



# **NORDIC SMART:**

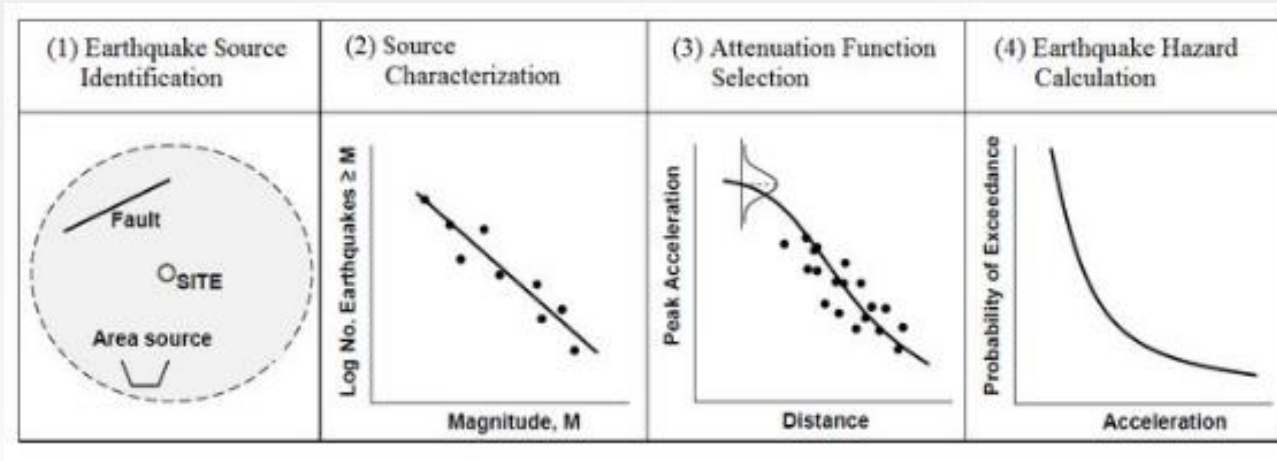
## **Catalogue data and planned tasks**

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# Earthquake catalogs





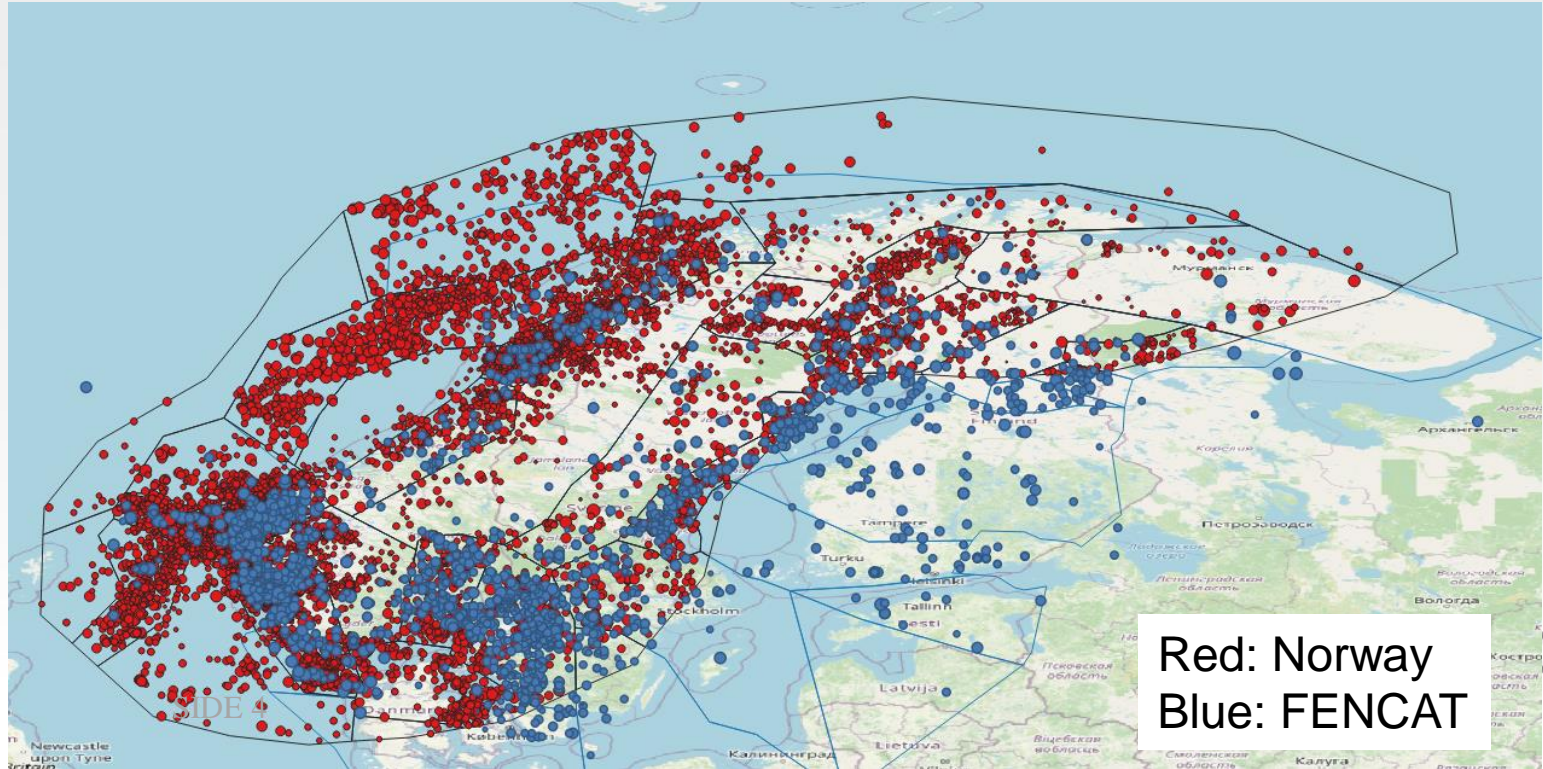
# Major challenges

- Events are contained in several catalogs (with slightly different locations, magnitudes, ...)
- Agencies use slightly different magnitude scales
- Catalog completeness varies in time and space
- Catalogs are contaminated by explosions, frost quakes and other non-earthquake events
