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Local seismic tomography velocity and attenuation structure and joint interpretation

Mousavi, S.; Korn, M.; Rössler, Dirk; Bauer, K.

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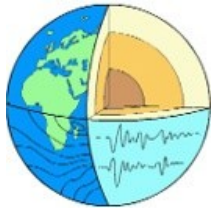

Local seismic tomography
velocity and attenuation structure and joint interpretation

Stage 1 : Catalogues and Phase Picking

S.Mousavi, M. Korn, D. Rößler, K. Bauer

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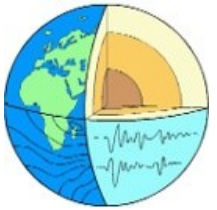

Out line:

- *Outlook on stages of project*
- *Data sources and Catalogue*
- *Phase picking*

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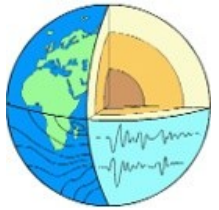

Main Goals

Image and identify fluid path by:

1- structural image of P- and S-velocities

2- structural image of seismic attenuation and to separate scattering and intrinsic attenuation

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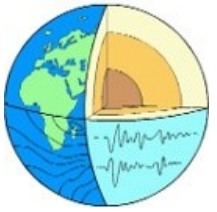

Short over view on whole process

Stage 1: Preparation of the database and travel time picking

Stage2:

I) Determination of one representative 1D model hypocenter locations for the whole region as a starting model of the 3D inversion. The program **VELEST** will be used.

II) Inversion for a 3D model

The associated package **SIMULPS/SIMUL2000** is of common use in local earthquake tomography.

A damped least-squares algorithm for joint inversion for 3D seismic velocity structure (vp, vp/vs) and hypocenter locations will be applied.

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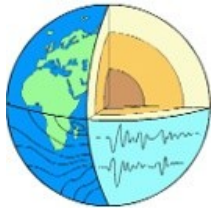

Stage 3: Seismic attenuation structure

Tomographic inversion of direct P wave spectral decay parameter t* for seismic attenuation structure will be done.

Stage 4: Joint interpretation of the results

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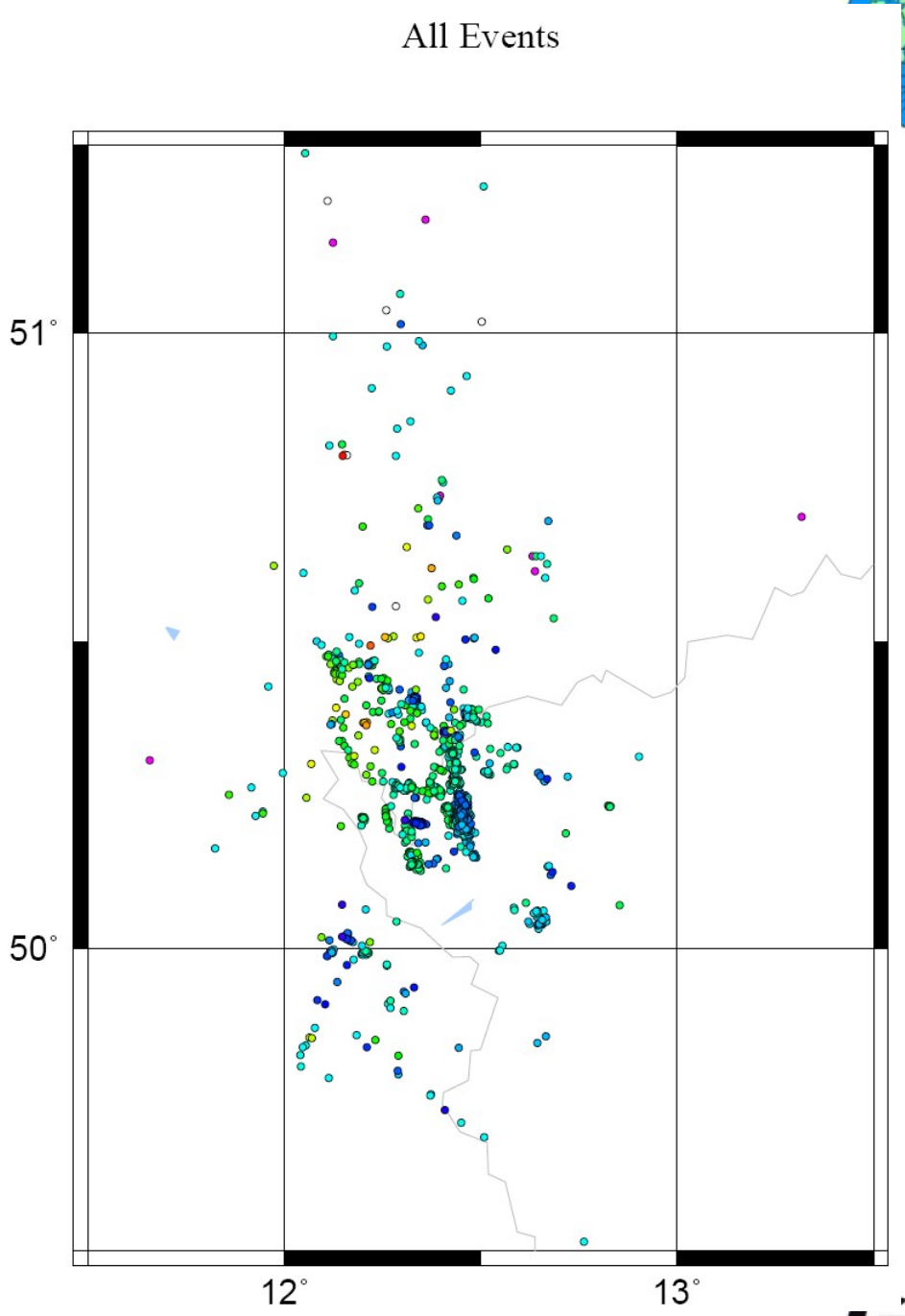
Data base 2001-2008

The list of data consists of 7871 earthquake

Lat	*Lon*	*depth*	*num*	*mag(max)*
50.199	12.458	9850	315	1.4
50.199	12.458	10340	200	1.8
50.207	12.445	10190	248	2.2
50.207	12.451	9280	320	2.5
50.204	12.462	8680	111	2.4
50.213	12.447	9380	576	3.8
50.214	12.444	10130	462	2.7
50.215	12.453	9840	148	2.4
50.21	12.451	10810	118	2.7
50.209	12.452	10790	566	2.1

The surface along latitude and longitude has been divided to 0.01 degree grid steps and in the depth to 1km grids So the largest earthquake in each cube has been selected and the rest of earthquakes with similar characteristics omitted.



