Centro di Ricerche Sismologiche

CRS

Antelope usage @ OGS

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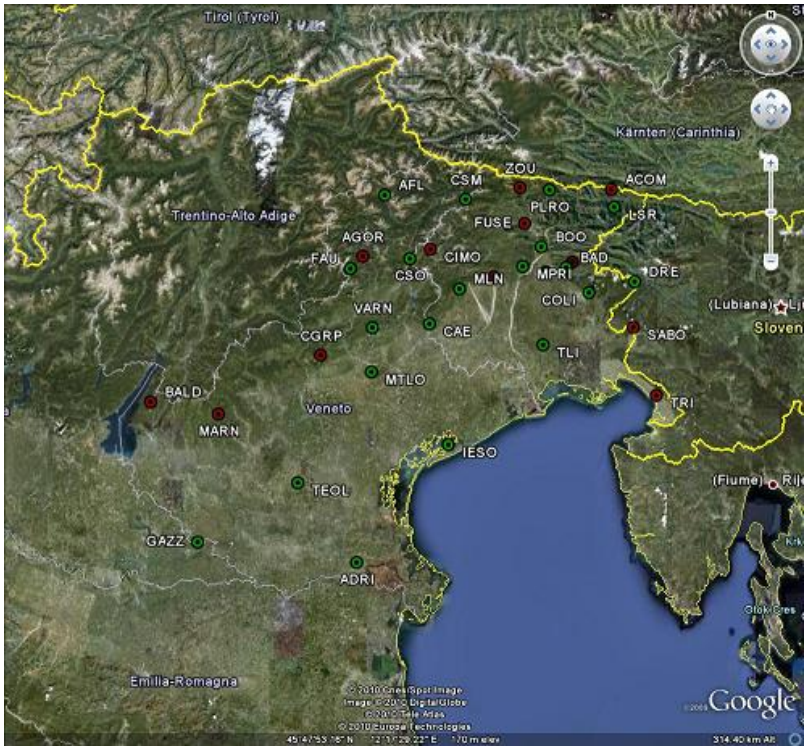
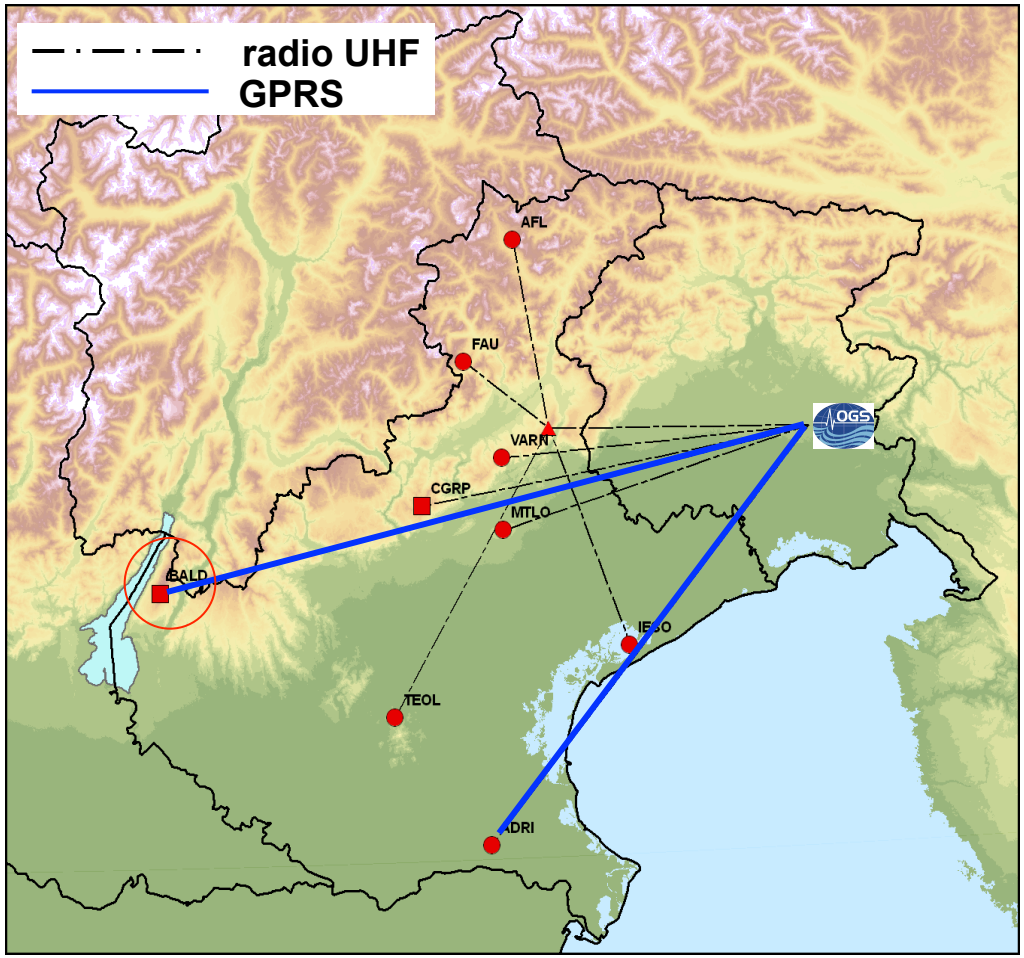
NE Italy Seismic Network - OGS



