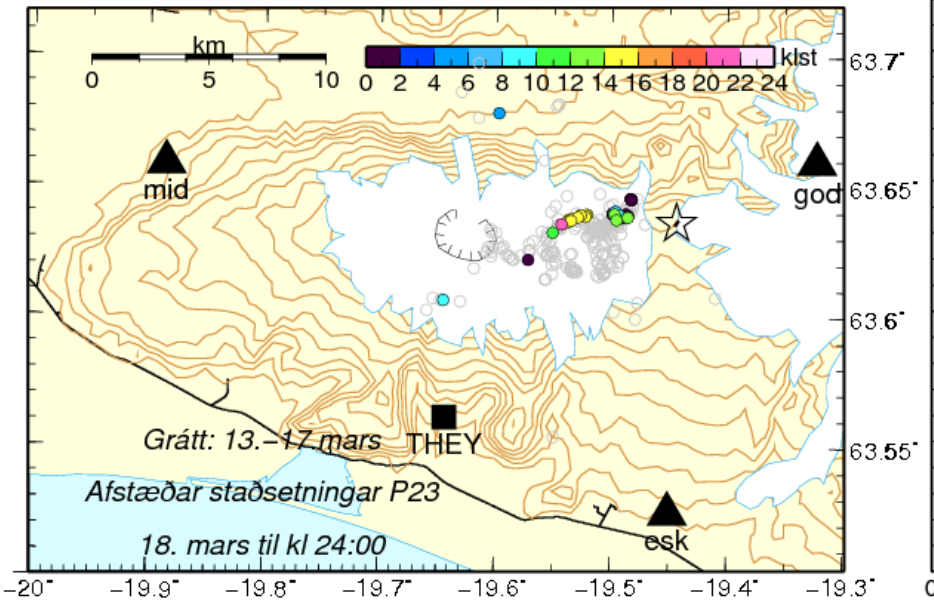
Veðurstofa Íslands

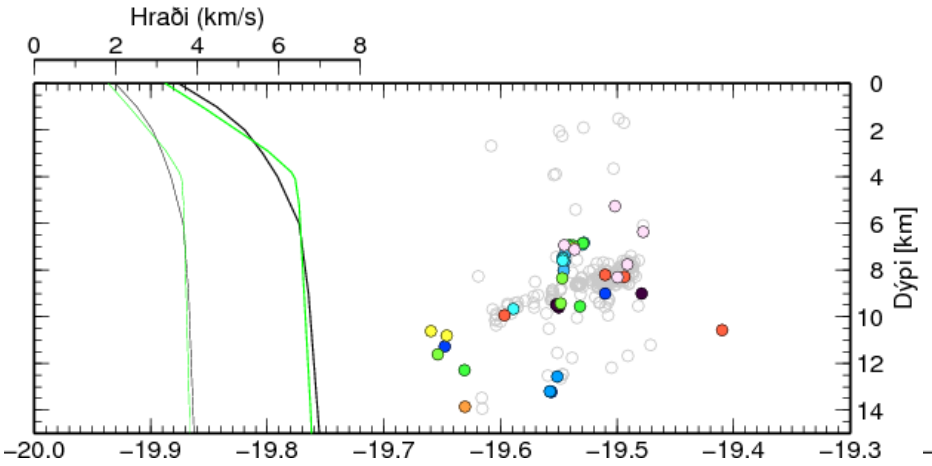


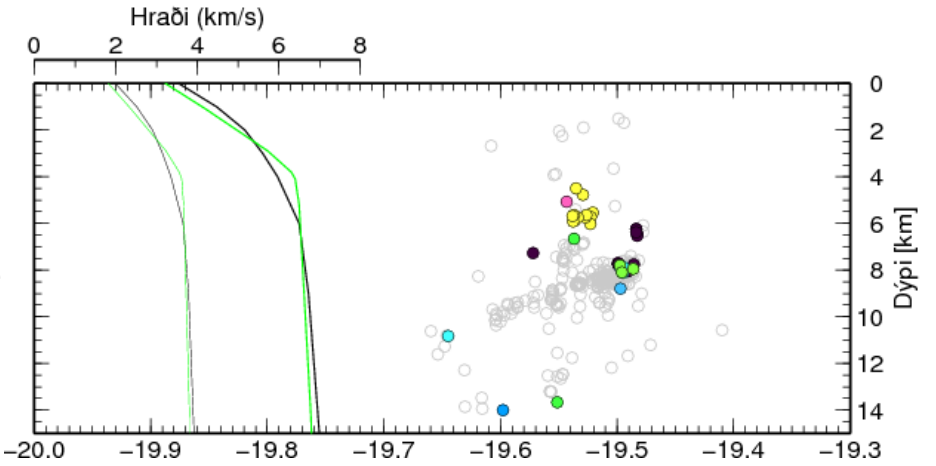
Skjálftar 17. & 18. mars 2010, afstæðar staðsetningar