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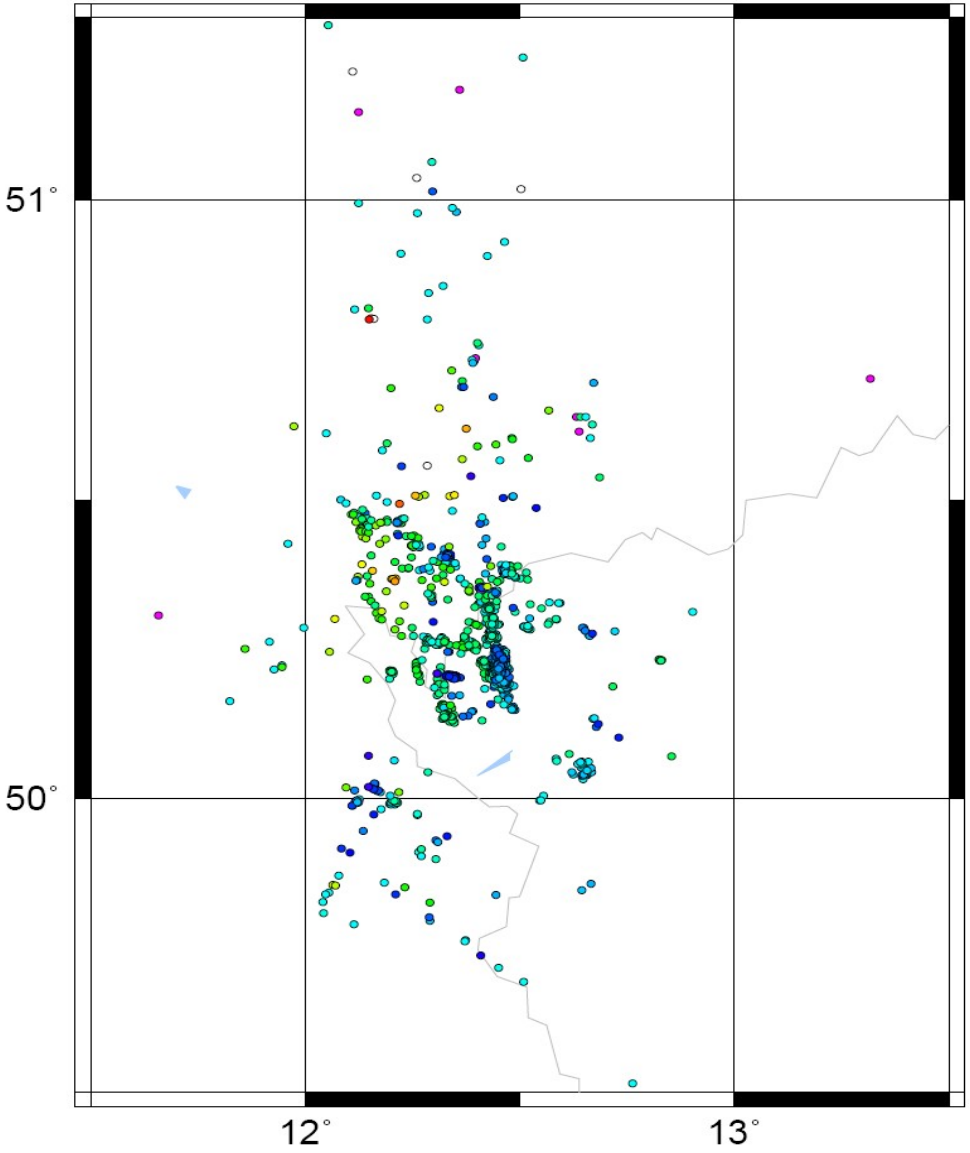
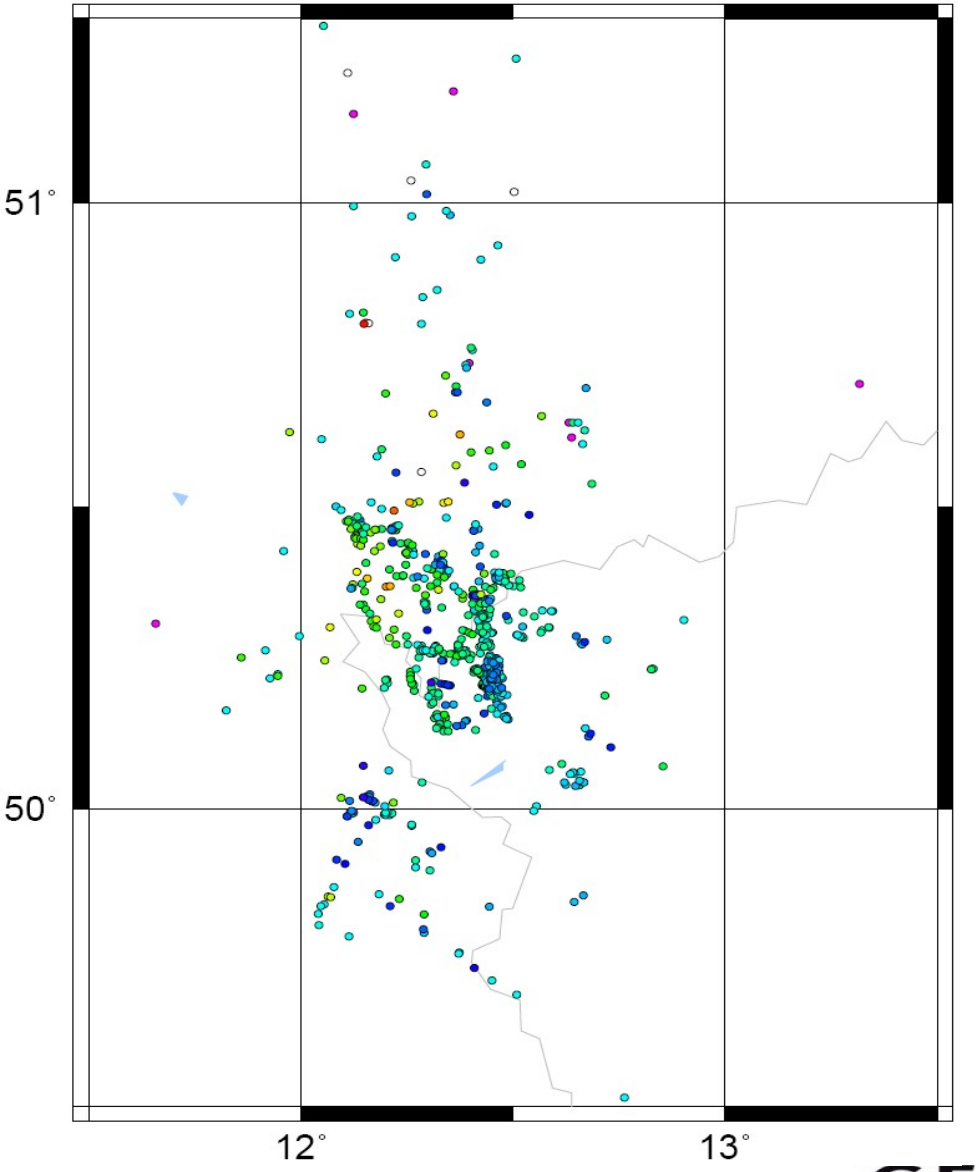
7871 events

All Events



700 events

Selected Events



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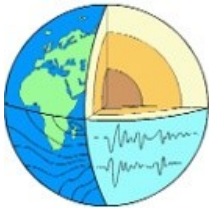

Data sources

2000	2001-2003	2006-2008
Potsdam	Potsdam	Potsdam(10/2008 – 3/2009)
SXNET	SXNET	SXNET
WEBNET	BAYERNNETZ	WEBNET
GRSN	GRSN	BAYERNNETZ
KRASNET	BOHEMA	GRSN
BAYERNNETZ		PASSEQ

