



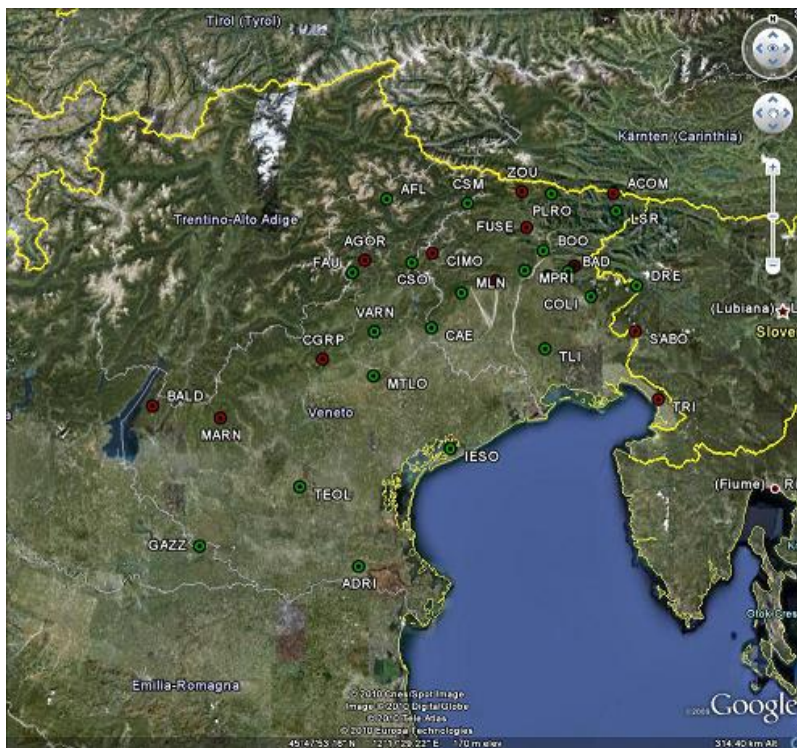
# Antelope usage @ OGS

Damiano Pesaresi

[dpesaresi@inogs.it](mailto:dpesaresi@inogs.it)

