Finnish National Seismic Network: Recent development of configuration and data analysis

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51st Nordic Seminar in Seismology 30.9.2020 T. Veikkolainen and T.Luhta

Seismic networks in Finland and adjacent areas

- The map shows Finnish permanent and semipermanent seismic stations and other seismic stations with constant data delivery to Finland
- Data from other foreign stations may be fetched upon request
- Kouvola, Helsinki and Ostrobothnia regions have densified local networks
- Temporary networks have been established not only for research projects but also for monitoring the induced seismicity related to the deep heat project of St 1 Inc. in Espoo, Finnish capital region
- Data from all these stations can be used in the daily analysis at the institute
- Growing interest in geothermal energy and highrise construction projects may result in further seismic networks to urban areas – the Helsinki network was established by the initiative of the city







NorDB database and Norlyst analysis tool

- The NorDB database is our solution for storing seismic events and their metadata as well as station information
- The database runs Python and PostgreSQL in Unix-based operating systems
- Event detections are automatically pushed to database and backups are also • generated to a remote location each night
- Seismic analysis tool Norlyst is installed separately but fetches data from NorDB
- The use of Norlyst in daily seismic analysis of the institute began in June 2020 and it has significantly smoothed the analysis workflow

[seismo@alps Desktop]\$ nordb search -v id=12017						
Criteria:						
event id: 12017						
2020 0021 04/3 /8 3 IP 67 730 20 553 0 0EEHEL 7 0 6 0 8IHEL 1						
GAP-346 0.6 2,000 12,000 5						
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Daily seismic analysis using Norlyst



Events not requiring manual phase picking are analyzed in Norlyst. Manually picked events are analyzed in Geotool but imported to Norlyst.





HelsinkiNet

- We agreed with City of Helsinki on the establishment of a seismic network in the city area
- The main goal is to better understand the influence of seismicity on the built environment
- Three stations (KUNI, VUOS, LAUT) now in operation close to the borders of the city
- Detection threshold in Helsinki region far below the national level (M_L =1)
- In June 18, a thunderstorm struck the coast of Finland we could clearly see it in the seismogram of VUOS!









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HelsinkiNet Stations











ED challenges vol 1

Mon 7/29/2019 7:48 AM To: seismo-staff@helsinki.fi

Moi

Huonoja uutisia

Kaikki Seismon ja OBF verkon ED-digitoijat kadottivat ajastuksen. Ohessa lista toimimattomista asemista:

OBF1 2099/12/13 04:19:43 OBF2 2099/12/13 04:19:43 OBF3 2099/12/13 04:19:44 OBF4 2099/12/13 04:19:43 OBF5 2099/12/13 04:19:42 OBF7 2099/12/12 17:08:38 OUF 1963/11/06 21:51:25

KAF2099/12/13 04:25:37KEF2099/12/13 04:25:36KEV2099/12/13 04:25:37

MEF 1963/11/06 21:57:20

NUR 2099/12/13 04:25:38

OUF 1963/11/06 21:57:19 OUL 1963/11/06 21:57:21 RAF 2099/12/13 04:25:38

TOF 1963/11/06 21:57:16 VJF 1963/11/06 21:57:21

VAF 2099/06/18 04:03:51

Lisäksi OUL, KLF ja KMNF ovat sekaisin



- Week Number Rollover issue caused our EarthData digitizers to lose timing

- problem was solved within two days (thanks to Anders Heinloo, GFZ Potzdam and our own technical team)

- The fix will work 1024 weeks (until 2038)





ED challenges vol 2



- Power supply inside the ED is getting tired \rightarrow a bypass needed







ED challenges vol 3



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Kouvola Network and Kuusaanlampi Array







Kouvola Network and Kuusaanlampi Array



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T. Veikkolaii Nordic Seis

T. Veikkolainen and T.Luhta Nordic Seismology Seminar 2020 - Distances between subarray substations 3.6m-120m

- Stations measuring 7/2020-1/2021

- Earthquakes from Kuusaanlampi area faults wanted

- Also measured noise will be utilized

- Detection capabilities of different size subarrays will be evaluated