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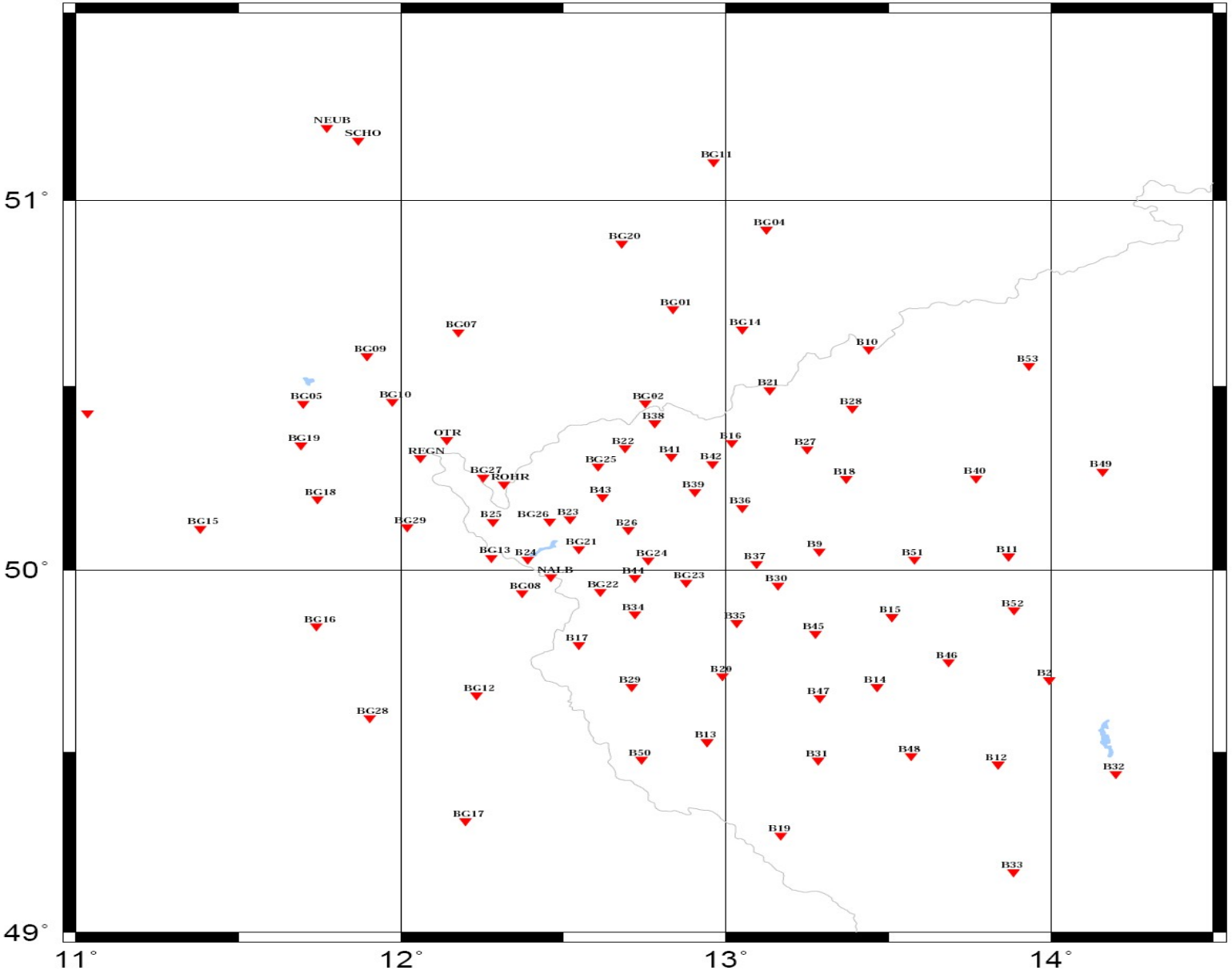
BOHEMA Project, BH network station



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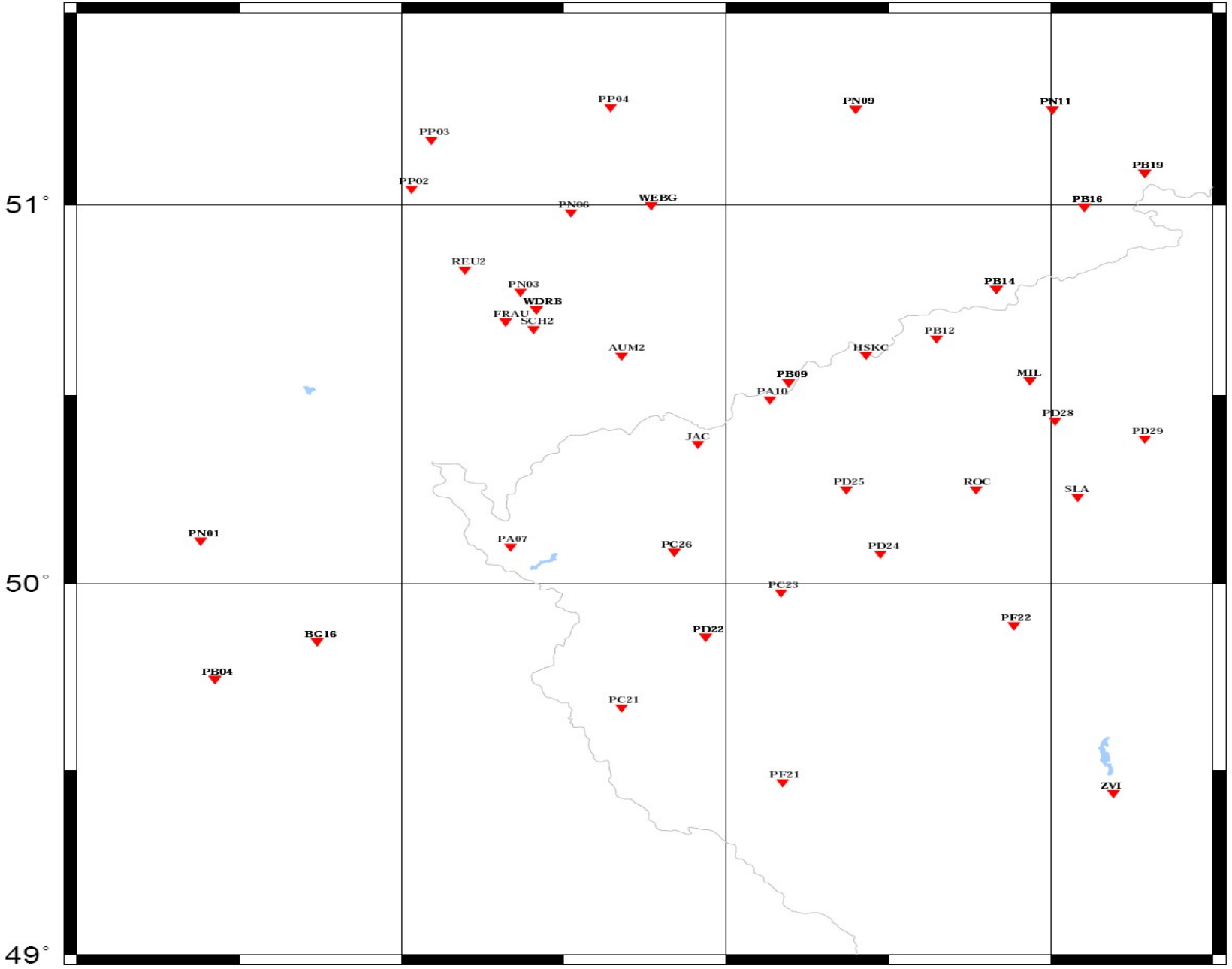
PASSEQ Project, PQ network station



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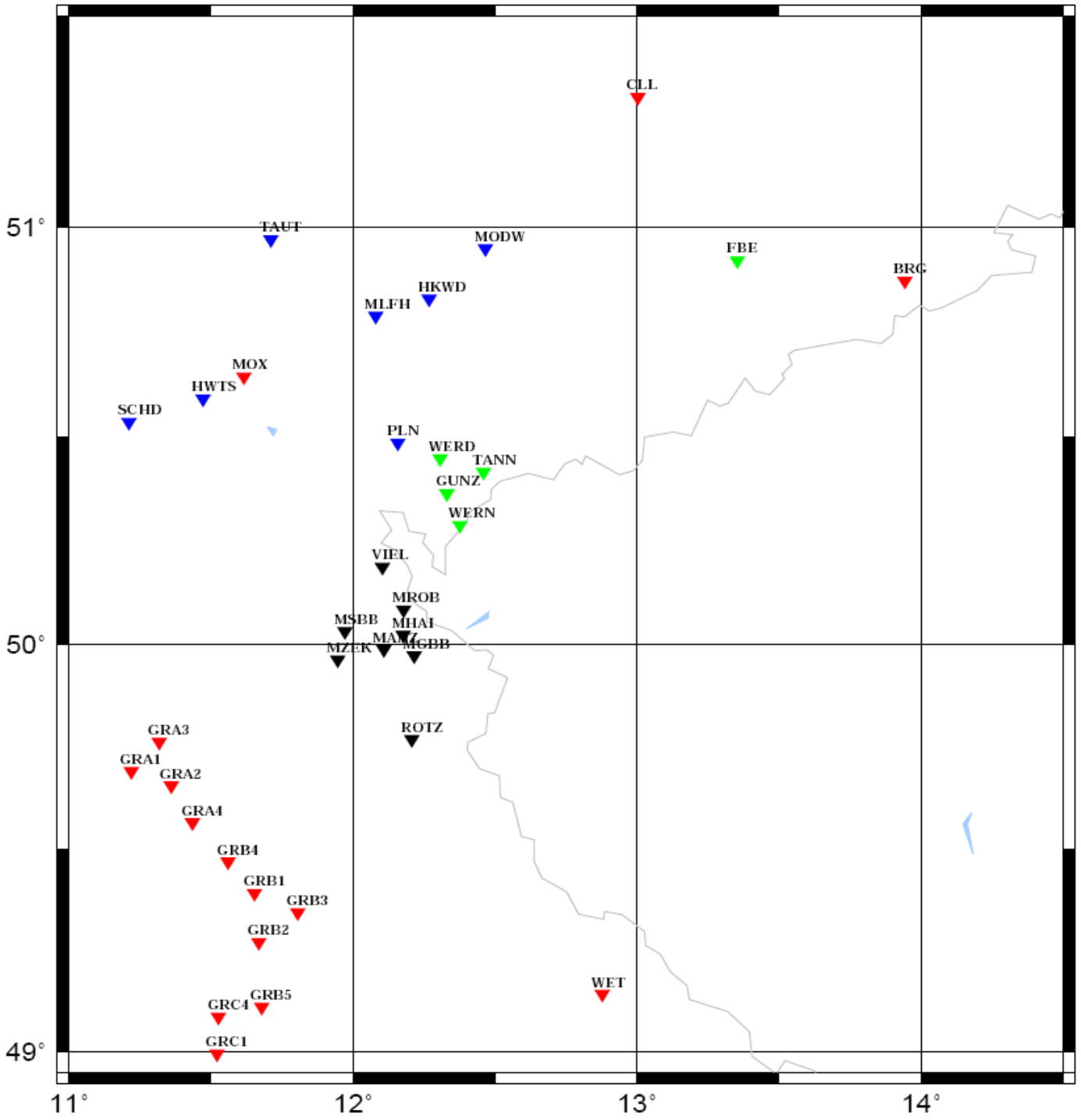
BW,GRF,SX,TH Stations