- Swarms, fore- and aftershocks need to be removed



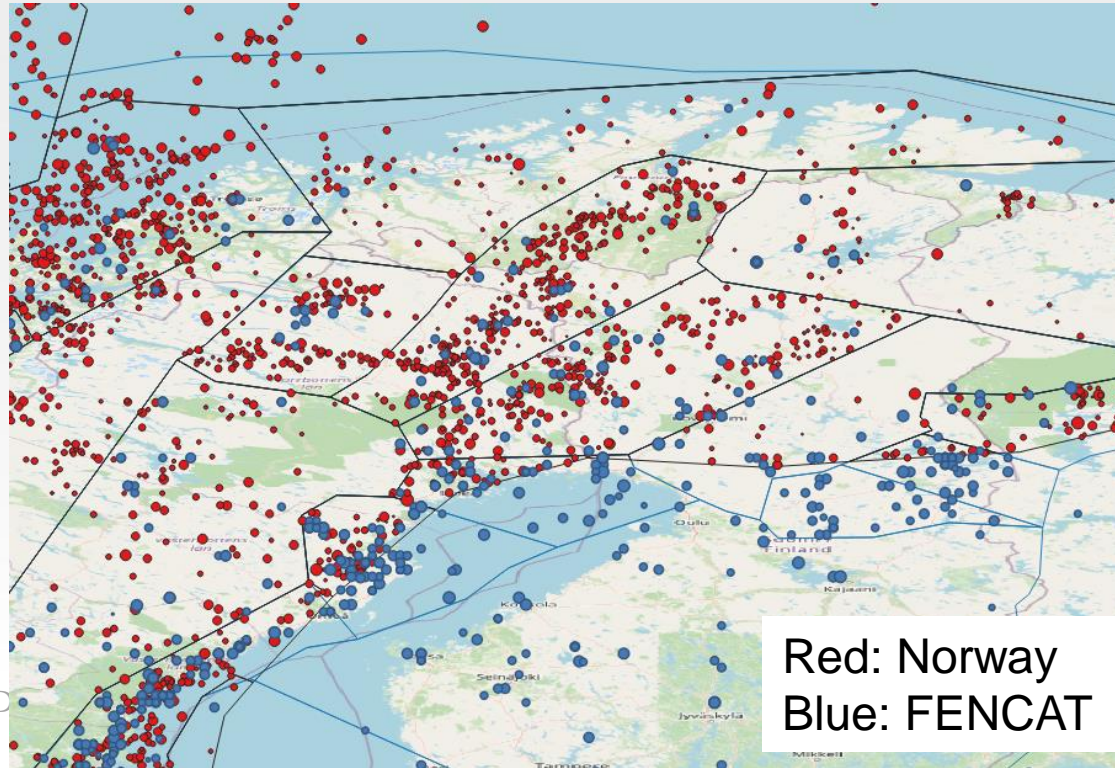


# Example: Norway vs. FENCAT





# Example: Norway vs. FENCAT



SID





# Example: Norwegian workflow

Magnitude 1+

300km perimeter

1497 - 2023.12

NNSN  
SNSN  
GEUS  
FENCAT  
ISC  
BGS

Join catalogues

Remove duplicates

Remove explosions

Homogenize magnitudes

Remove dependent events

Remove conflicting magnitudes

Remove outliers

Mostly automated. Ongoing manual inspection and verification.