Veðurstofa Íslands



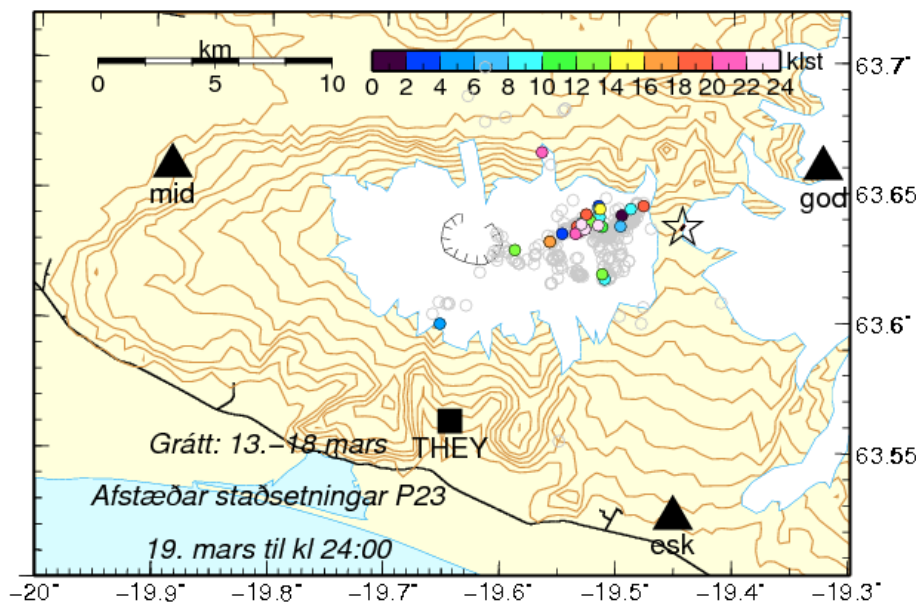


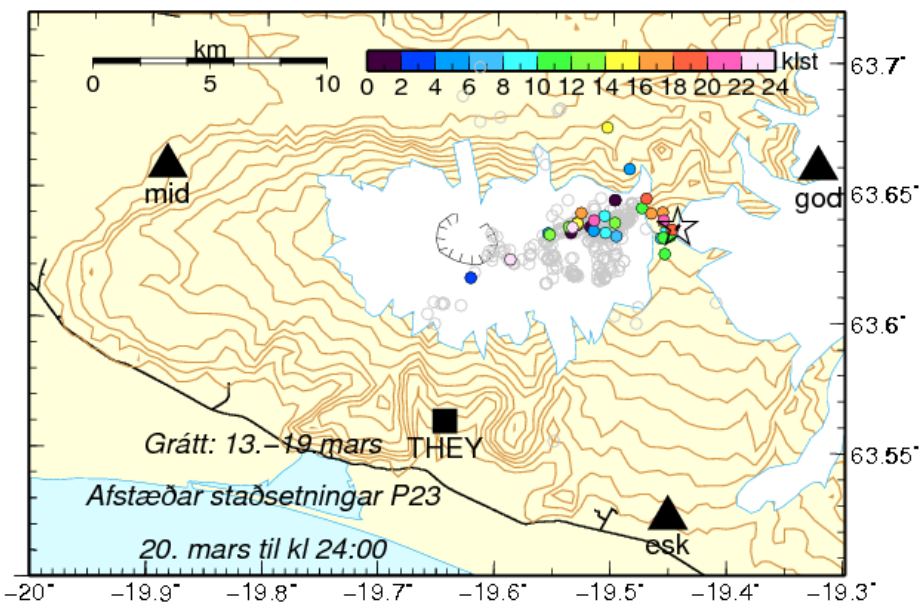