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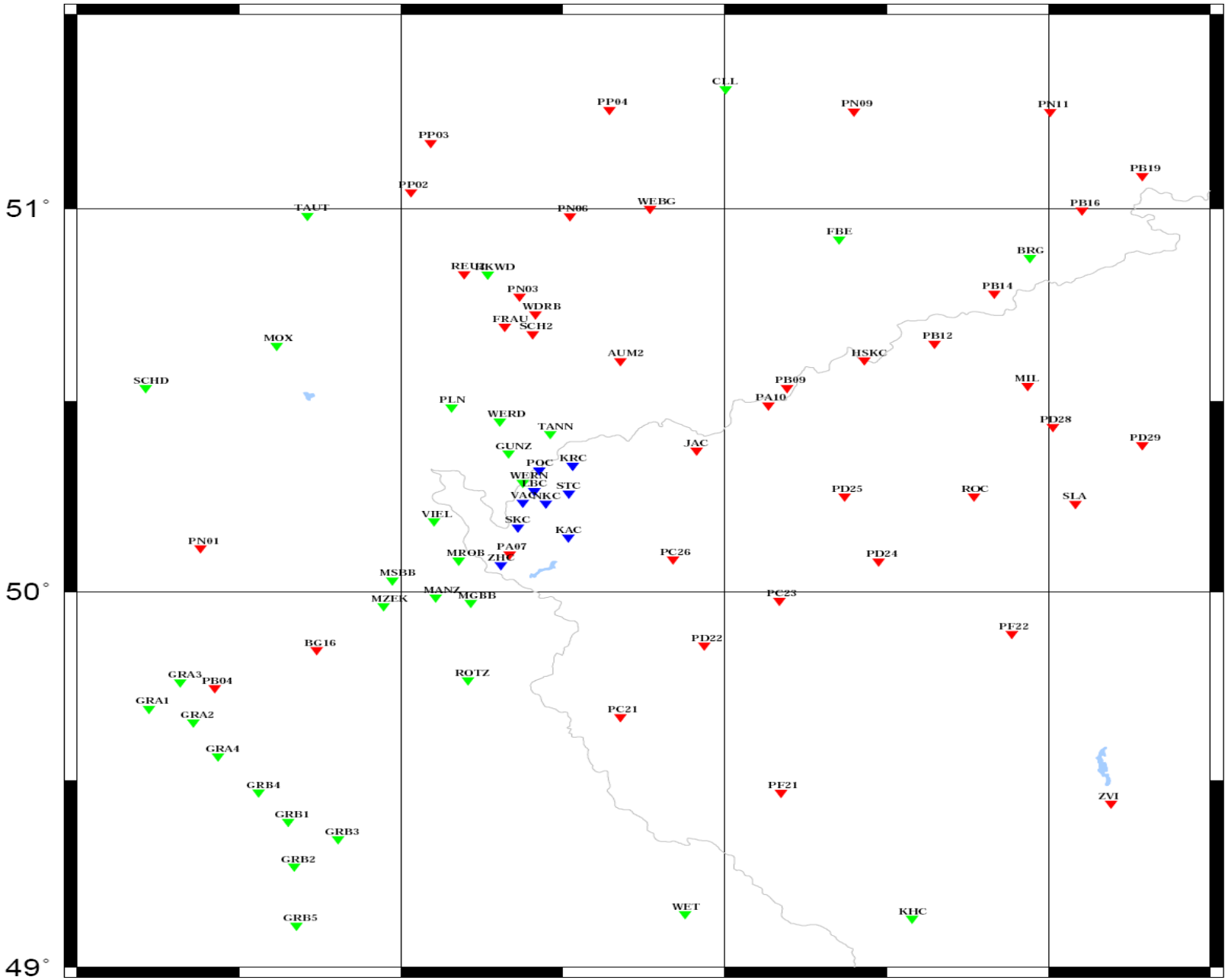
PASSEQ network, WEBNET network and other permanent stations



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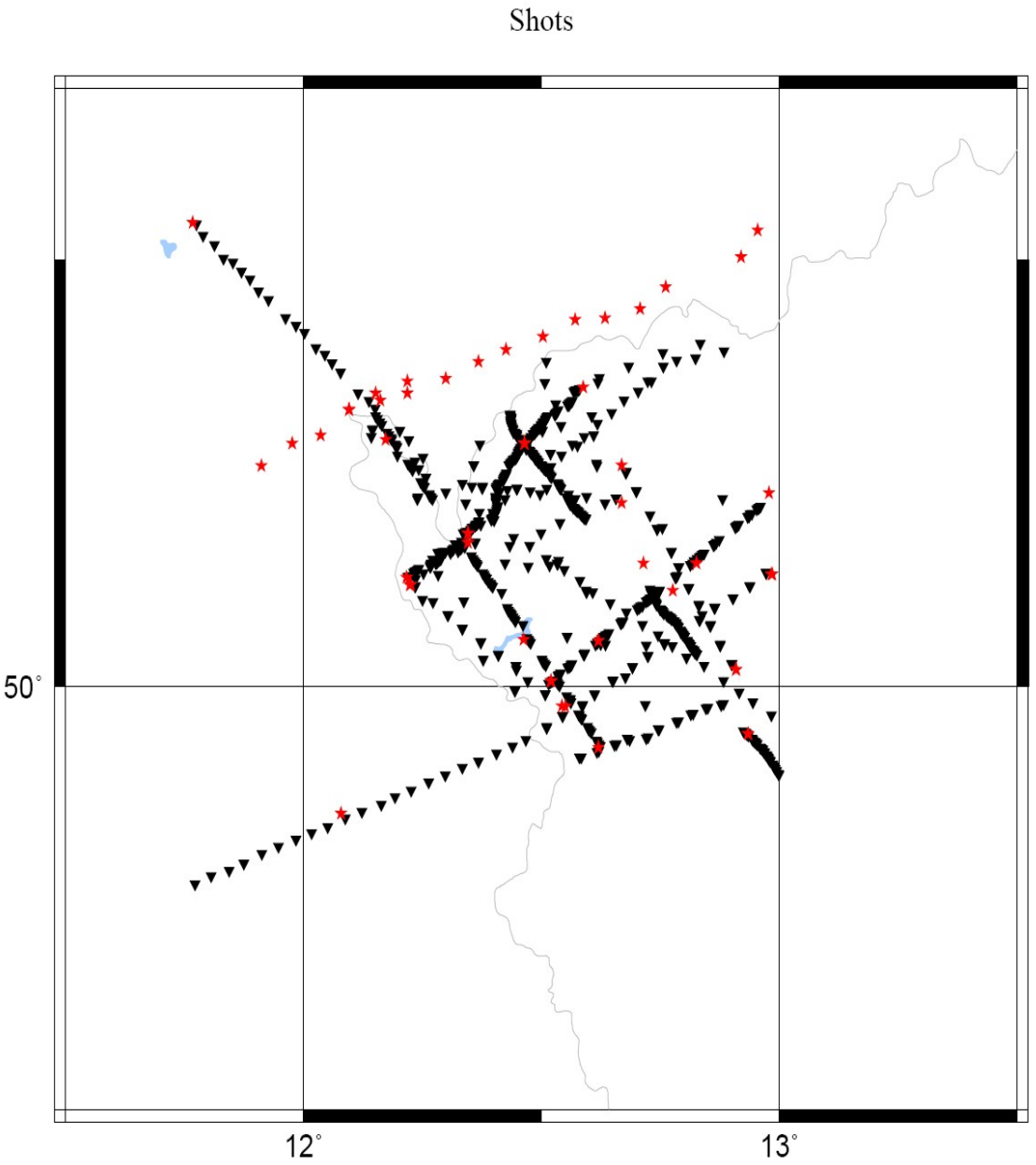
49 shots

