ROMANIAN SEISMIC NETWORK

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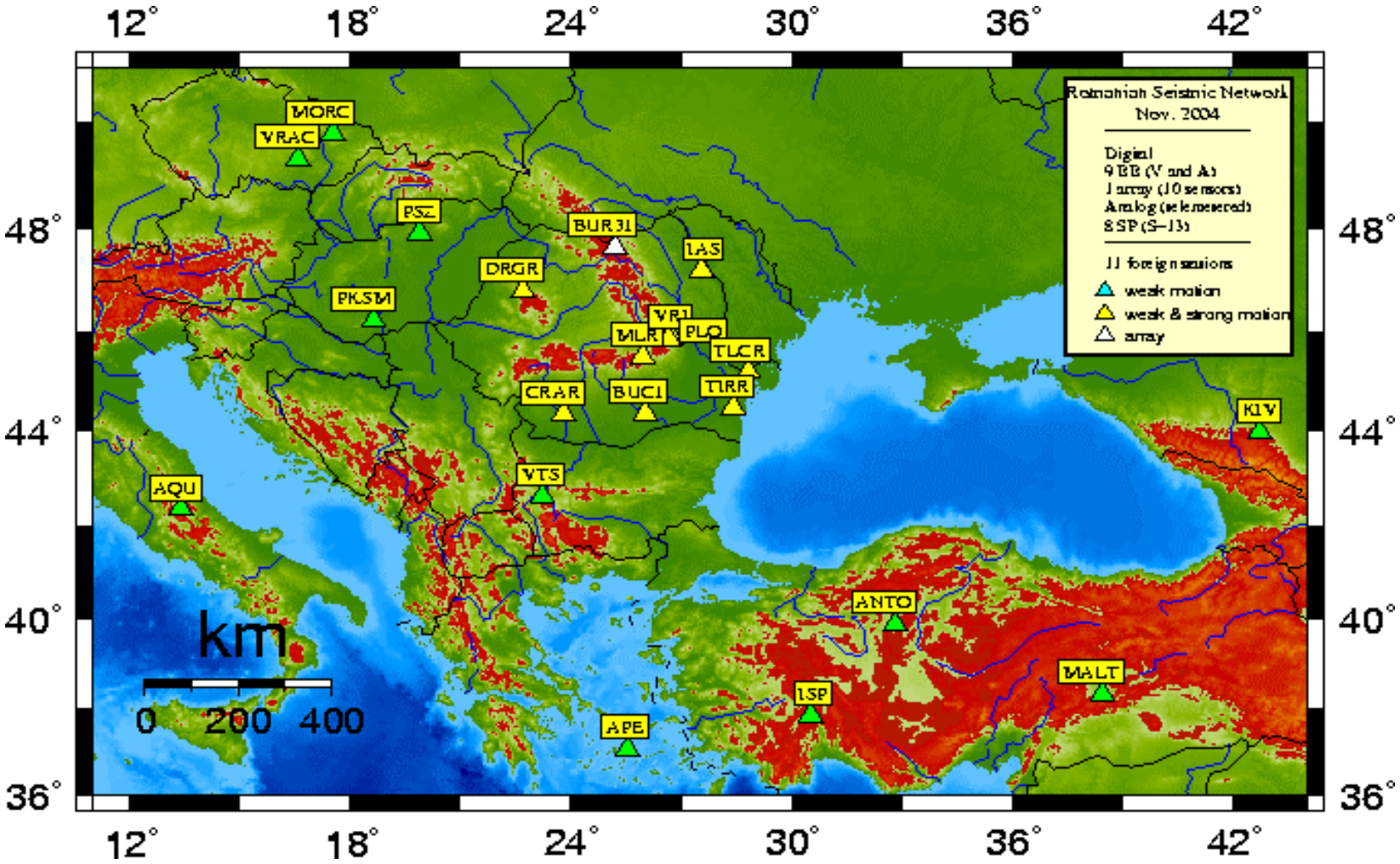
CONTENT

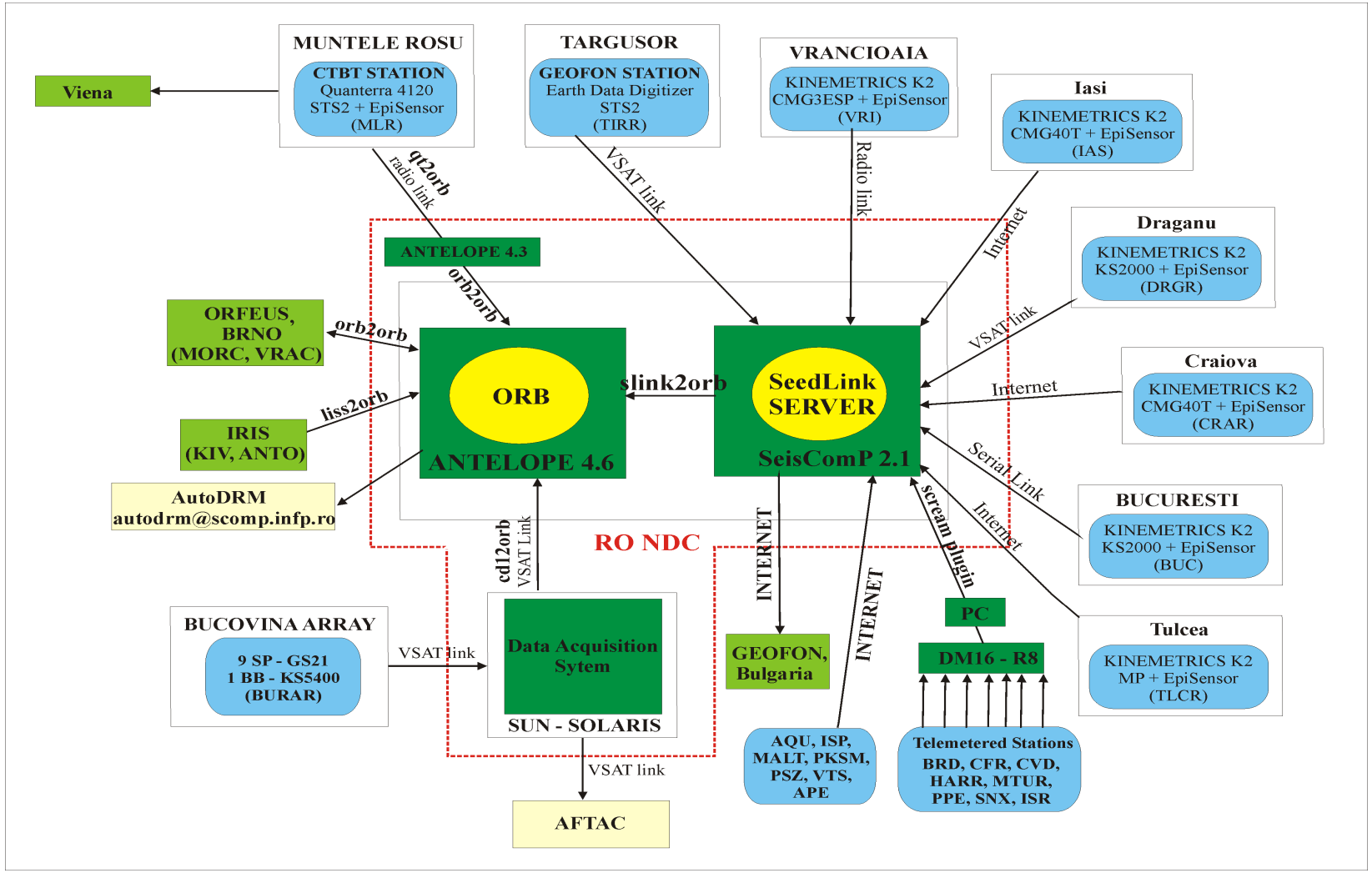
- General overview of the Romanian Seismic Network
- Building master table files
- The 27 October 2004 seismic event.
  - Waveform measurements
  - Building the shakemap.