- 12 BB stations
  - mostly Q330 + STS-2
  - real time, continuous
- 21 SP stations
  - Mars88 + Lennartz 1sec
  - real time, on trigger

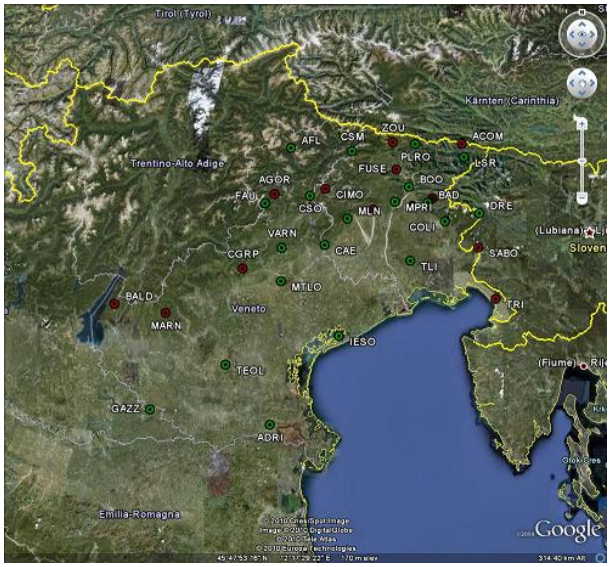
How is data transmitted?



- Digital UHF radio system
  - bandwidth 19.2kb/s
  - shared frequencies
- GPRS modem
- Satellite (1 site)

OGS-CRS: monitoring NE Italy seismicity

- 2 people on call duty H24 for 1 week
  - 1 seismologist + 1 technician
- Intervention in office for events with M>3.5
- OGS staff intervention at Civil Protection headquarters for events with M>4.5



CRS headquarters in Udine (Italy)

Intervention at CRS headquarters for:

- operations checking
- review / confirmation of the location and magnitude (picking of S waves)
- control over any replicas of earthquake
- maintain the link with the structures of the regional Civil Protection

Data acquisition with Antelope @ OGS: how it all started

INTERREG III A Italia-Austria

2000-2006

"SEISMOLOGICAL NETWORKS WITHOUT FRONTIERS IN THE SOUTH EASTERN ALPS"

Participants:

- ZAMG (Vienna, Austria)
- OGS (Udine, Italy)
- DST (Trieste, Italy)
- ARSO (Ljubljana, Slovenia), external

OGS Virtual Seismic Network (~100 real-time stations)