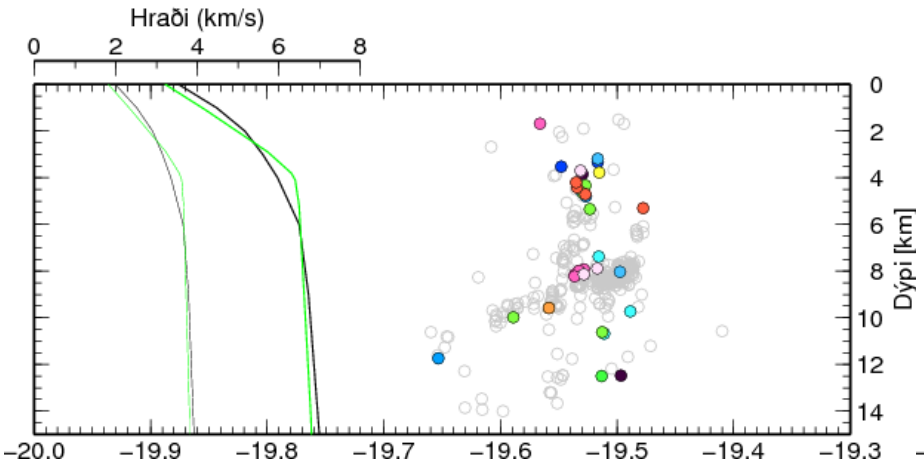


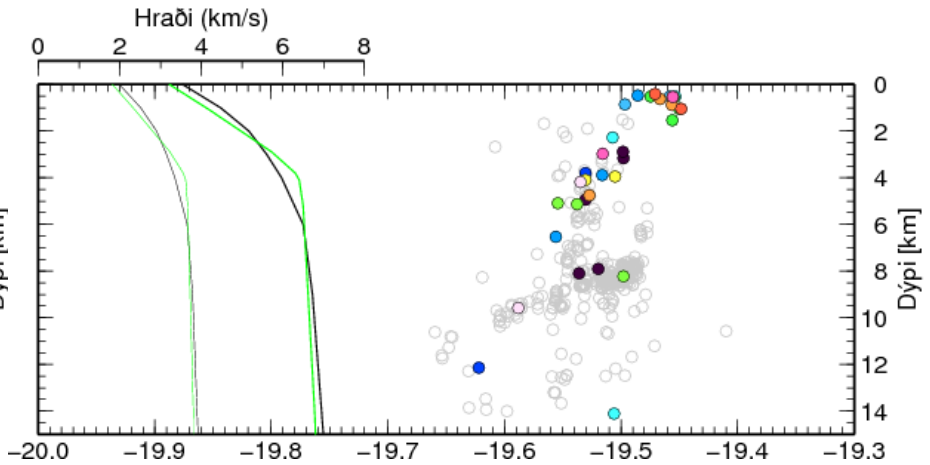
Skjálftar 19. & 20. mars 2010, afstæðar staðsetningar