Romanian Seismic Network - Nov. 2004

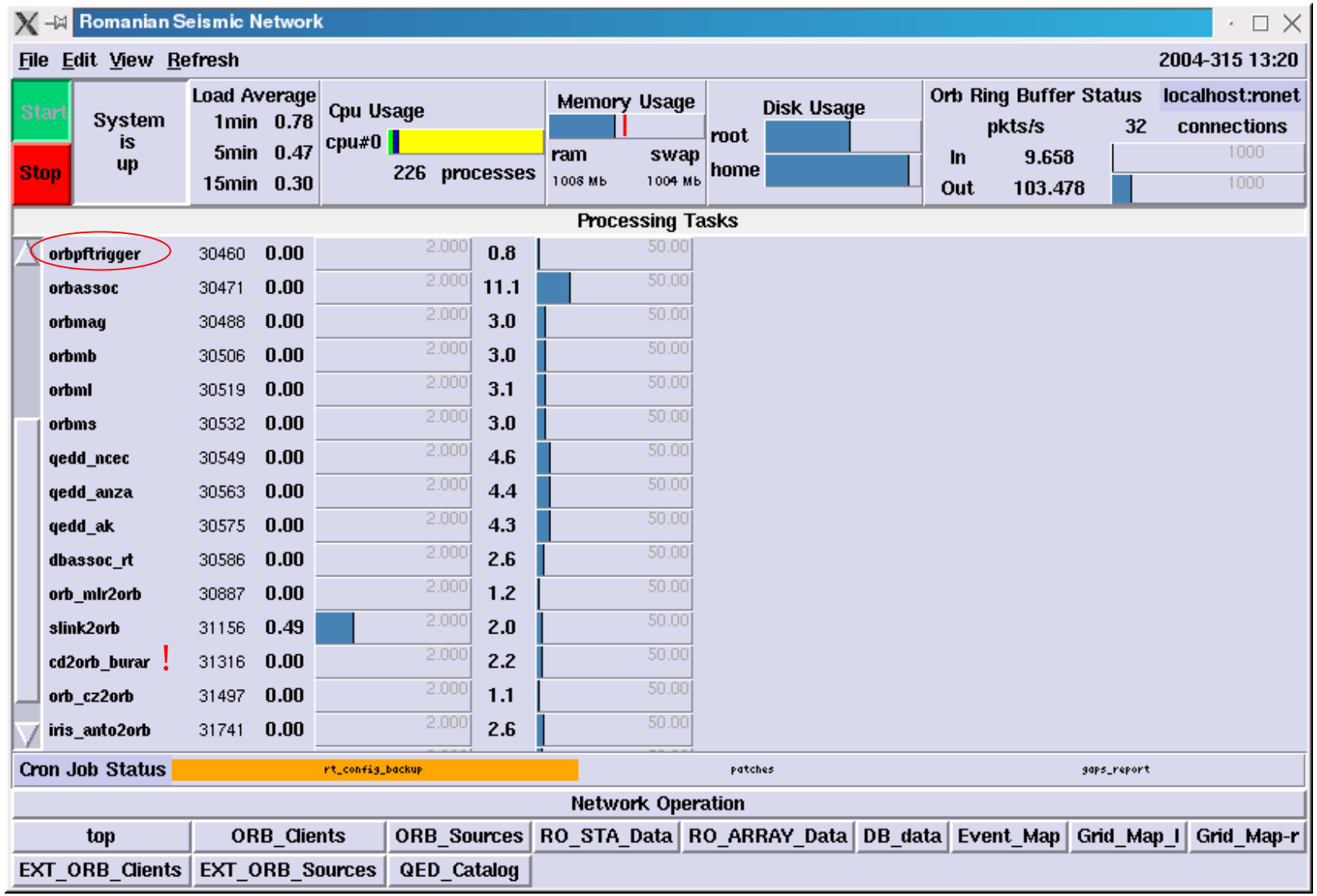
The BB network was installed in the framework of the Romanian-German cooperation, within the project “Strong Earthquakes: A challenge for Geosciences and Civil Engineering” of the University of Karlsruhe, Germany.