SED

Provincia di Trento

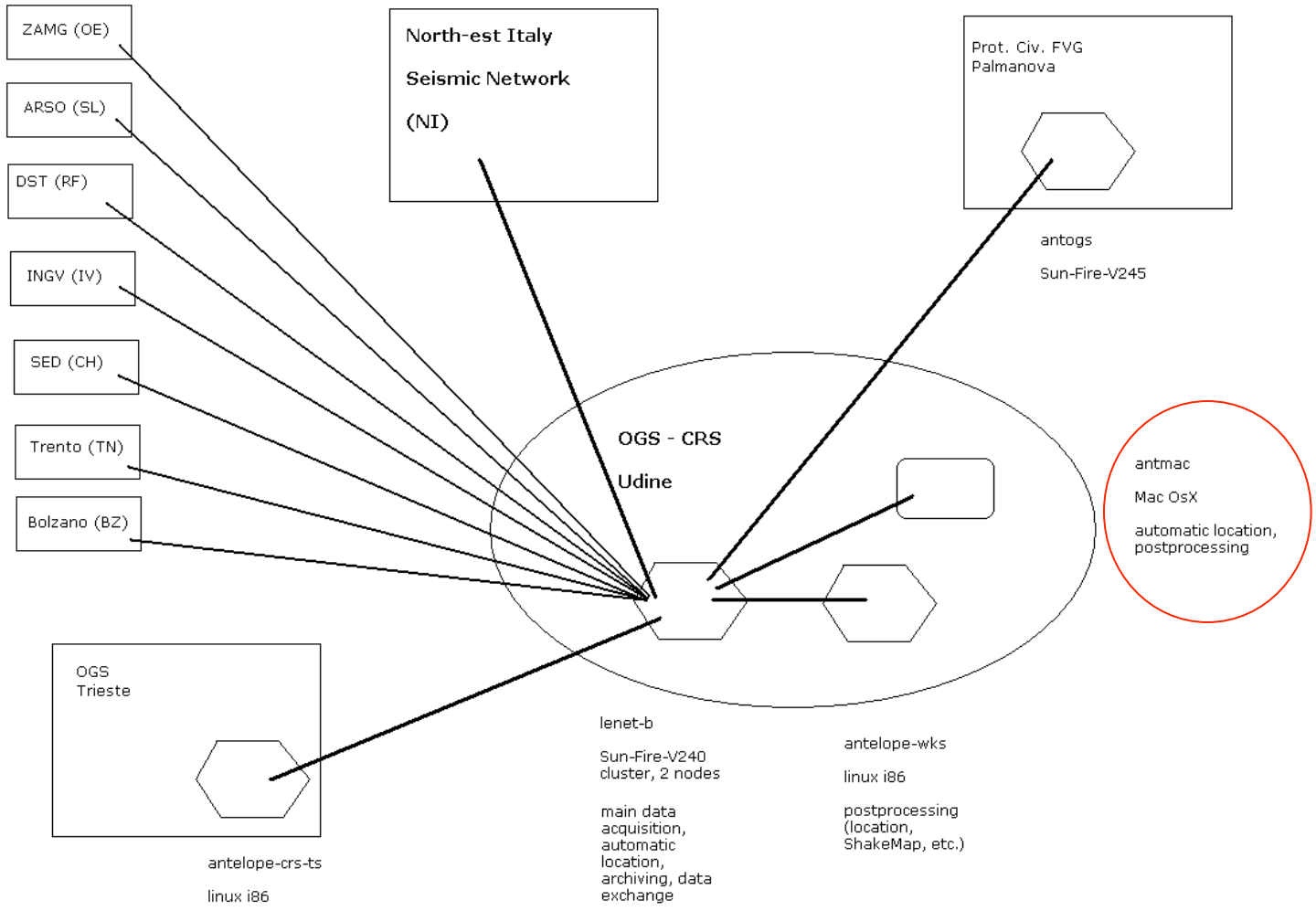
Provincia di Bolzano

INGV

ZAMG

Dipartimento di Geoscienze

OGS Antelope configuration



main rtexec processes table

```
Processes &Tbl{
orbserver                       orbserver -p $ORB orbserver
orbexport                       orbserver -p $ORBEXPORT orbexport
orbvino                         orbserver -p $ORBVINO orbvino
orbsor                          orbserver -p $ORBSOR orbsor
orbasain                        orbserver -p $ORBASAIN orbasain
qt2orb                          qt2orb -dataorb $ORB -cmdorb $ORB -calib_db $DB -v
q3302orb                        q3302orb -v -calib_db $DB -S state/q3302orb -v OGS dataorb $ORB
TN2orb                          slink2orb  -v -dc $DB -dm $DB -S state/TN2orb -pf pf/TN2orb.pf $TNSEISCOMP $ORB
MN2orb                          slink2orb -v -dc $DB -dm $DB -S state/MN2orb -pf pf/MN2orb.pf $INGVSC $ORB
DST2orb                         orb2orb -m '((NI|RF|IT)_.*|MN_TRI)_(H|E|S)(H|L|G|N)(Z|N|E).*' -r 'NI_(ACOM|AGOR|BALD|CGRP|CIMO|CUSI|FUSE|MPR2|SABO|VINO|ZOU2)_.*' -S state/
        DST2orb $DSTORB $ORB
ARSO2orb                        orb2orb -m 'SL_(ROBS|CADS|VOJS|GORS|SKDS|JAVS|KNDS|CEY|GBAS|MOZS|LJU|VNDS).*_(H|E|S)(H|L|G|N)(Z|N|E).*' -S state/ARSO2orb $ARSOORB
        $ORB
ZAMG2orb                        orb2orb -m 'OE_(ABTA|ARSA|DAVA|FETA|KBA|MOA|MYKA|RETA|SOKA|WTTA)_(H|E|S)(H|L|G|N)(Z|N|E).*' -S state/ZAMG2orb $ZAMGORB $ORB
SI2orb                          orb2orb -S state/SI2orb -m 'SI_.*_(H|E|S)(H|L|G|N)(Z|N|E).*' $SIORB $ORB
CH2orb                          slink2orb -v -dc $DB -dm $DB -S state/CH2orb -pf pf/CH2orb.pf $SEDSC $ORB
orb2db                          orb2db -v -S state/orb2db -r 'FV_.*' $ORB $DB
orb2db_FV                       orb2db  -v -S state/orb2db_FV -m 'FV_.*' -p pf/orb2db_FV.pf $ORB $DB
orb2dbt                         orb2dbt -v -state state/orb2dbt -overwrite $ORB $DB
orbdetect                       orbdetect  -v -onlypicks -out $ORB $ORB $DB
orbassoc                        orbassoc  -v -select /db/detection $ORB $ORB dbmaster/ttgrid
orbmb                           orbampmag -pf pf/orbmb -v -state state/orbmb -use_if_not_defining -auth_expr mb -next_target_orbmag orbml -make_magtables $ORB $ORB $DB