Veðurstofa Íslands

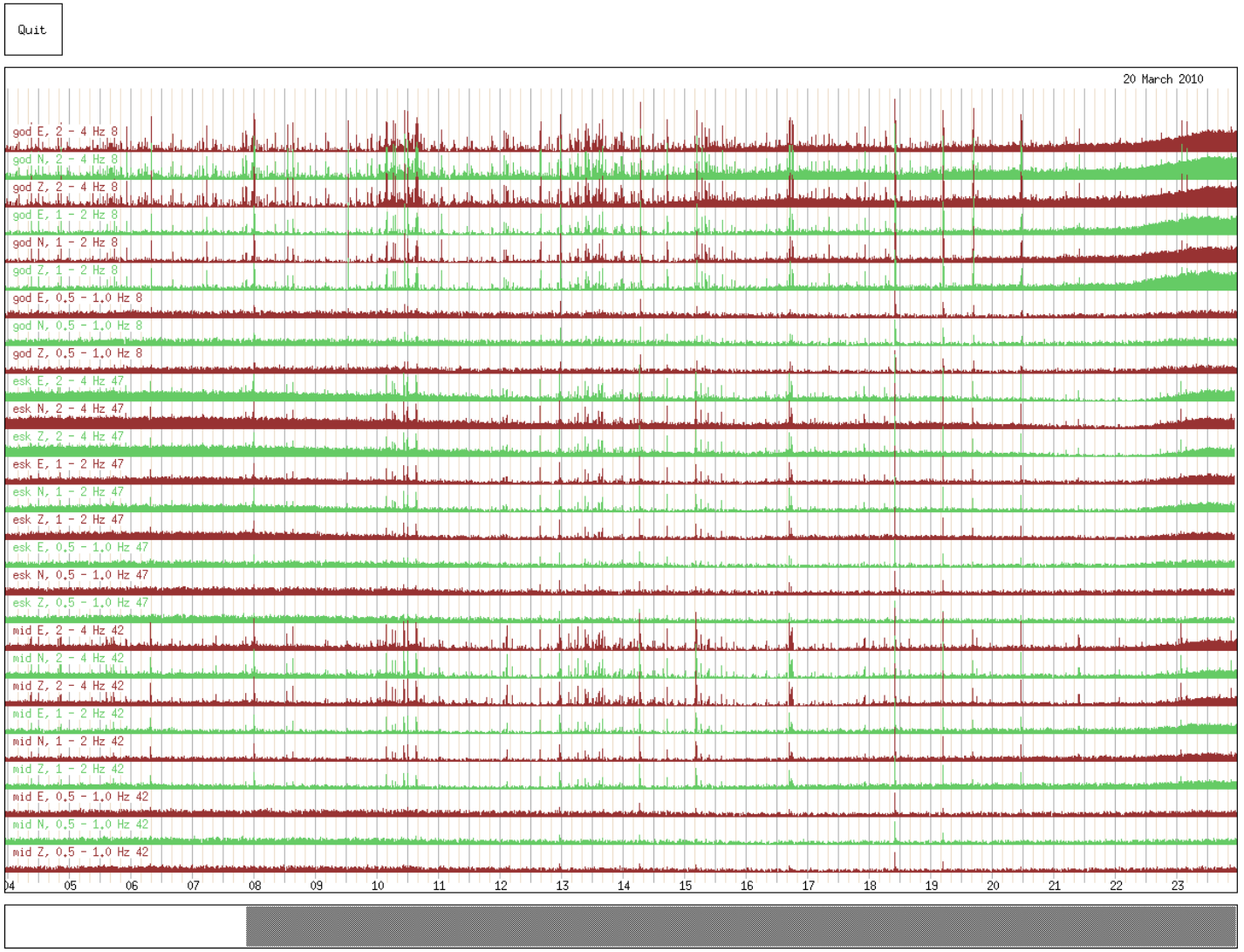








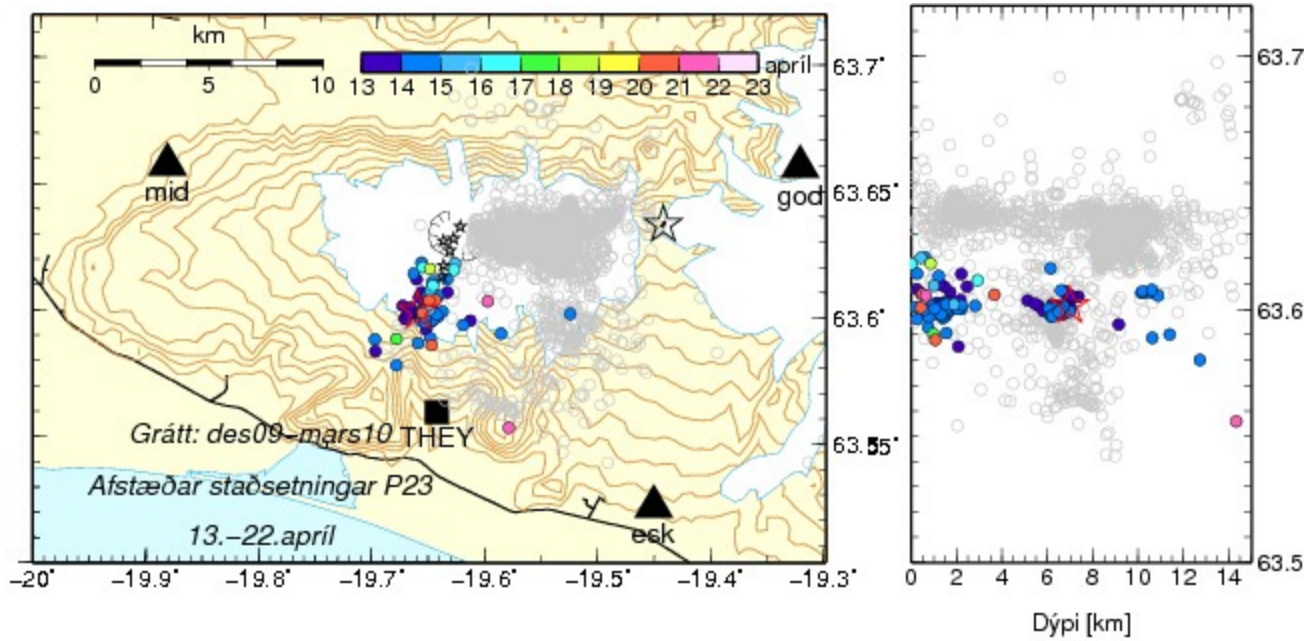