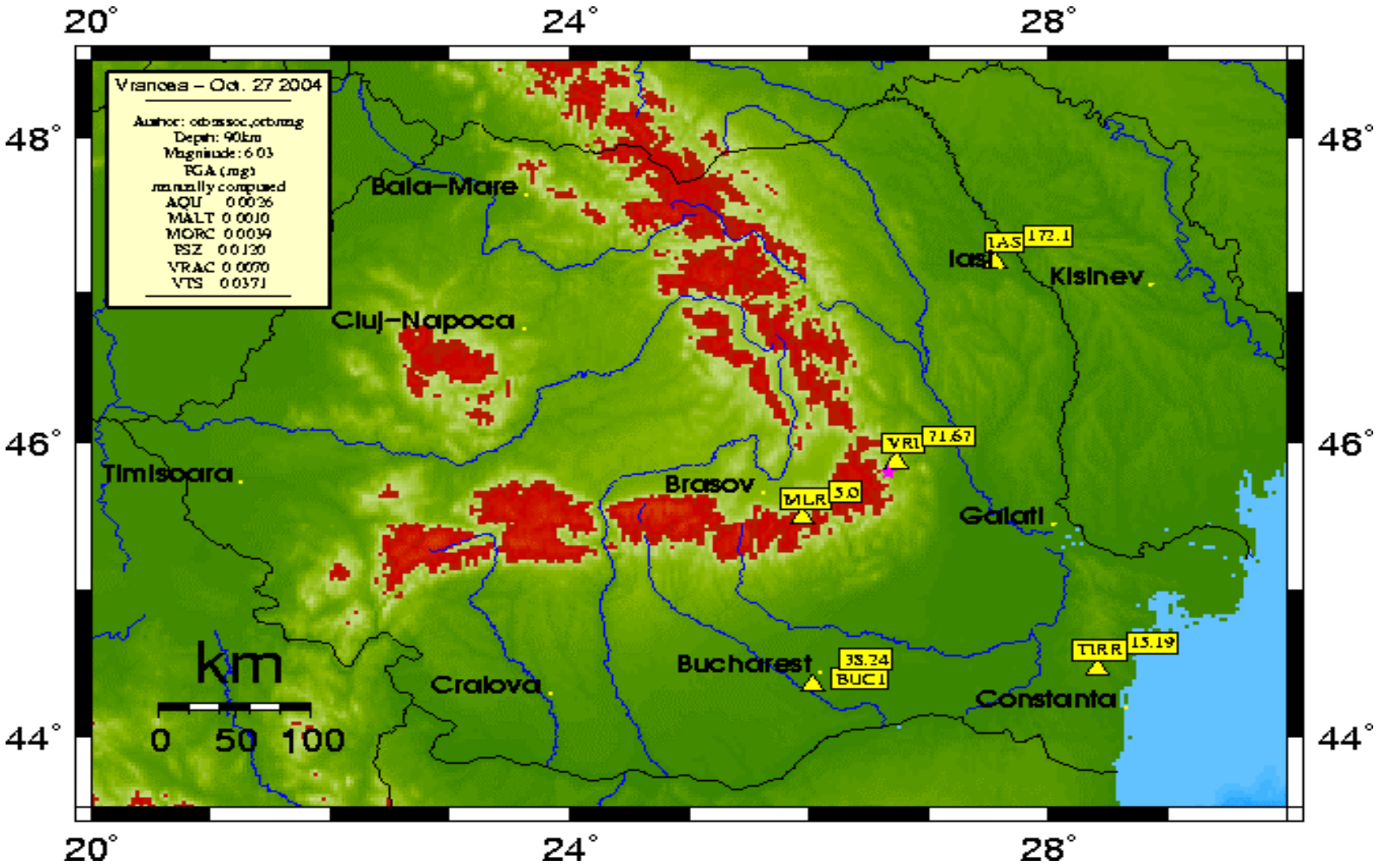
Seismic Data Flow at RO NDC



Antelope 4.6 - Processing Tasks



Vrancea - Oct. 27 2004



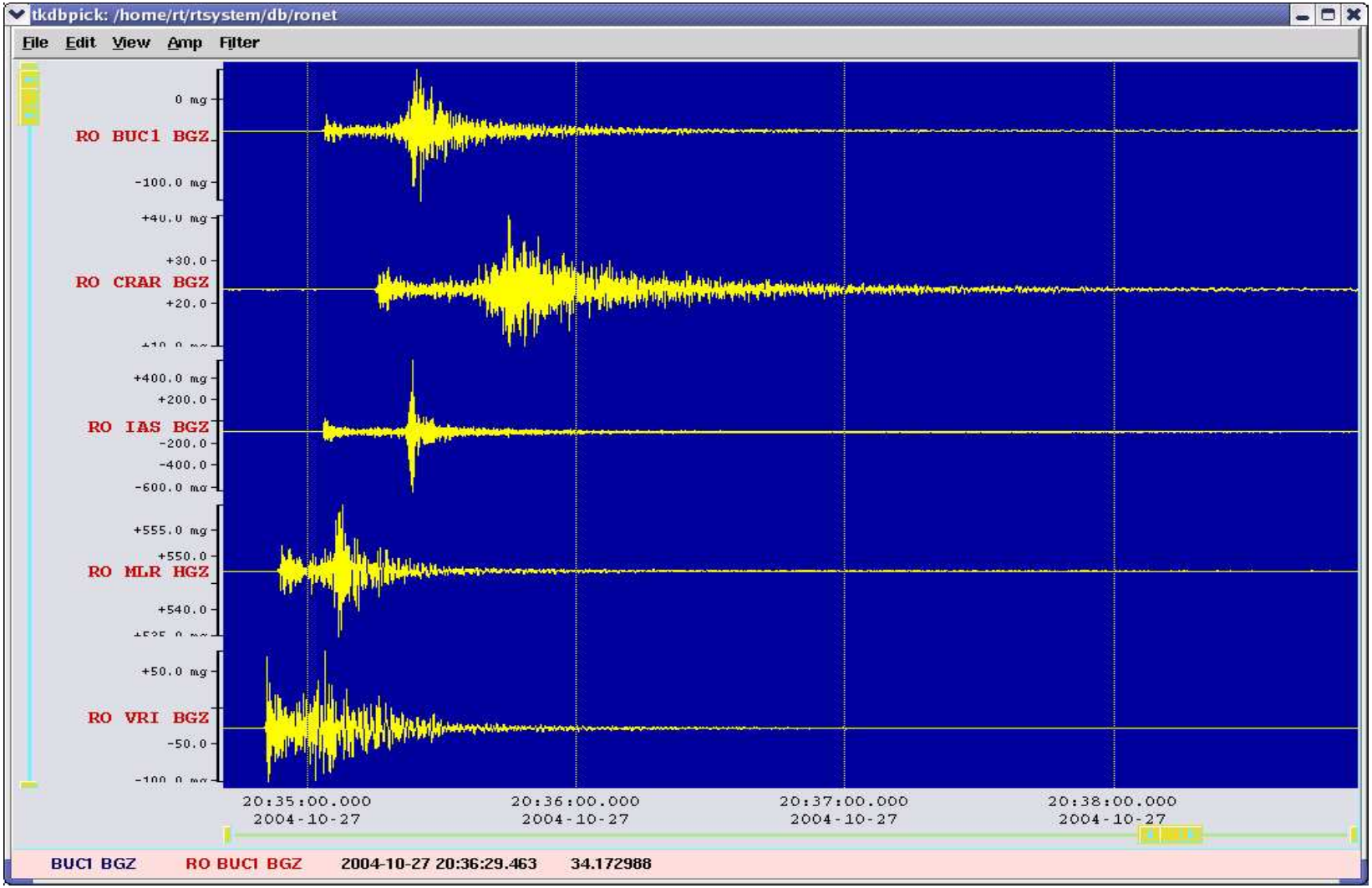
How to produce automatically a post-event seismic bulletin