orbml                           orbampmag -pf pf/orbml_Bragato_Tento_Gasperini -v -state state/orbml -use_if_not_defining -auth_expr ml -target_orbmag orbml -next_target_orbmag orbms -
        make_magtables $ORB $ORB $DB
orbms                           orbampmag -pf pf/orbms -v -state state/orbms -use_if_not_defining -auth_expr ms -target_orbmag orbms -make_magtables $ORB $ORB $DB
orb2export                      orb2orb -m 'FV_.*|NI_(ACOM|CGRP|CIMO|CUSI|FUSE|MPR2|SABO|ZOU2)_(H|E|S)(H|L|G|N)(Z|N|E).*' -S state/orb2export -r '/.*|.*/pf.*' $ORB $ORBEXPORT
exportVINO                      orb2orb -m 'NI_VINO_.*|qt2orb.*' -S state/exportVINO $ORB $ORBVINO
orb2sor                         orb2orb -S state/orb2sor -m '((FV|NI|RF|IT|SI|SL|OE)_.*|MN_TRI)_(H|E|S)(H|L|G|N)(Z|N|E).*' -r 'NI_(AGOR|BALD)_.*' $ORB $ORBSOR
orb_alert_friuli                orbptrigger  -background -select "/pf/orbmag" -state state/orbptrigger_friuli $ORB /database/AlertFriuli/alert_friuli @origin.evid@ @origin.orid@
orb_alert_veneto                orbptrigger -background -select "/pf/orbmag" -state state/orbptrigger_veneto $ORB /database/AlertVeneto/alert_veneto @origin.evid@ @origin.orid@
orb_alert_TN                    orbptrigger -background -select "/pf/orbmag" -state state/orbptrigger_TN $ORB /database/AlertTrentino/alert_trentino @origin.evid@ @origin.orid@
orbtrigger_topkserver           orbptrigger -background -select "/db/origin" -state state/orbptrigger_topkserver $ORB /database/topkserver/orbtrigger_topkserver %evid% %orid% %time% %lat%
        %lon% %depth% %ml% %lddate%
orbtrigger_orb2db_evid          orbptrigger  -background -select "/db/origin" -state state/orbptrigger_orb2db_evid $ORB /database/evdb/orb2db_evid %evid%
orbtrigger_towebpcfvg           orbptrigger -background -select "/pf/orbmag" -state state/orbptrigger_towebpcfvg $ORB /database/towebpcfvg/towebpcfvg.pl @origin.evid@ @origin.orid@
orbtrigger_toShakeMap           orbptrigger  -background -select "/db/origin" -state state/orbptrigger_toShakeMap $ORB /database/toShakeMap/orbtrigger_toShakeMap %evid% %orid% %auth%
        %time% %lat% %lon% %depth% %ml% %lddate%
}
```