Manual review of catalogue

Magnitude clusters

Large events

Temporal clusters

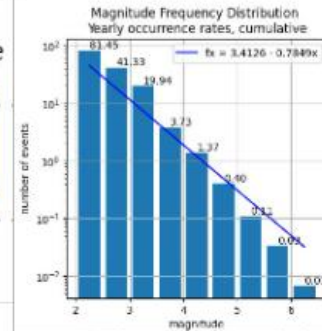
Completeness

Minimum magnitude

Maximum magnitude

For each area zone

A and B values





# Catalogs that we would like to consider

- FENCAT (Fennoscandia)
- SNSN events (Sweden, small events are not in FENCAT)
- NNSN (Norway, larger uncertainties in FENCAT)
- Denmark + N Germany
- Poland
- Baltic region
- Russian catalog (Morozov et al., 2020)
- SHARP catalog (North Sea; EU project)





# Why is it important to merge (and discuss!)?

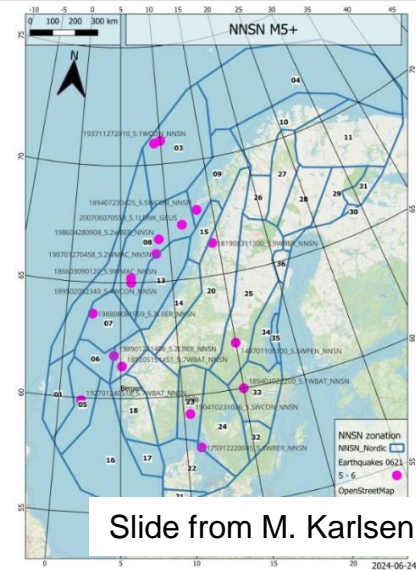
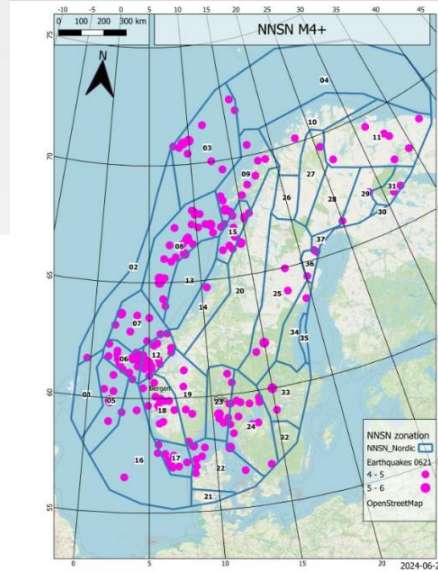
We all know our own region best  
QA across catalogs is needed

## Ambivalent historical data

Events in the original Fenocat-catalogue

DST 18230205.22	58.4	24.5	CB	8.3.9M	VI	2.60U
DST 18740405.22	58.6	23.7	CB	6.2.5M	IV+	2.40U
DST 18530326.0130	59.5	24.7	BB	5.1.2M	III ?	30U
DST 18870519.00	57.8	22.2	?	1.3.0M	VII	20U
DST 18580131a11130	59.3	22.6	AB	8.3.0M	V	2.50U
DST 18690215.00	59.5	24.7	CB	6.2.5M	IV	30U
DST 18771016.0225	59.0	23.5	AB	10.3.0M	IV	30U
DST 18771016.0225	59.0	23.5	AB	10.3.5M	V	70U
DST 18840128.0425	59.4	28.2	AA	5.3.0M	V+	50U
STL 19090602.0930	58.4	25.6	BB	7.1.8M	III ?	2.60U
DST 10120408.1330	59.7	25.0	DD	5.2.0M	III	30U
DST 10120408.2015	59.7	25.0	AD	5.1.6M	III	30U
DST 10120415	59.7	25.0	D	6.3.0M	III	30U
RST 19310712.22	59.4	25.3	CA	Sm2.5M	IV+	24U
KON 19761025.083945	59.26	23.39	10m4.7B	4.4BI4.5BU	VI+	225U
SIL 19761025a0849	59.3	23.5		3.5	IV+	U
SIL 19761025a0907	59.3	23.5		3.0	III+	U
ANA 19761108a101707	59.33	23.47		3.5	IV+	U
SIL 19761122a121442.5	59.3	23.5	13m2.5?		III ?	U
HEL 19800109.012452.4	58.91	22.99		2.4L	U	
HEL 19810622.192737.7	59.45	22.66		7.2.6L	III	F
SIL 19870409.1921	59.4	26.1		7.3.5	IV	55U
HEL 20030112.114347.6	59.398	23.419		10F1.2L		
HEL 20040128.154000.2	58.792	23.851		10F1.6I		
HEL 20061106.011140.3	59.677	24.857		3.1.1I		
EST 20130204.201754.2	58.921	23.522		4.1.0I		

Slide from H. Soosalu, Estonia



Slide from M. Karlsen, Norway







# Our plans/tasks in NORDIC SMART

- Merge the available catalog, prioritizing local agency in each source zone.
- Each catalog will be cleaned for explosions before merging
- Magnitudes will be homogenized using routines developed for FENCAT (Uski et al., in prep)
- After merging:
  - remove duplicates
  - Decluster
  - Calculate GR parameters







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