682 Stations

2000/01/01



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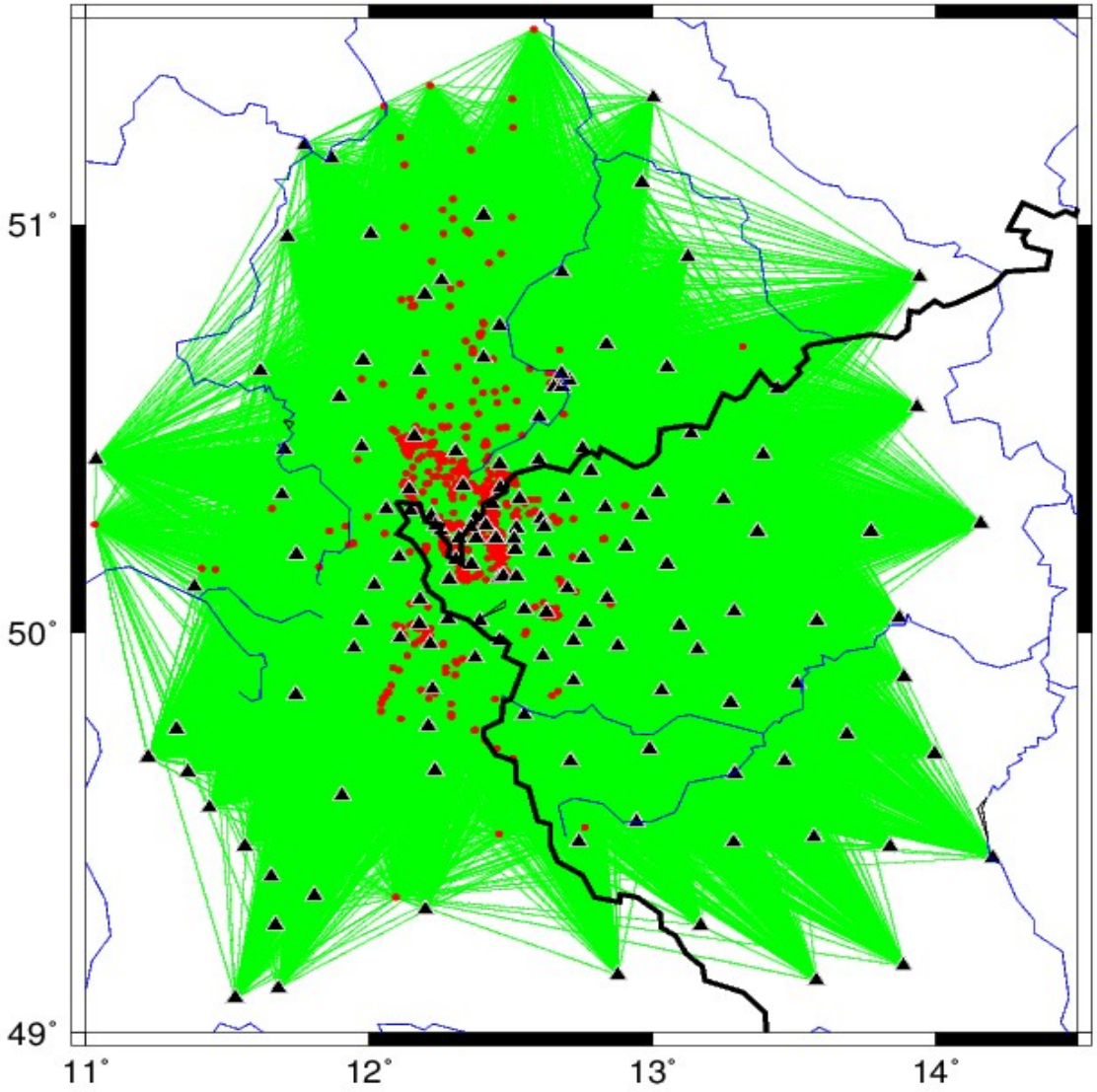
Ray coverage for all events during 2001-2008 for all stations



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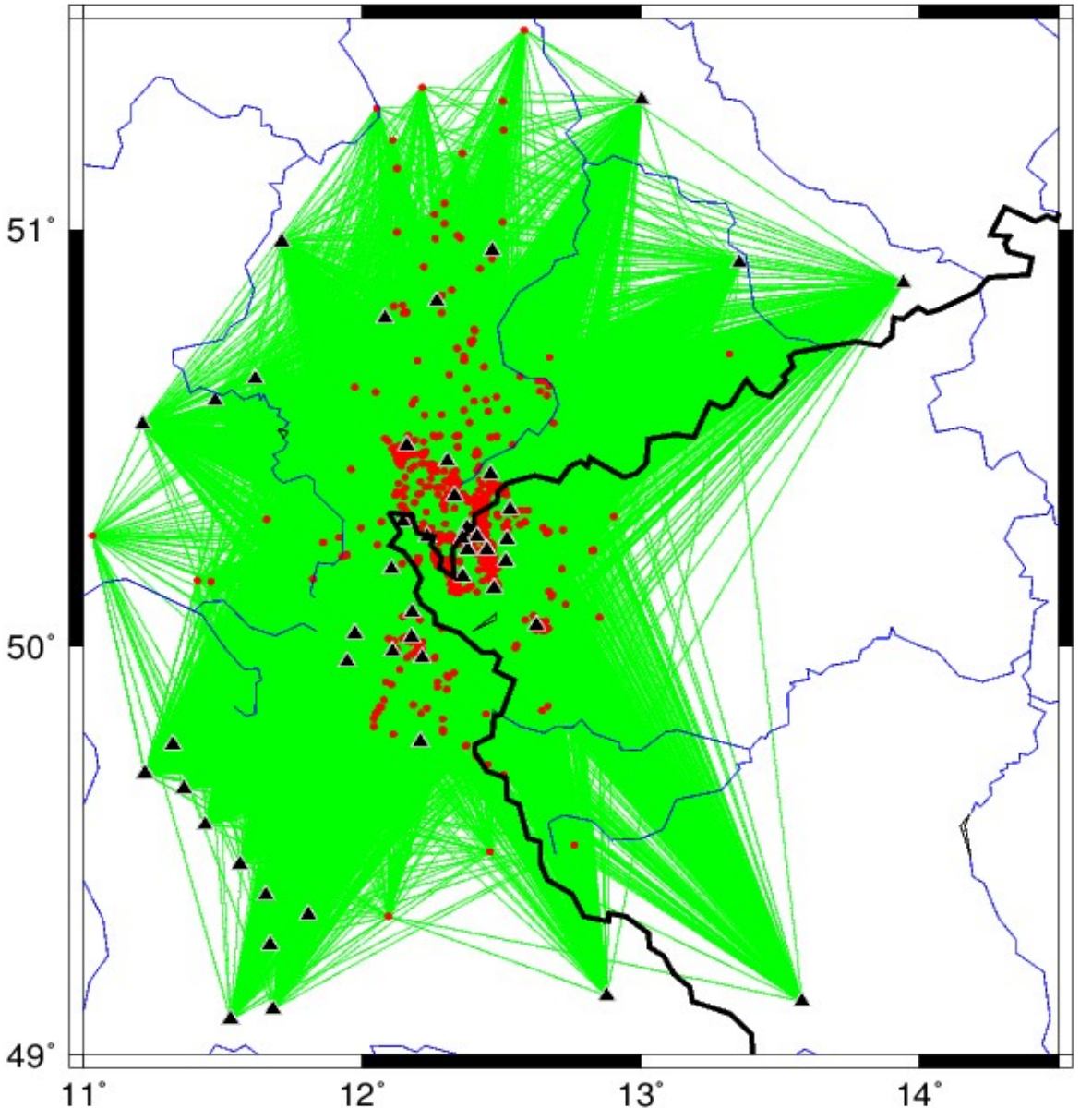
Ray coverage for all of the events of 2001-2008 for the stations which their data set are available