main OGS Antelope load averages

load averages: 1.46, 1.53, 1.73; up 43+01:15:59 11:18:27
109 processes: 108 sleeping, 1 on cpu
CPU states: 80.9% idle, 13.2% user, 5.9% kernel, 0.0% iowait, 0.0% swap
Memory: 4096M phys mem, 419M free mem, 20G total swap, 13G free swap

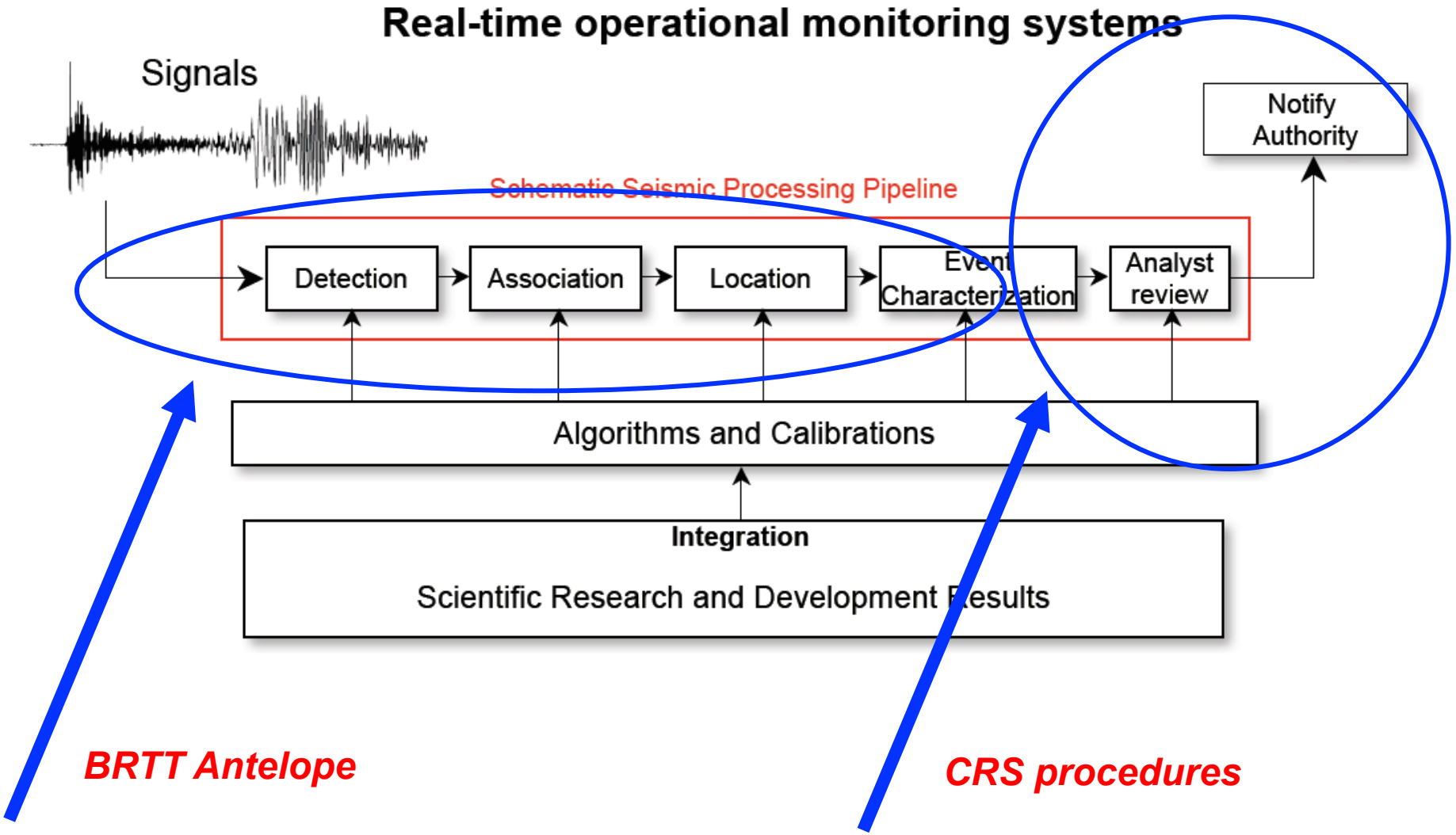
PID	USERNAME	LWP	PRI	NICE	SIZE	RES	STATE	TIME	CPU	COMMAND
10221	rt	97	59	0	1042M	249M	sleep	104.0H	11.01%	orbserver
10838	rt	1	54	0	172M	33M	sleep	26.7H	2.74%	orbdetect
10807	rt	1	59	0	175M	14M	sleep	575:08	0.91%	orb2db
25261	rt	51	59	0	97M	7928K	sleep	64:33	0.75%	q3302orb
23626	rt	1	54	0	2992K	1760K	cpu/0	0:00	0.73%	top
10730	rt	4	59	0	107M	52M	sleep	292:33	0.51%	orbserver
10354	rt	8	59	0	108M	18M	sleep	110:05	0.44%	orbserver
10877	rt	1	59	0	5248K	872K	sleep	150:48	0.32%	orb2orb
10734	rt	13	59	0	90M	2640K	sleep	51:45	0.17%	qt2orb
10865	rt	1	59	0	5248K	864K	sleep	39:29	0.15%	orb2orb
10765	rt	1	59	0	89M	1544K	sleep	69:46	0.10%	slink2orb
10217	rt	1	59	0	67M	4712K	sleep	46:56	0.06%	perl
10771	rt	1	59	0	5272K	1128K	sleep	21:16	0.04%	orb2orb
10763	rt	1	59	0	89M	1568K	sleep	34:46	0.04%	slink2orb
10769	rt	1	59	0	5272K	1104K	sleep	32:57	0.03%	orb2orb

main OGS orb sources & clients

orbserver 3/18/2011 (077) 10:20:53.358
Version 'Release 4.10 SunOS 5.10 2008-05-02 '
Pid 10221 @ crs-v240-b:/database (158.110.30.133), port #7000
Started Wed 2011-054 Feb 23 12:20:32 by rt, running 22 days 22.0 hours
ring buffer last initialized Thu 2008-311 Nov 06 11:24:27
Maximum 1000.0 Mbytes packet data
Maximum 2500010 packets
Maximum 1000 sources
59 clients
427 sources
690044 opens 689985 closes 0 errors 0 rejections
Total Output rate = 2876.885 kbps
Total Input rate = 179.578 kbps

Total Output packet rate = 1051.880 pkts/s
Total Input packet rate = 188.278 pkts/s