- **rtauto** - based on Antelope rtbulletin
- options to print and send email to list
- includes more information
- execution triggered by orbpftrigger
- a map is also produced

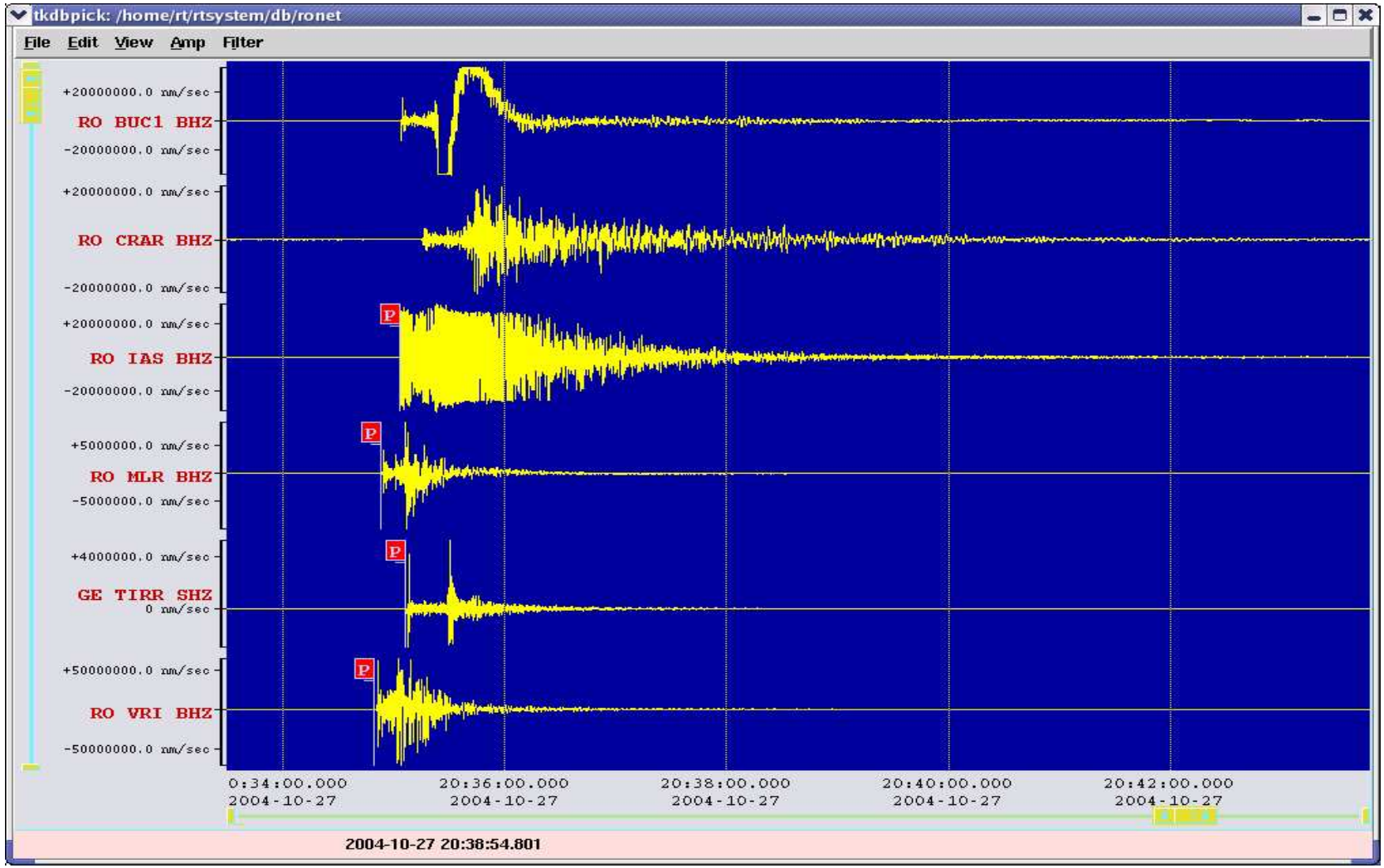
Which is the best strategy to activate it ?

```
Event      817 ROMANIA

Date          Time        Err   RMS Latitude Longitude  Smaj  Smin  Az Depth   Err Ndef Nsta Gap  mdist  Mdist Qual   Author      OrigID
2004/10/27 20:34:36.81  -1.00  0.30  45.7990   26.6651  -1.0  -1.0  -1  90.0  -1.0   12   12  93   0.08  11.48 a i uk orbassoc       1092

Magnitude   Err Nsta Author      OrigID

Sta     Dist  EvAz Phase        Time      TRes  Azim AzRes   Slow   SRes Def   SNR       Amp    Per Qual Magnitude    ArrID
ANTO    7.44 140.7 P        20:36:22.361  -0.2                          T__  90.6                m__                 11091
AQU    10.12 254.8 P        20:36:59.103   0.1                          T__ 133.7                m__                 11092
BUC1    1.52 197.4 P        20:35:02.977   0.2                          T__ 1020.                m__  ml   7.05    11093
                                                                                                      mb   6.85
IAS     1.52  23.4 P        20:35:03.092   0.3                          T__ 2116.                m__  ml   7.28    11094
                                                                                                      mb   7.09
MALT   11.48 126.5 P        20:37:17.330  -0.3                          T__ 194.3                m__                 11095
MLR     0.59 238.8 P        20:34:52.764   0.5                          T__ 24887                m__  ml   6.03    11096
                                                                                                      mb   5.71
MORC    7.30 306.3 P        20:36:20.399  -0.3                          T__  51.1                m__                 11097
PSZ     5.09 297.1 P        20:35:50.175  -0.4                          T__  55.1                m__  ml   4.53    11098
                                                                                                      mb   4.62
TIRR    1.82 136.8 P        20:35:06.355  -0.3                          T__ 37575                m__  ml   6.29    11099
                                                                                                      mb   6.08
VRAC    7.64 301.0 P        20:36:25.838   0.5                          T__ 359.1                m__                 11100
VRI     0.08  33.1 P        20:34:49.627   0.2                          T__ 33680                m__  ml   5.65    11101
                                                                                                      mb   5.60
VTS     4.02 218.9 P        20:35:35.897  -0.2                          T__ 1974.                m__  ml   5.05    11102
                                                                                                      mb   4.45
```

tkdbpick - acceleration channels



tkdbpick - velocity channels



The ShakeMap Problem

dbgme - 2-D ground-motion estimation from a database of hypocenters and measurements

ground-motion values : - Peak Ground Acceleration (PGA)
- Peak Ground Velocity (PGV)
- intrumental modified-Mercalli intensity
- spectrally filtered accelerations
- data available in qrid table and gme files