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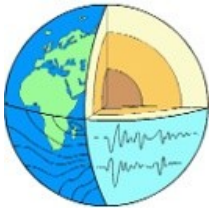

Phase picking

Seismic handler

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29-AUG-2000_12:13:15.67

Terminal

sima@dell: ~/project/data/Dirk/V2000/AUG291213-

```
|sh> read 6-15
|sh> read all 6-15
|sh> ^C
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sima@dell:~/project/data/Dirk/V2000/AUG291213-$
sima@dell:~/project/data/Dirk/V2000/AUG291213-$ xopen;;
bash: syntax error near unexpected token `;;'
sima@dell:~/project/data/Dirk/V2000/AUG291213-$ SH

SeismicHandler version 5.5 February-2011, Copyright (C) 2011
Klaus Stammler, Federal Institute for Geosciences and Natural Res
ources (BGR)
SeismicHandler comes with ABSOLUTELY NO WARRANTY.
This is free software, and you are welcome to redistribute it
under certain conditions; type `HELP GPL' for details.

|sh> xopen;;
|sh> ^C
sima@dell:~/project/data/Dirk/V2000/AUG291213-$
sima@dell:~/project/data/Dirk/V2000/AUG291213-$
sima@dell:~/project/data/Dirk/V2000/AUG291213-$
sima@dell:~/project/data/Dirk/V2000/AUG291213-$ SH

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under certain conditions; type `HELP GPL' for details.

|sh> xopen;;
|sh> read all 6-15
|sh> del all
|sh> read all all
|sh> del 1-3
|sh> del 22-57
|sh> norm sw
|sh> demean all
|sh>
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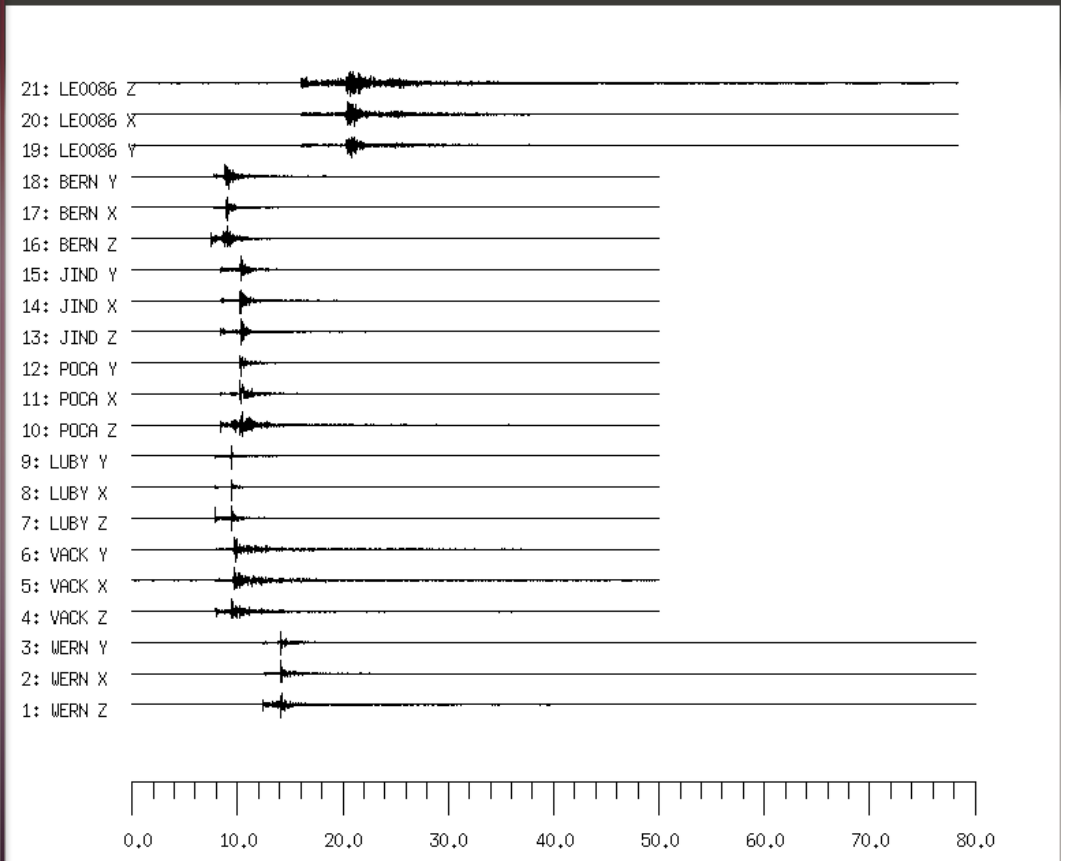
Wdw 1 (Graphic)



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LUBY lat: 50.26020 lon: 12.35920

Terminal

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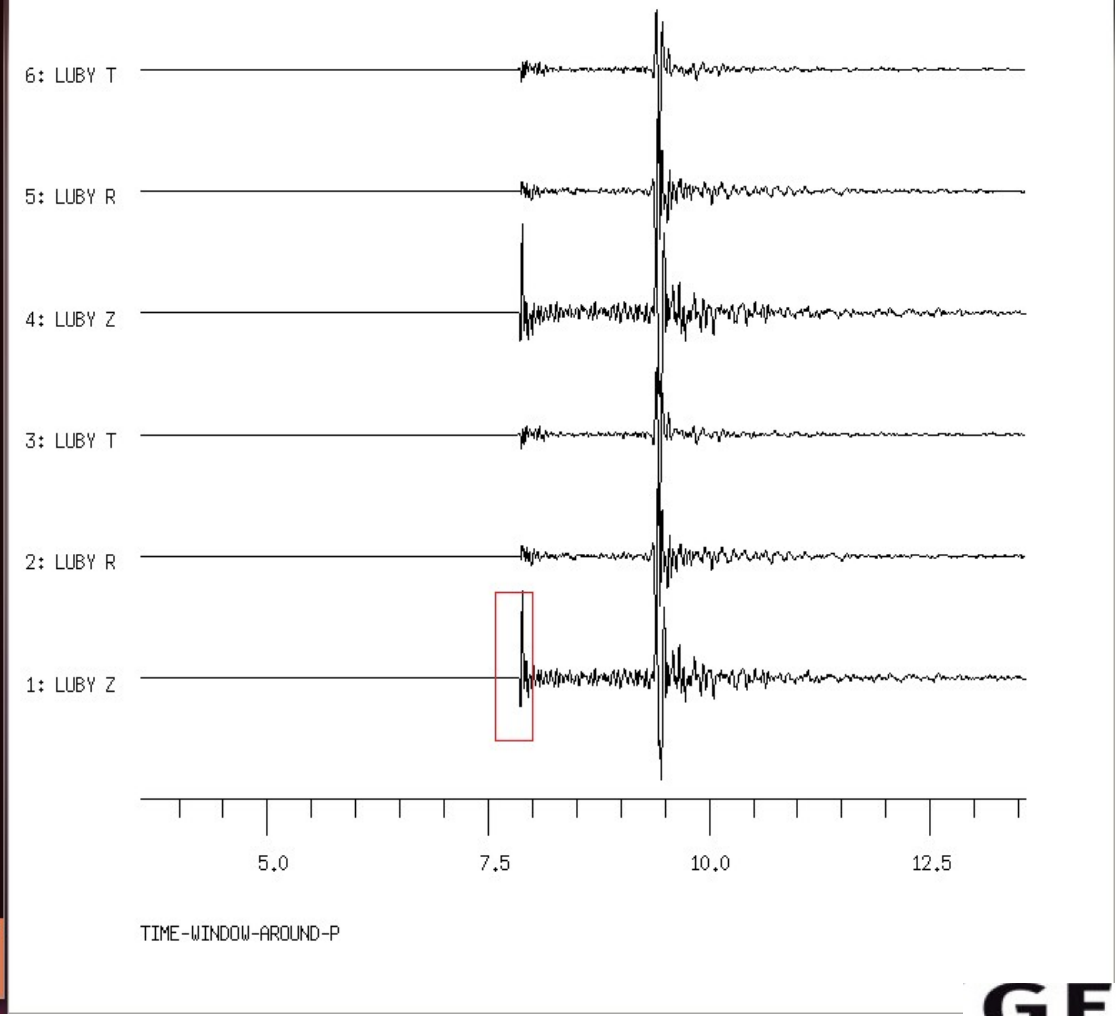

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LUBY lat: 50.26020 lon: 12.35920

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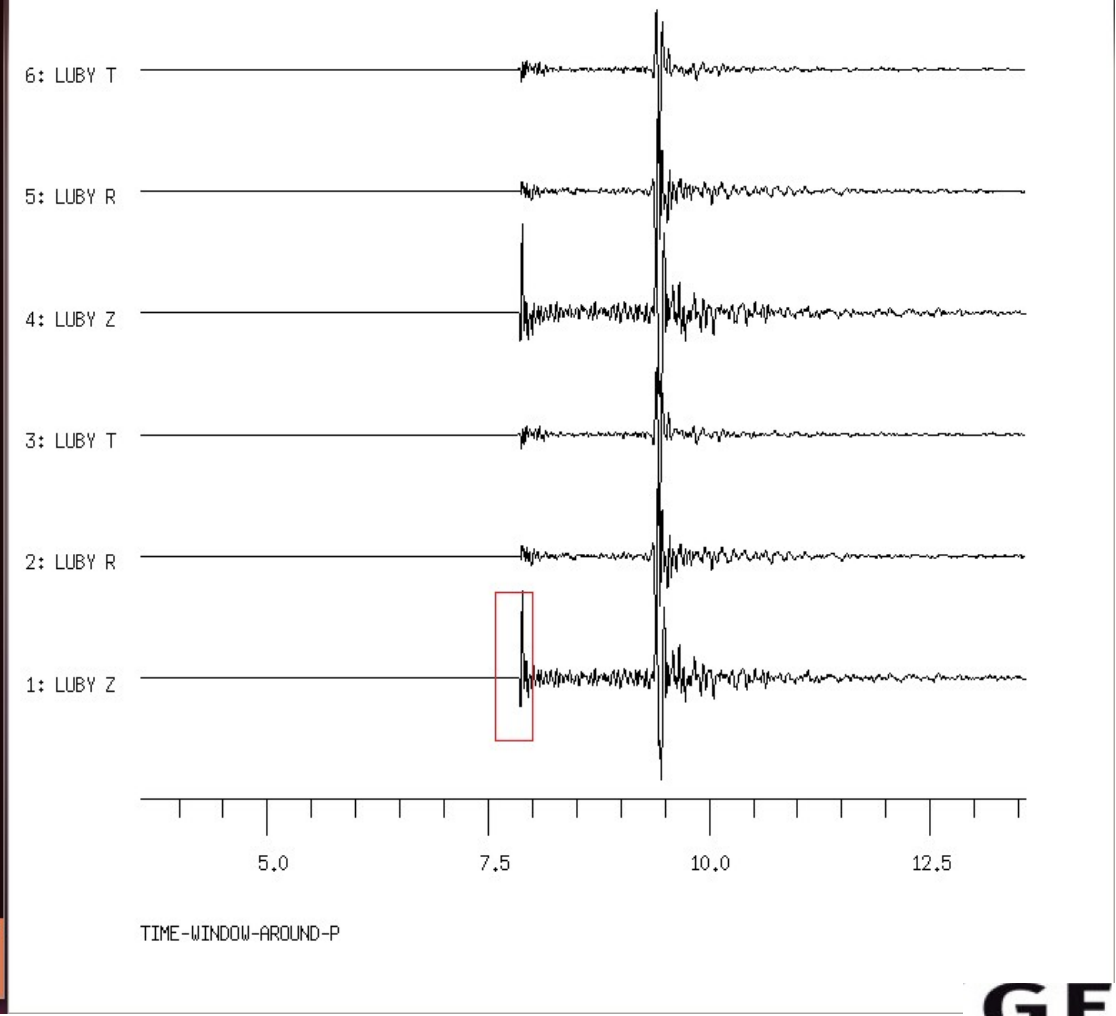

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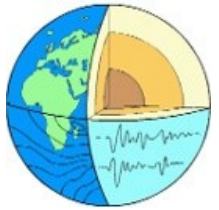

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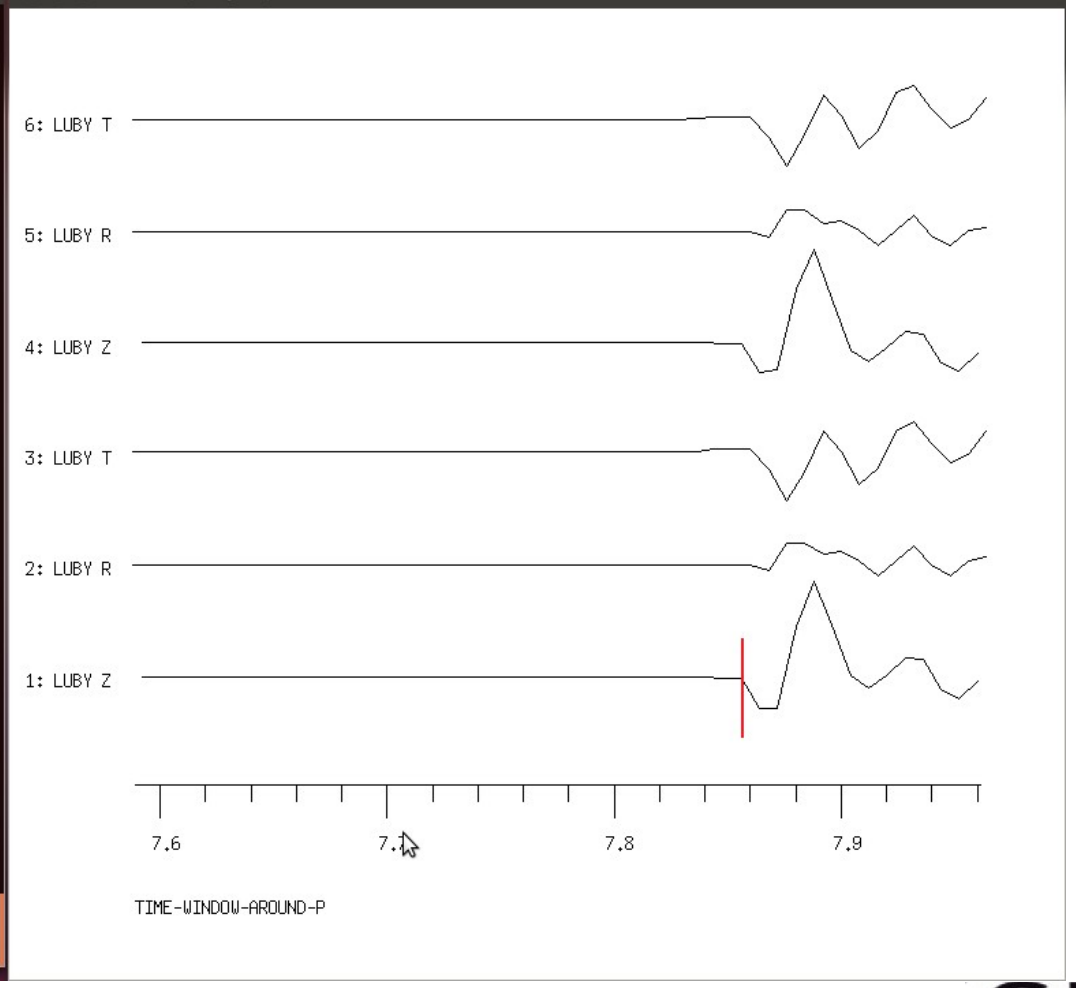