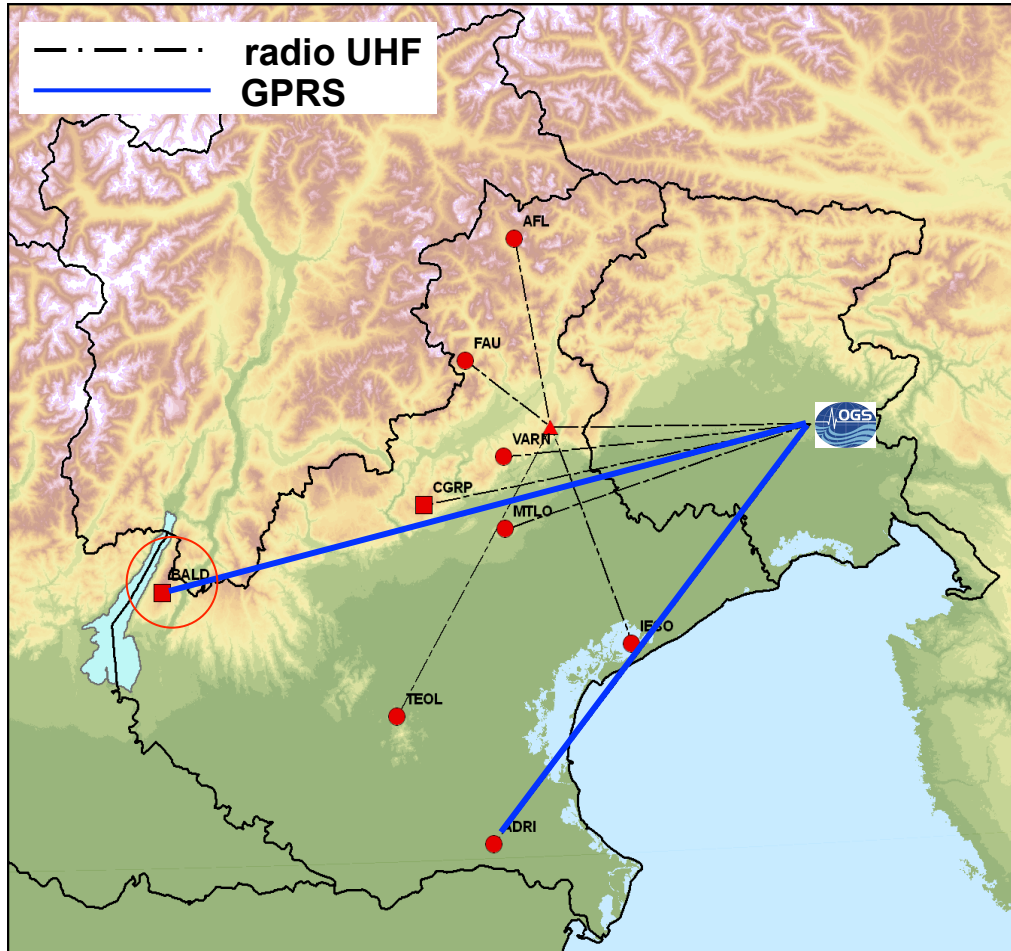
QAUG Bucharest March 2011

# 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

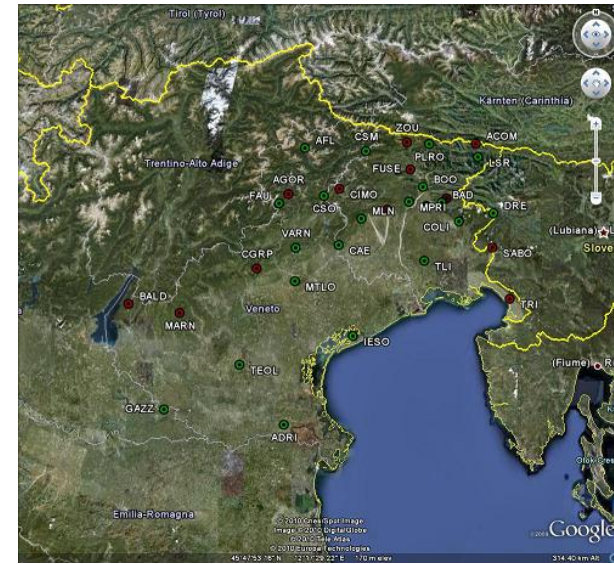
# How is data transmitted?



- 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*

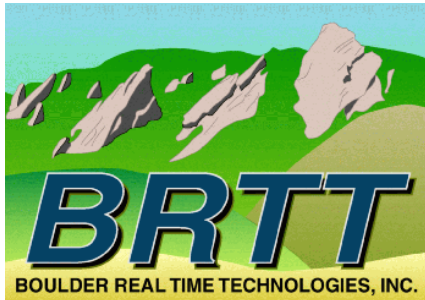
*2000-2006*

*"SEISMOLOGICAL NETWORKS WITHOUT FRONTIERS IN THE  
SOUTH EASTERN ALPS"*



Participants:

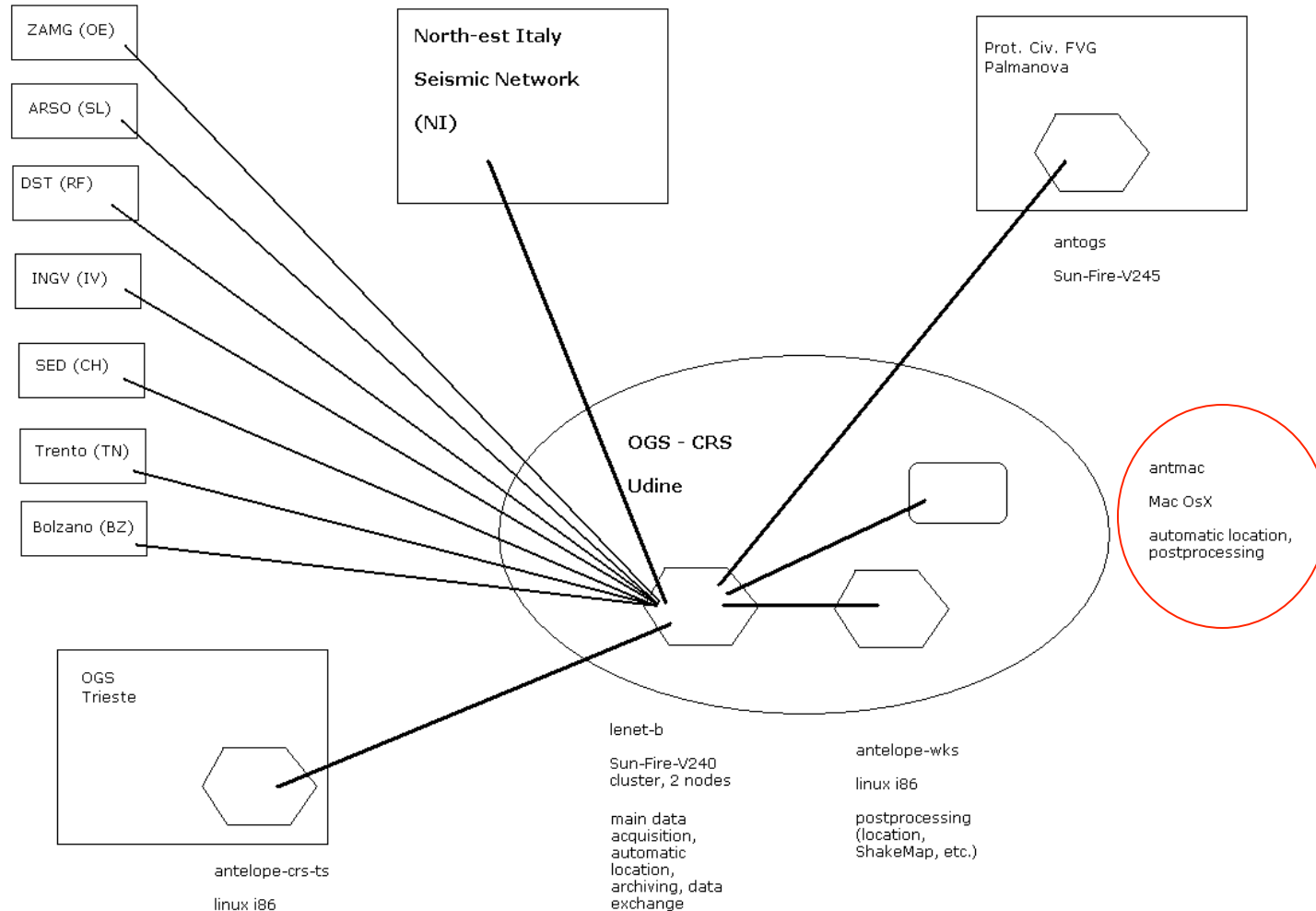
- ZAMG (Vienna, Austria)
  - OGS (Udine, Italy)
  - DST (Trieste, Italy)
- ARSO (Ljubljana, Slovenia), external