- based on delegates (trinetsm_es99, trinetsm_es99_mmi)
  - direct measurements used where possible
  or
  - computed by a *recipe*

dbgme_show - plot a gme file (*mode shade ?*)

Getting the dbgme input data

dbwfmeas - fills the wfmeas and / or wfmgme tables

dbwfmeas - single mode

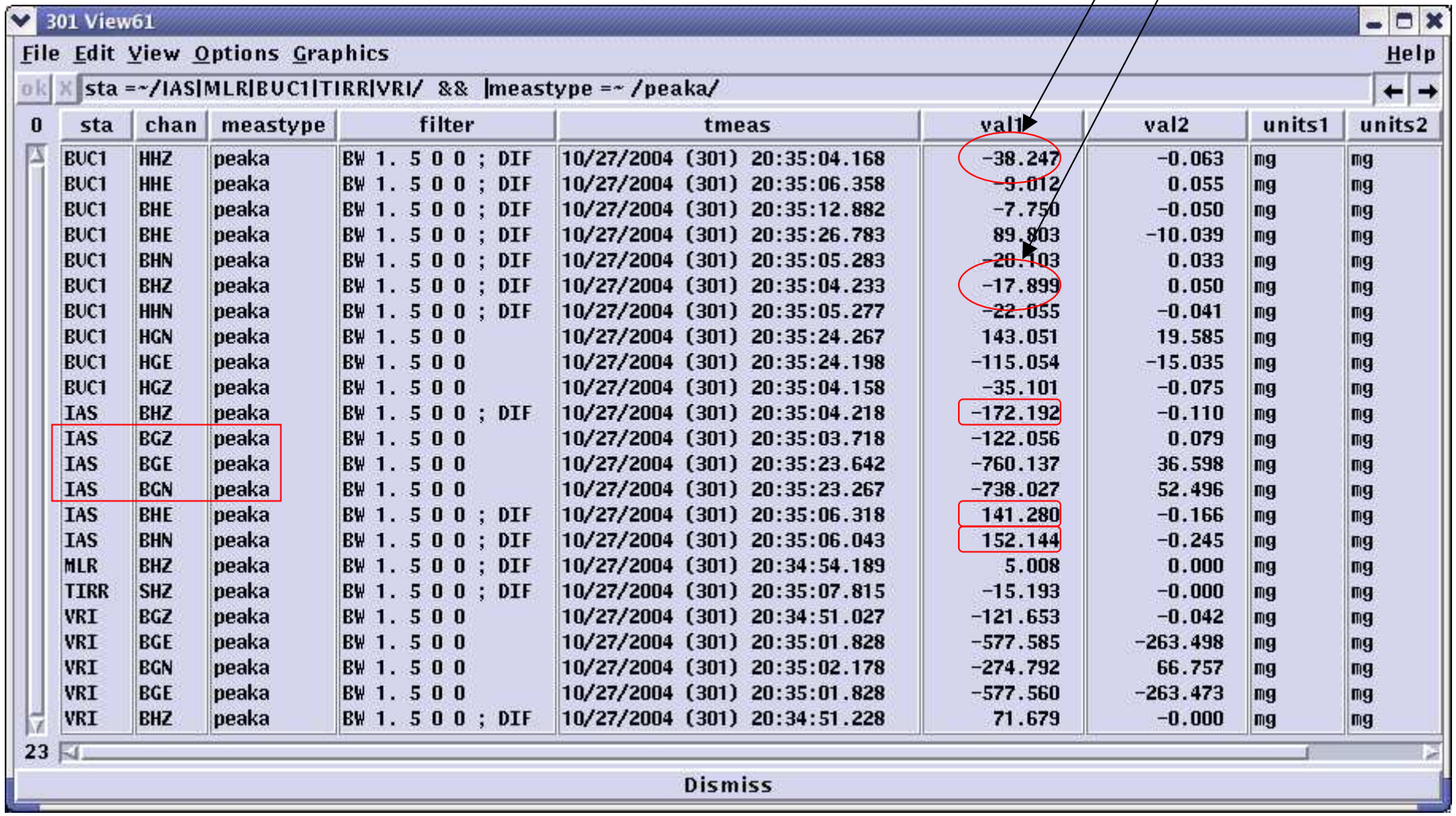
- wfmeas table

- *val1 and val2 ?*

- *high sampling rate vs. low sampling rate, which one to use ?*

100 sps

20 sps

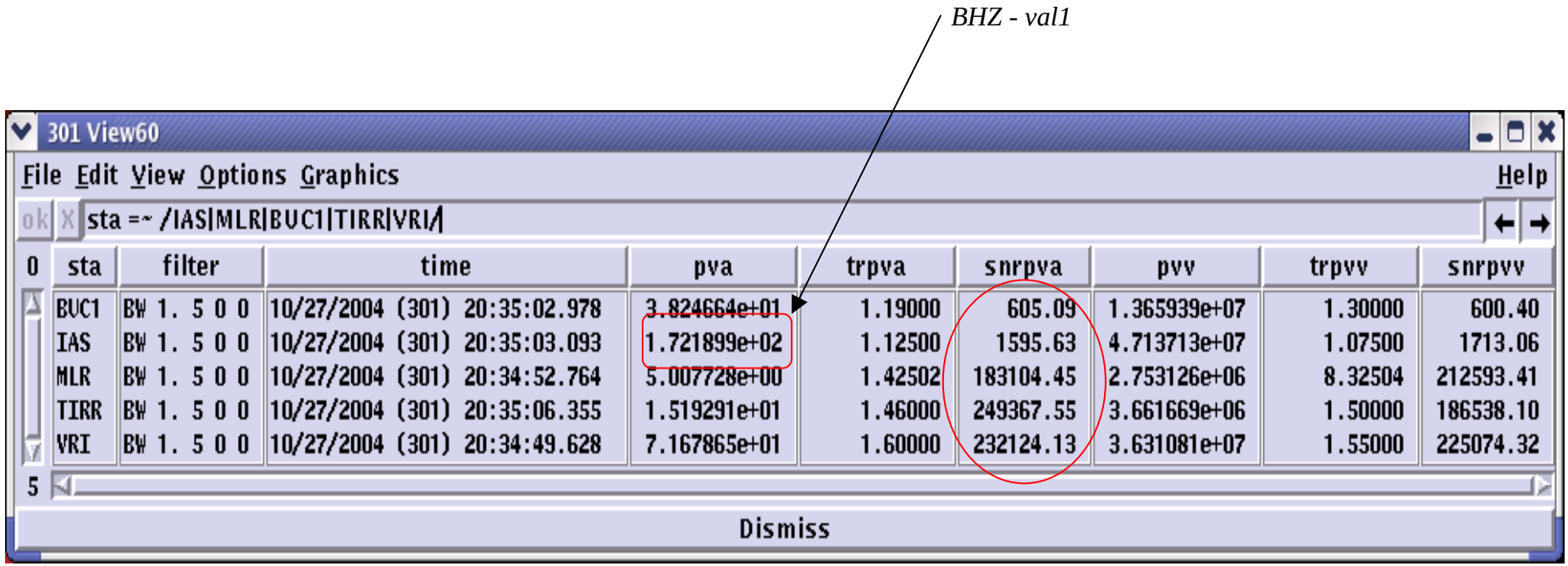


0	sta	chan	meastype	filter	tmeas	val1	val2	units1	units2
	BUC1	HHZ	peaka	BW 1. 5 0 0 ; DIF	10/27/2004 (301) 20:35:04.168	-38.247	-0.063	mg	mg
	BUC1	HHE	peaka	BW 1. 5 0 0 ; DIF	10/27/2004 (301) 20:35:06.358	-3.012	0.055	mg	mg
	BUC1	BHE	peaka	BW 1. 5 0 0 ; DIF	10/27/2004 (301) 20:35:12.882	-7.750	-0.050	mg	mg
	BUC1	BHE	peaka	BW 1. 5 0 0 ; DIF	10/27/2004 (301) 20:35:26.783	89.803	-10.039	mg	mg
	BUC1	BHN	peaka	BW 1. 5 0 0 ; DIF	10/27/2004 (301) 20:35:05.283	-28.103	0.033	mg	mg
	BUC1	BHZ	peaka	BW 1. 5 0 0 ; DIF	10/27/2004 (301) 20:35:04.233	-17.899	0.050	mg	mg
	BUC1	HHN	peaka	BW 1. 5 0 0 ; DIF	10/27/2004 (301) 20:35:05.277	-22.055	-0.041	mg	mg
	BUC1	HGN	peaka	BW 1. 5 0 0	10/27/2004 (301) 20:35:24.267	143.051	19.585	mg	mg
	BUC1	HGE	peaka	BW 1. 5 0 0	10/27/2004 (301) 20:35:24.198	-115.054	-15.035	mg	mg
	BUC1	HGZ	peaka	BW 1. 5 0 0	10/27/2004 (301) 20:35:04.158	-35.101	-0.075	mg	mg
	IAS	BHZ	peaka	BW 1. 5 0 0 ; DIF	10/27/2004 (301) 20:35:04.218	-172.192	-0.110	mg	mg
	IAS	BGZ	peaka	BW 1. 5 0 0	10/27/2004 (301) 20:35:03.718	-122.056	0.079	mg	mg
	IAS	BGE	peaka	BW 1. 5 0 0	10/27/2004 (301) 20:35:23.642	-760.137	36.598	mg	mg
	IAS	BGN	peaka	BW 1. 5 0 0	10/27/2004 (301) 20:35:23.267	-738.027	52.496	mg	mg
	IAS	BHE	peaka	BW 1. 5 0 0 ; DIF	10/27/2004 (301) 20:35:06.318	141.280	-0.166	mg	mg