Byrjun eldgossins á Fimmvörðuhálsi

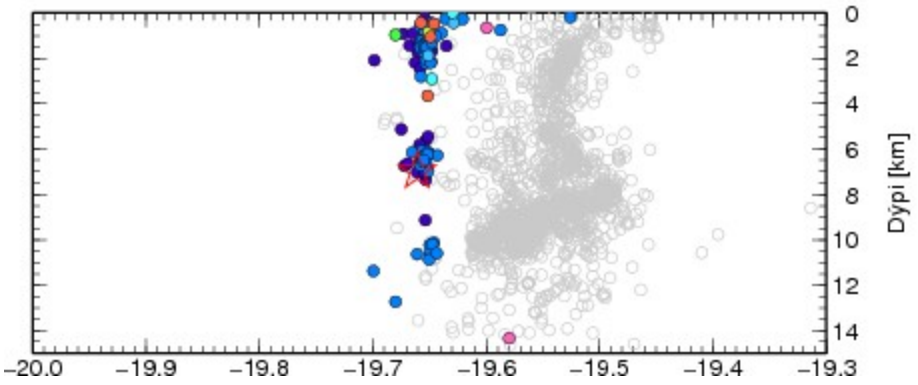


“Túrista-gosið” á Fimmvörðuhálsi