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



# 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 $SSEDSC $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.oid@
orb_alert_veneto  orbptrigger -background -select "/pf/orbmag" -state state/orbptrigger_veneto $ORB /database/AlertVeneto/alert_veneto @origin.evid@ @origin.oid@
orb_alert_TN      orbptrigger -background -select "/pf/orbmag" -state state/orbptrigger_TN $ORB /database/AlertTrentino/alert_trentino @origin.evid@ @origin.oid@
orbtrigger_topkserver
                %lon% %depth% %ml% %lddate%
                orbptrigger -background -select "/db/origin" -state state/orbptrigger_topkserver $ORB /database/topkserver/orbtrigger_topkserver %evid% %oid% %time% %lat%
orbtrigger_orb2db_evid
                orbptrigger -background -select "/db/origin" -state state/orbptrigger_orb2db_evid $ORB /database/evdb/orb2db_evid %evid%
orbtrigger_towebpcfv
                orbptrigger -background -select "/pf/orbmag" -state state/orbptrigger_towebpcfv $ORB /database/towebpcfv/towebpcfv.pl @origin.evid@ @origin.oid@
orbtrigger_toShakeMap
                %time% %lat% %lon% %depth% %ml% %lddate%
                orbptrigger -background -select "/db/origin" -state state/orbptrigger_toShakeMap $ORB /database/toShakeMap/orbtrigger_toShakeMap %evid% %oid% %auth%
}
```



# main OGS Antelope load averages

load averages: 1.46, 1.53, 1.73;  
11:18:27

up 43+01:15:59

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

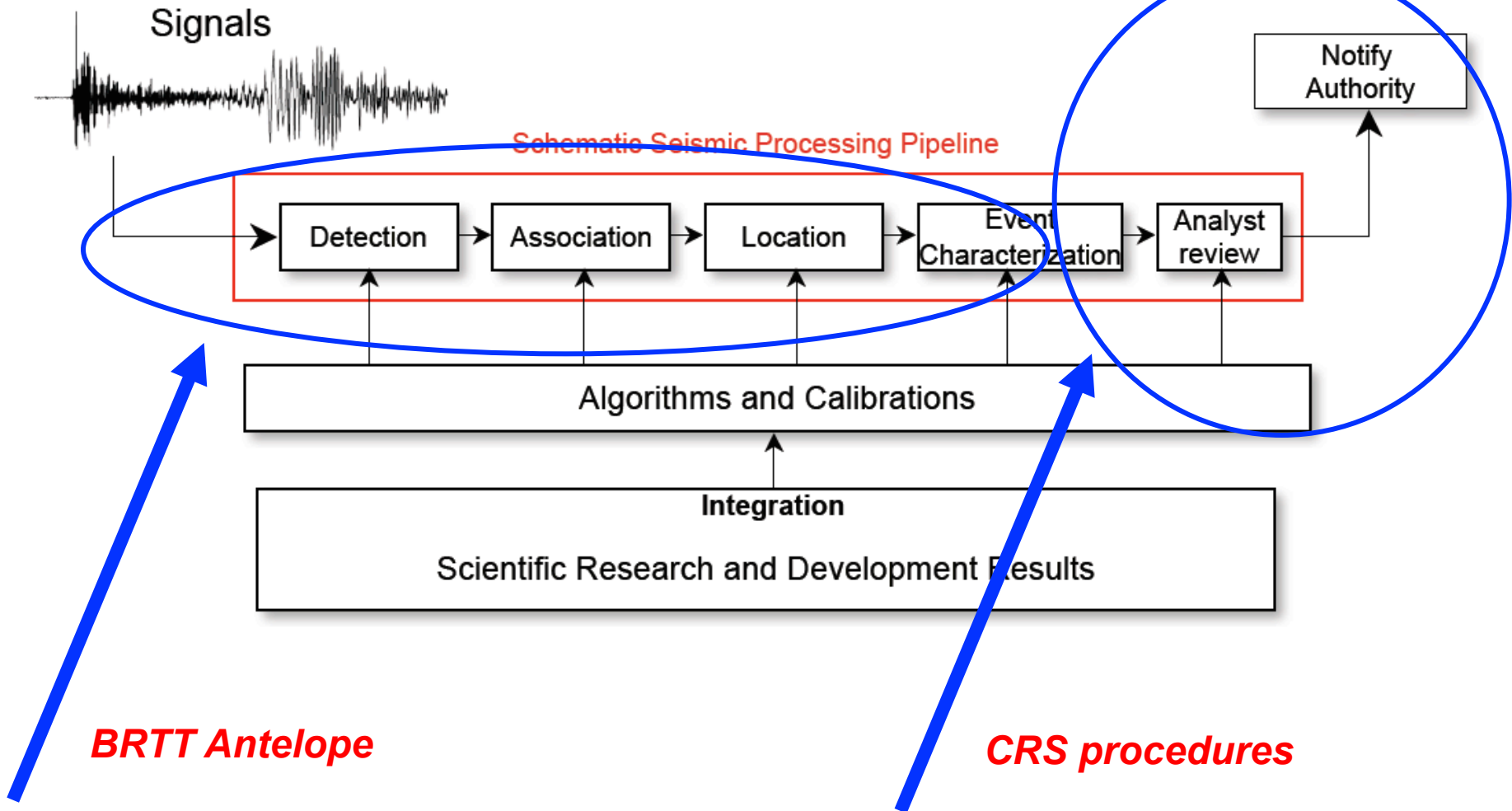
Total Input rate = 179.578 kbps

Total Output packet rate = 1051.880 pkts/s

Total Input packet rate = 188.278 pkts/s