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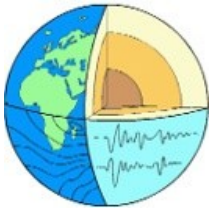

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Open Save Undo

masterevent.dat

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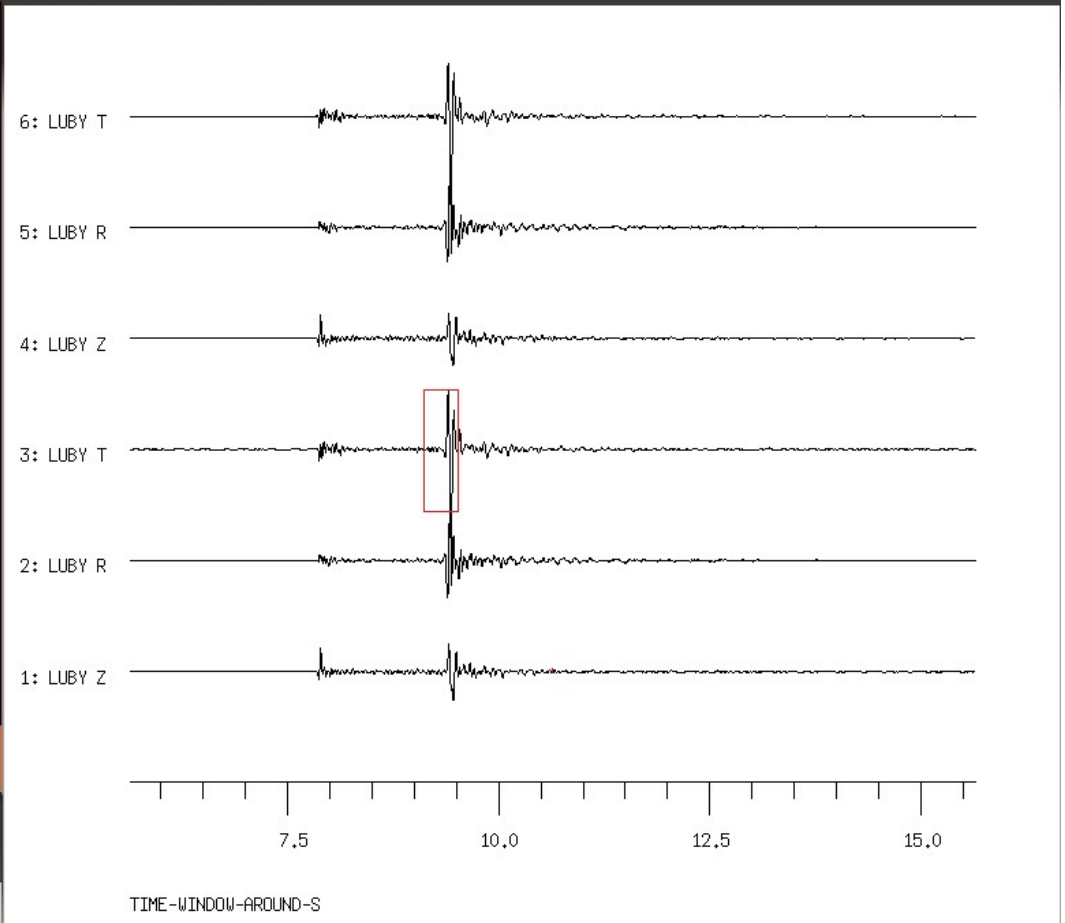

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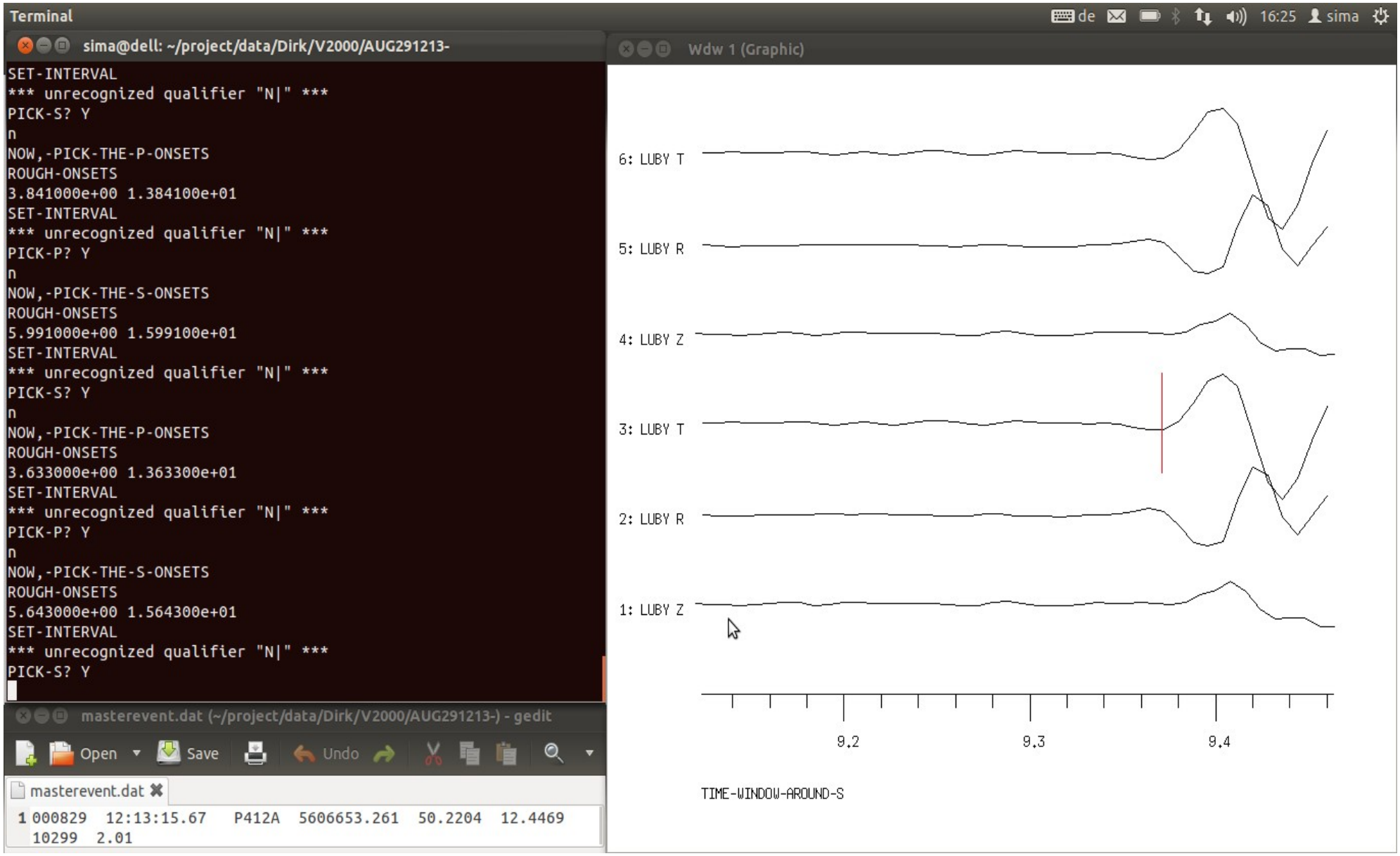

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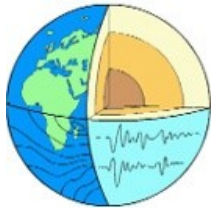

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VACK P 2.238000e+00 2.242000e+00 2.235000e+00 Q
VACK S 4.000000e+00 4.004000e+00 3.993000e+00

LUBY P 2.183000e+00 2.185000e+00 2.180000e+00 Y
LUBY S 3.677000e+00 3.680000e+00 3.675000e+00

POCA P 2.667000e+00 2.669000e+00 2.661000e+00 Q
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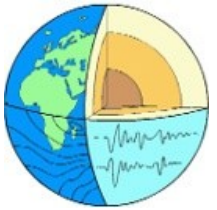

Results of picking in next stages

Stage 2 & 3 : Seismic Tomography

Hypocenter location by VELEST & SIMUL2000

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