Veðurstofa Íslands

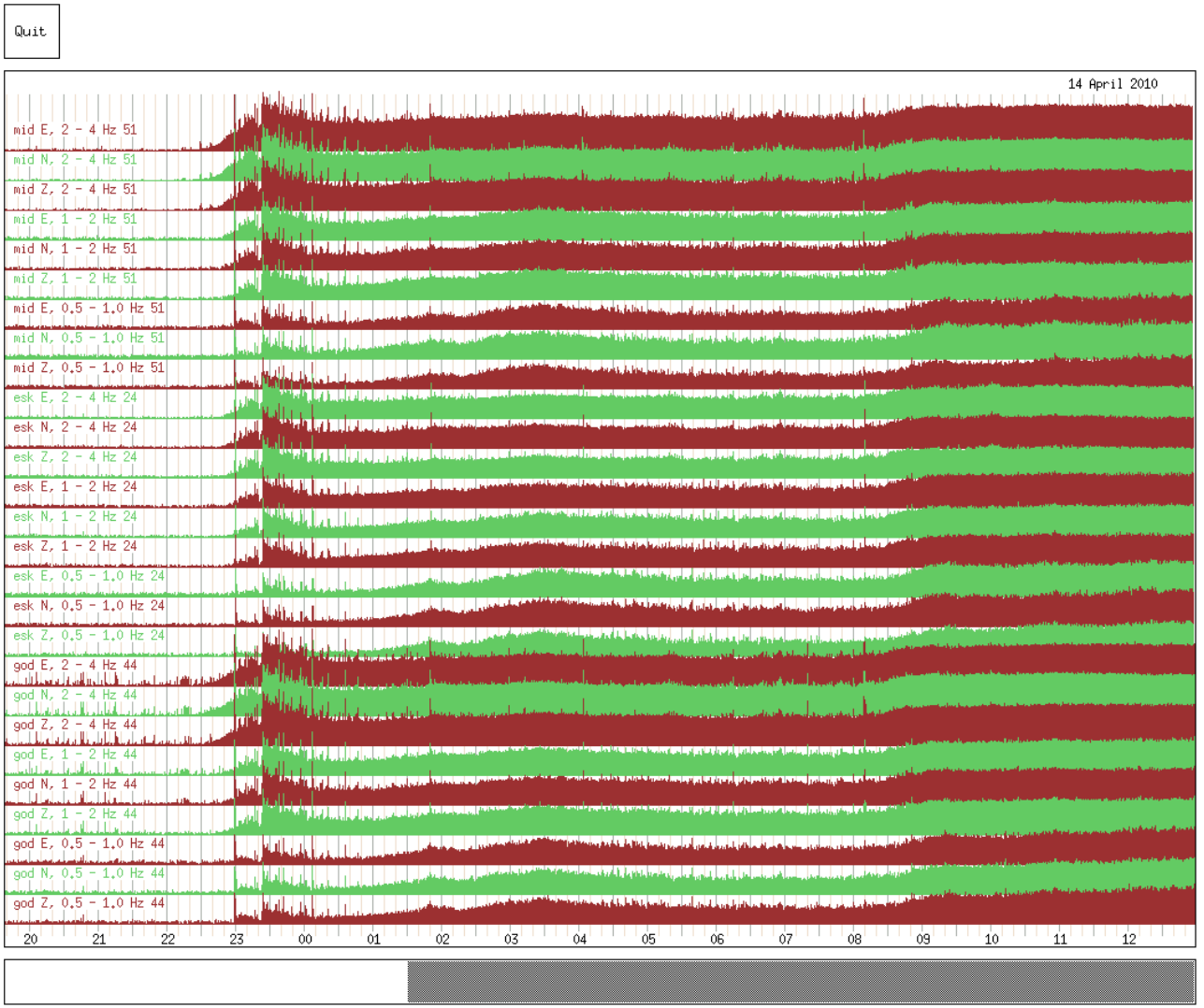
Eldgos í toppgígnum hófst 14. apríl 2010