	IAS	BHN	peaka	BW 1. 5 0 0 ; DIF	10/27/2004 (301) 20:35:06.043	152.144	-0.245	mg	mg
	MLR	BHZ	peaka	BW 1. 5 0 0 ; DIF	10/27/2004 (301) 20:34:54.189	5.008	0.000	mg	mg
	TIRR	SHZ	peaka	BW 1. 5 0 0 ; DIF	10/27/2004 (301) 20:35:07.815	-15.193	-0.000	mg	mg
	VRI	BGZ	peaka	BW 1. 5 0 0	10/27/2004 (301) 20:34:51.027	-121.653	-0.042	mg	mg
	VRI	BGE	peaka	BW 1. 5 0 0	10/27/2004 (301) 20:35:01.828	-577.585	-263.498	mg	mg
	VRI	BGN	peaka	BW 1. 5 0 0	10/27/2004 (301) 20:35:02.178	-274.792	66.757	mg	mg
	VRI	BGE	peaka	BW 1. 5 0 0	10/27/2004 (301) 20:35:01.828	-577.560	-263.473	mg	mg
	VRI	BHZ	peaka	BW 1. 5 0 0 ; DIF	10/27/2004 (301) 20:34:51.228	71.679	-0.000	mg	mg

23

dbwfmeas - vector mode

- wfmgme table
- *how to take into account the snrpva values ?*



0	sta	filter	time	pva	trpva	snrpva	pvv	trpvv	snrpvv
	BUC1	BW 1. 5 0 0	10/27/2004 (301) 20:35:02.978	3.824664e+01	1.19000	605.09	1.365939e+07	1.30000	600.40
	IAS	BW 1. 5 0 0	10/27/2004 (301) 20:35:03.093	1.721899e+02	1.12500	1595.63	4.713713e+07	1.07500	1713.06
	MLR	BW 1. 5 0 0	10/27/2004 (301) 20:34:52.764	5.007728e+00	1.42502	183104.45	2.753126e+06	8.32504	212593.41
	TIRR	BW 1. 5 0 0	10/27/2004 (301) 20:35:06.355	1.519291e+01	1.46000	249367.55	3.661669e+06	1.50000	186538.10
	VRI	BW 1. 5 0 0	10/27/2004 (301) 20:34:49.628	7.167865e+01	1.60000	232124.13	3.631081e+07	1.55000	225074.32

5

Antelope and KMI's Strong Motion Analyst (SMA)

Waveform parameters comparison - pga (mg)

	Antelope database (20/40/100sps)				K2 .evt files (200sps)		
	dbwfmeas (1-5 Hz)	tkdbpick (1-5Hz)			SMA (.12-5Hz)		
		N	E	Z	N	E	Z
BUC1	38.24	+121.4	-82.32	+64.69	13.4	8.0	4.4
IAS	172.18	-419.8	364.3	133.0	25.5	20.0	8.0
VRI	71.67	-271.47	-631.0	-90.0	28.0	80.0	11.0