Earthquake detection and notification

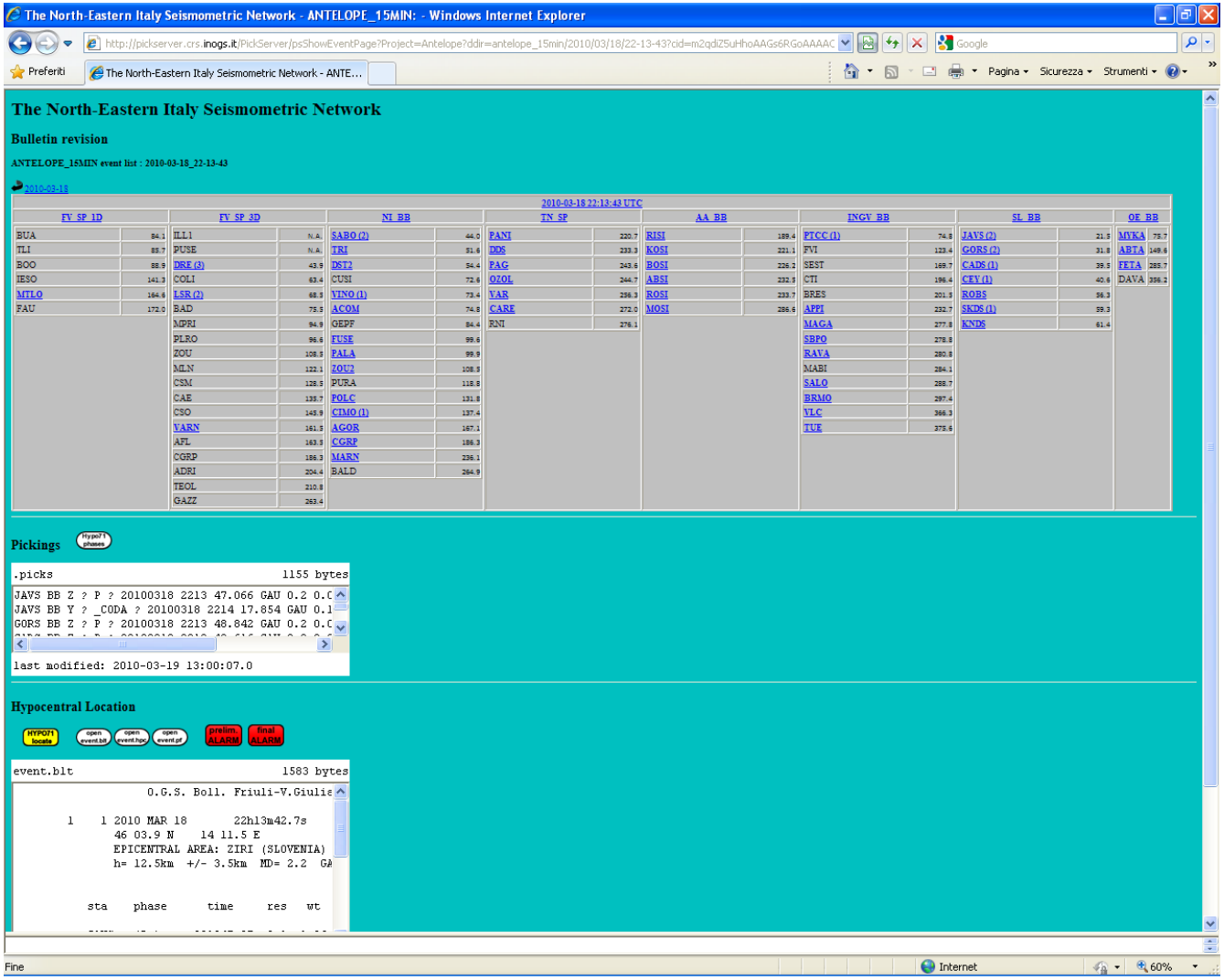


OGS adds-on for Antelope

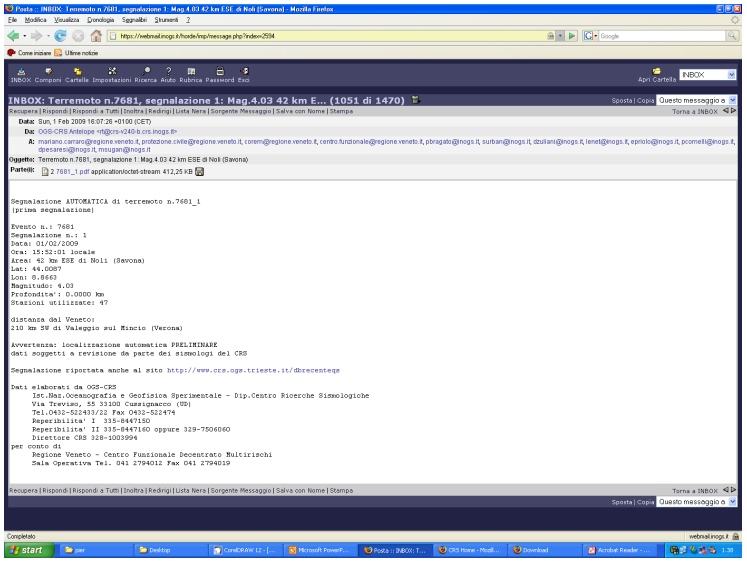
- PickServer (Lomax viewer)
- Comprehensive Alarm routines with re-location control
  - Output: email, fax, SMS, web
- M882orb and ORION2orb plugins
- Data archive (OASIS)
- Drumplot