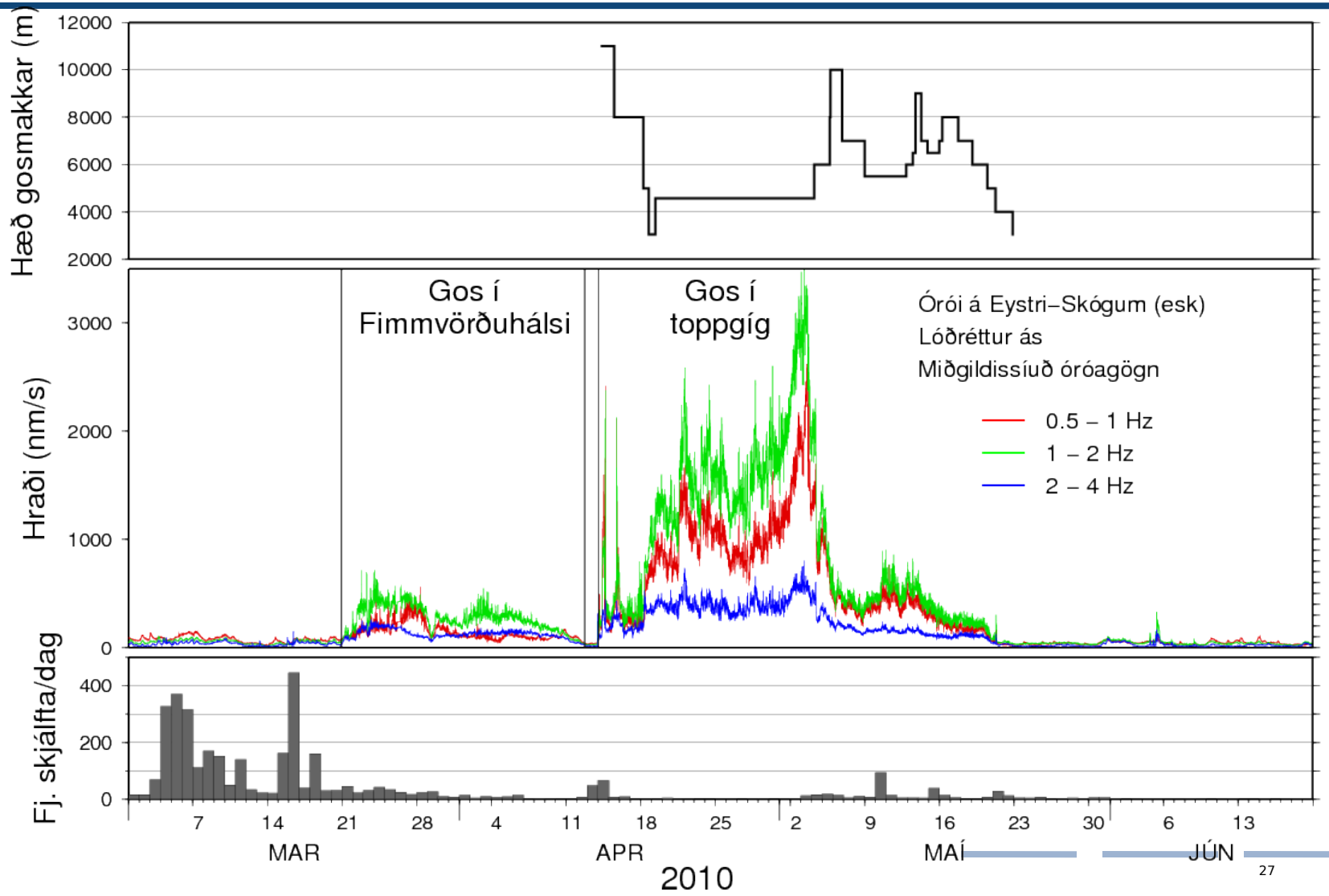
Byrjun eldgossins í toppgíg Eyjafjallajökuls

Veðurstofa Íslands



Gosin í Eyjafjallajökli - á jarðskjálftamæli við Eystri-Skóga

Veðurstofa Íslands



Jökulhlaup

Veðurstofa Íslands

Ólafur Sigurjónsson

Blönduð virkni: ösku- og hraungos

Takk fyrir áheyrnina