Site specific data - dbgme_pf

```
. . .
sitecorr_file           pf/fakevs30.xyz
vs30_default_mps  600
pga_sitecorr_cutoffs_g  0 0.15 0.25 0.35
pga_sitecorr_table &Tbl{      # Short-period table
   163 1.65 1.43 1.15 0.93    # Borcherdt 1994 'E'
   298 1.34 1.23 1.09 0.96    # Borcherdt 1994 'DE'
   301 1.33 1.23 1.09 0.96    # Borcherdt 1994 'D'
   372 1.24 1.17 1.06 0.97    # Borcherdt 1994 'CD'
   464 1.15 1.10 1.04 0.98    # Borcherdt 1994 'C'
   686 0.98 0.99 0.99 1.00    # Borcherdt 1994 'BC'
   724 1.00 1.00 1.00 1.00    # Borcherdt 1994 'B'
 . . .
```

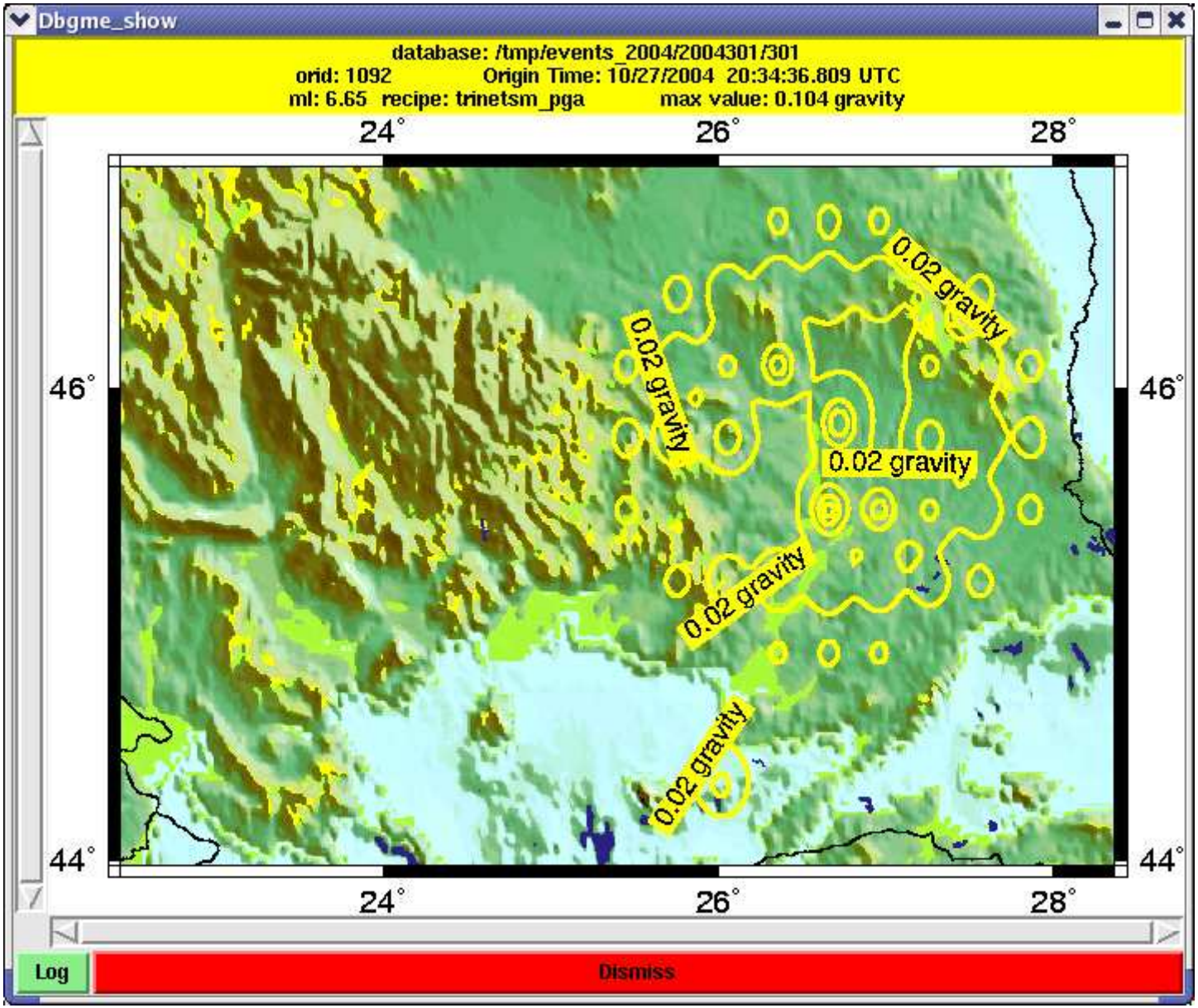
make_fake_vs30 - generate a fake vs30 input file from topographic data

input - database of GMT grid files (gmt1.0 format)