- *ShakeMap*
- *SeisComP (data exchange)*

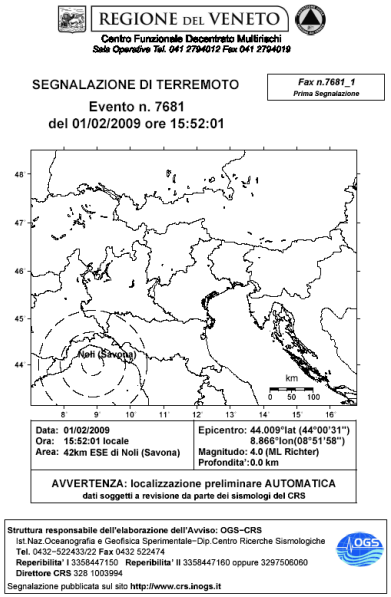
OGS PickServer



Alarms



e-mail



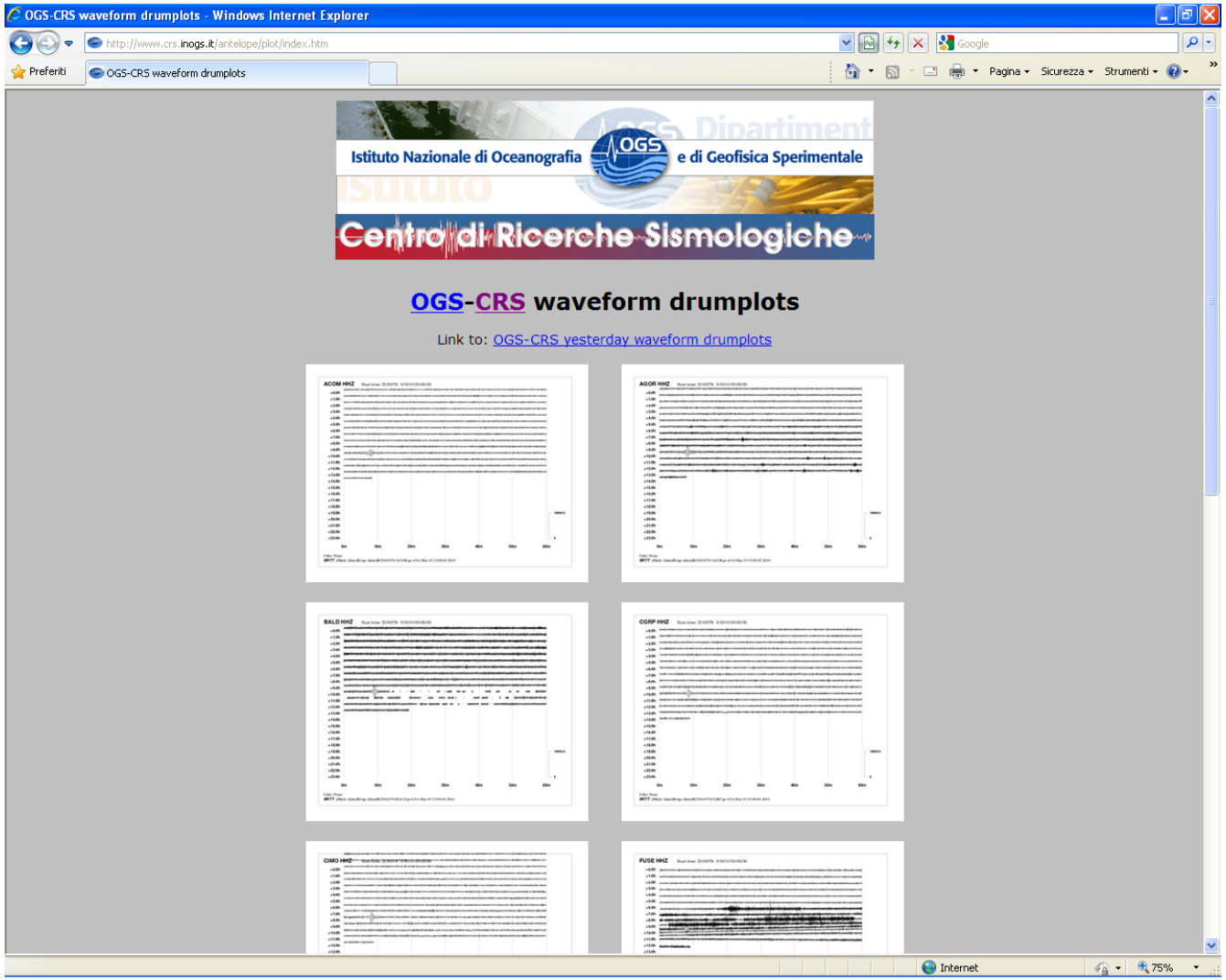
fax

sms

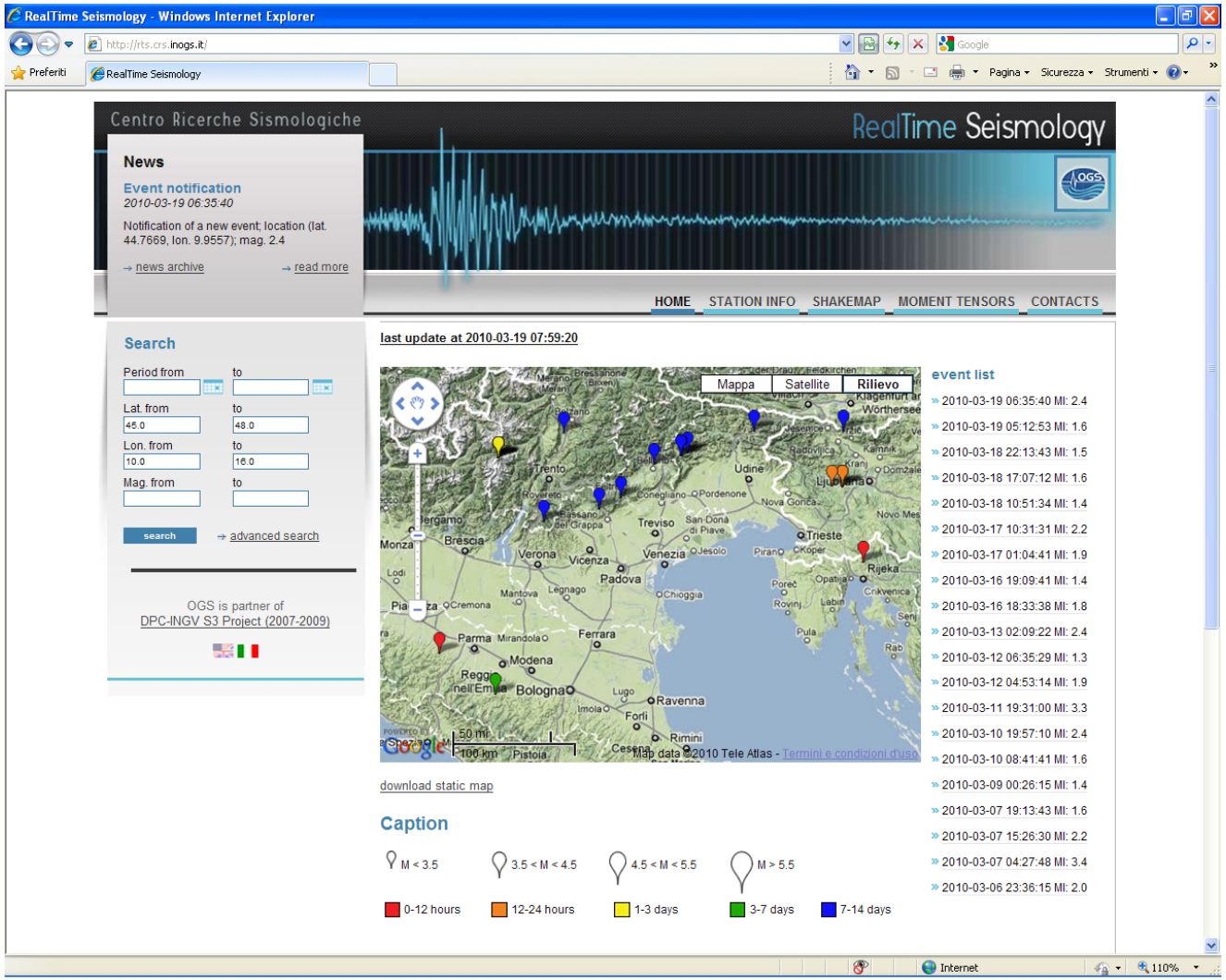
OGS-CRS Terremoto n.7681
segnalazione n.1
Mag4.03 H15:52:01
del 01/02/2009
42km ESE di Noli(Savona)
lat44.0087 lon8.8663
rep 3358447150

web

OGS dbheli


OGS-CRS waveform drumplots - Windows Internet Explorer
http://www.crs.inogs.it/antelope/plot/index.htm
OGS-CRS waveform drumplots
Istituto Nazionale di Oceanografia e di Geofisica Sperimentale
Centro di Ricerche Sismologiche
OGS-CRS waveform drumplots
Link to: OGS-CRS yesterday waveform drumplots
ACOM HHZ
AGOR HHZ
BALD HHZ
CGRP HHZ
CIMO HHZ
FUSE HHZ
Internet
75%

OGS Real Time Seismology



Still to do (☹):

- Migration core Antelope (SUN cluster) from 4.10 to 5.0-64
- Split event determination and graphics on PowerMAC from main acquisition on SUN cluster
  - Reliability (2 machines)?
- Migration from orbampmag to orbevproc
- Migration from orb2db to cdorb2db + db2msd (still valid?)
- orbdetect tuning
  - BB continuous
  - SP trigger
  - S phases?
- orbassoc tuning (grid, windows, etc.)

EGU2011 SM1.3

Improving seismic networks performances: from site selection to data integration

THANKS!

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and all the **OGS-CRS** team!