# Earthquake detection and notification

## Real-time operational monitoring systems



# 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

The North-Eastern Italy Seismometric Network - ANTELOPE\_15MIN: - Windows Internet Explorer

http://pickserver.crs.inogs.it/PickServer/psShowEventPage?Project=Antelope?dir=antelope\_15min/2010/03/18/22-13-43?cid=m2qdiZSuHhAAgs6RGaAAAC

The North-Eastern Italy Seismometric Network - ANTE...

## The North-Eastern Italy Seismometric Network

Bulletin revision

ANTELOPE\_15MIN event list : 2010-03-18\_22-13-43

2010-03-18

2010-03-18 22:13:43 UTC

FV SP_ID	FV SP_3D	NI_BB	TN_SF	AA_BB	INGY_BB	SL_BB	OE_BB								
BUA	84.1	ILI1	84.1	SABO (2)	44.0	FANI	220.7	RISI	189.4	PTCC (1)	74.8	JAYS (2)	21.5	MIKA	75.7
TLI	82.7	PUSE	81.4	TRI	81.4	DDS	233.3	KOSI	221.1	PVI	123.4	GORS (2)	31.8	ARTA	148.4
BOO	88.9	DRE (3)	43.9	DST2	84.4	PAG	243.4	BOSI	226.2	SEST	149.7	CADS (1)	29.5	FITA	285.7
IESO	141.3	COLI	83.4	CUSH	72.4	OZOL	244.7	ABSI	232.3	CTI	196.4	CEY (1)	40.4	DAVA	194.2
MTLO	164.4	LSR (2)	68.5	VINO (1)	71.4	VAR	286.3	BOSI	231.7	BRES	201.5	ROBS	56.1		
FAU	172.5	BAD	75.5	ACOM	74.5	CARE	272.2	MOSI	226.4	APPI	232.7	SKDS (1)	59.3		
		MPRI	84.9	GEFF	84.4	RNI	278.1			MAGA	277.8	KNDS	41.4		
		PLRO	86.4	EUSE	86.4					SBFO	278.8				
		ZOU	108.5	PALA	99.9					RAVA	280.8				
		MLN	122.1	TOU2	108.9					MABI	284.1				
		CSM	128.5	PURA	118.9					SALO	288.7				
		CAE	135.7	FOIC	131.9					BRMO	297.4				
		CSO	145.9	CIMO (1)	137.4					VLC	286.3				
		YARN	151.5	AGOR	157.1					TUE	375.9				
		AFI	183.9	CGRP	186.3										
		CGRP	186.3	MARN	236.1										
		ADRI	204.4	BALD	204.9										
		TEOL	210.8												
		GAZZ	283.4												

Pickings Hypocenter

.picks 1155 bytes