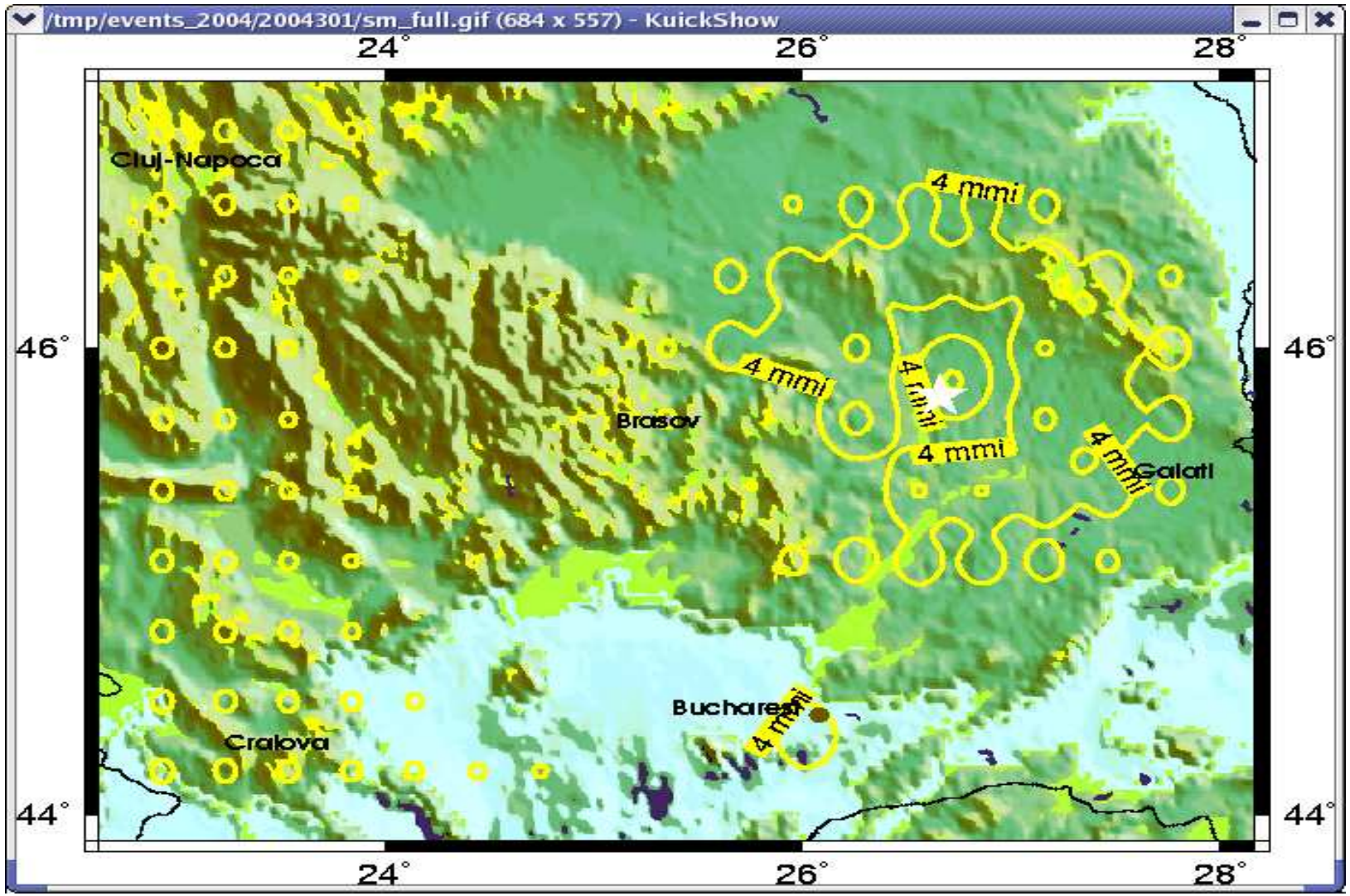
output – GMT grid file, ascii cggrid file, postscript plot

fake.grd and fake_landmask.grd not of same size !

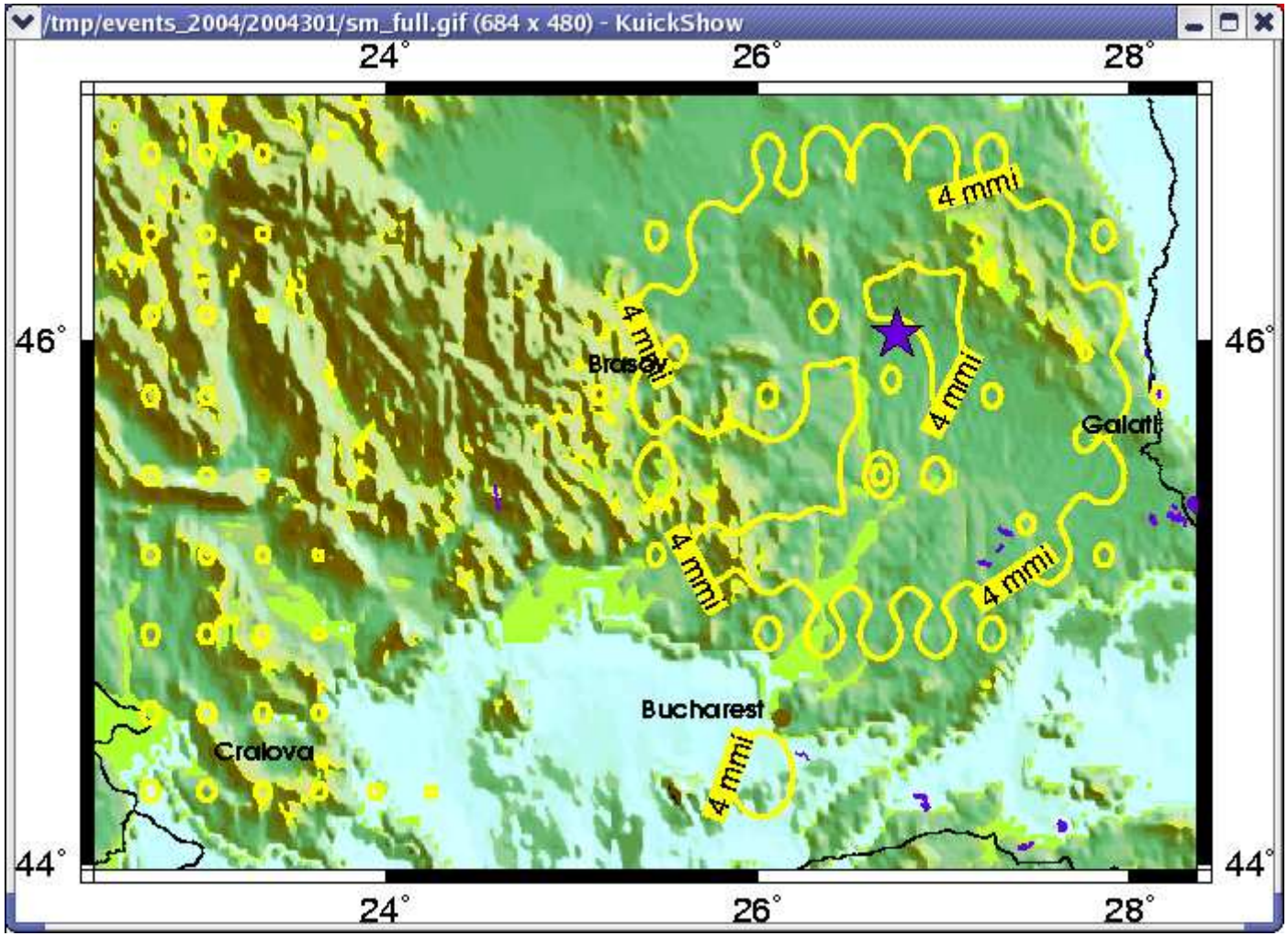
Recipe: trinetsm_pga, vs30_default_mps = 600



Recipe: trinetsm_mmi, vs30_default_mps = 600



Recipe: trinetsm_mmi, vs30_default_mps = 300



Recipe: trinetsm_mmi, vs30_default_mps = 200