```

JAYS BB Z ? P ? 20100318 2213 47.066 GAU 0.2 0.C
JAYS BB Y ? _CODA ? 20100318 2214 17.854 GAU 0.1
GORS BB Z ? P ? 20100318 2213 48.842 GAU 0.2 0.C
last modified: 2010-03-19 13:00:07.0
  
```

Hypocentral Location

HYP01 locate open event.blt open event.hgt open event.d prelim ALARM final ALARM

event.blt 1583 bytes

```

O.G.S. Boll. Friuli-V.Giulia
1 1 2010 MAR 18 22h13m42.7s
46 03.9 N 14 11.5 E
EPICENTRAL AREA: ZIRI (SLOVENIA)
h= 12.5km +/- 3.5km MD= 2.2 G
sta phase time res wt
  
```

Fine Internet 60%

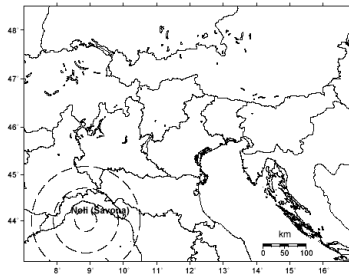


# Alarms



SEGNALAZIONE DI TERREMOTO  
 Evento n. 7681  
 del 01/02/2009 ore 15:52:01

Fax n.7681\_1  
 Prima Segnalazione



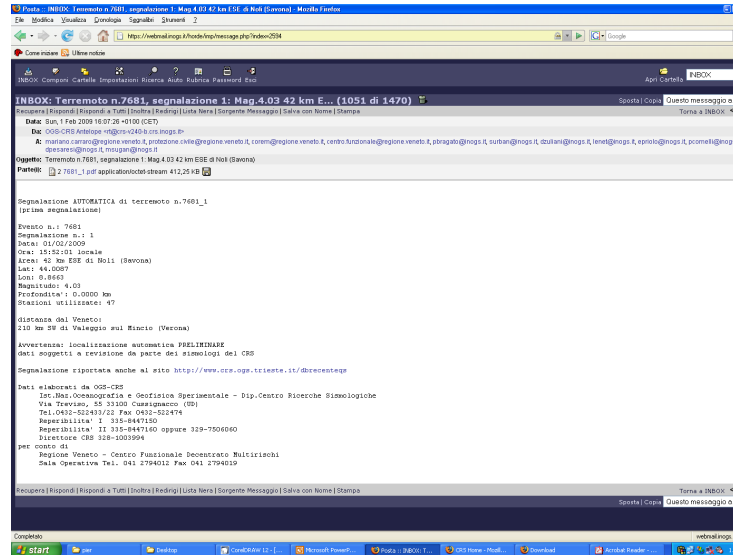
Data: 01/02/2009  
 Ora: 15:52:01 locale  
 Area: 42km ESE di Noli (Savona)

Epicentro: 44.009°lat (44°00'31")  
 Ora: 8.866°lon(08°51'58")  
 Magnitudo: 4.0 (ML Richter)  
 Profondita': 0.0 km

AVVERTENZA: localizzazione preliminare AUTOMATICA  
 dati soggetti a revisione da parte dei sismologi del CRS

Struttura responsabile dell'elaborazione dell'Avviso: OGS-CRS  
 Ist.Naz. Oceanografia e Geofisica Sperimentale - Dip. Centro Ricerche Sismologiche  
 Tel. 0432-52243/22 Fax 0432 522474  
 Reperibilità 1 3358447150 Reperibilità 2 3358447160 oppure 3297506060  
 Direttore CRS 028 1003964  
 Segnalazione pubblicata sul sito <http://www.crs.inogs.it>

fax



e-mail

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.ingv.it/antelope/plot/index.htm

OGS Dipartimento  
Istituto Nazionale di Oceanografia e di Geofisica Sperimentale  
Istituto  
Centro di Ricerche Sismologiche

## OGS-CRS waveform drumplots

Link to: [OGS-CRS yesterday waveform drumplots](#)

The image displays six waveform drumplots arranged in a 3x2 grid. Each plot shows seismic waveforms for a specific station: ACOM, AGOR, BALD, CGRP, CMO, and FUSE. The plots are titled with the station name and include a 'Station' field with the name and coordinates. Each plot shows a series of waveforms with a time axis at the bottom ranging from 0 to 300 seconds. The waveforms are plotted on a grid with a vertical axis representing amplitude. The plots are arranged in a 3x2 grid. The top row contains ACOM and AGOR, the middle row contains BALD and CGRP, and the bottom row contains CMO and FUSE. Each plot has a title, a 'Station' field, and a time axis. The waveforms are plotted on a grid with a vertical axis representing amplitude. The plots are arranged in a 3x2 grid.

Internet 75%

# OGS Real Time Seismology

RealTime Seismology - Windows Internet Explorer

http://rts.crsi.inogs.it

Centro Ricerche Sismologiche **RealTime Seismology**

**News**

**Event notification**  
2010-03-19 06:35:40

Notification of a new event: location (lat. 44.7669, lon. 9.9557); mag. 2.4

[→ news archive](#) [→ read more](#)

HOME STATION INFO SHAKEMAP MOMENT TENSORS CONTACTS

last update at 2010-03-19 07:59:20

**Search**

Period from  to

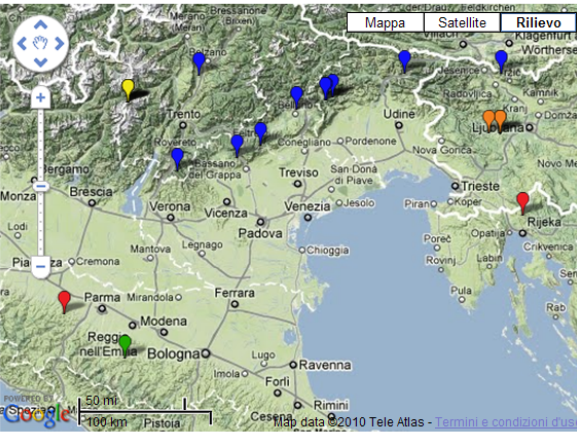
Lat. from  to

Lon. from  to

Mag. from  to

[→ advanced search](#)

OGS is partner of  
DPC-INGV S3 Project (2007-2009)



Mappa Satellite Rilievo

event list

- 2010-03-19 06:35:40 MI: 2.4
- 2010-03-19 05:12:53 MI: 1.6
- 2010-03-18 22:13:43 MI: 1.5
- 2010-03-18 17:07:12 MI: 1.6
- 2010-03-18 10:51:34 MI: 1.4
- 2010-03-17 10:31:31 MI: 2.2
- 2010-03-17 01:04:41 MI: 1.9
- 2010-03-16 19:09:41 MI: 1.4
- 2010-03-16 18:33:38 MI: 1.8
- 2010-03-13 02:09:22 MI: 2.4
- 2010-03-12 06:35:29 MI: 1.3
- 2010-03-12 04:53:14 MI: 1.9
- 2010-03-11 19:31:00 MI: 3.3
- 2010-03-10 19:57:10 MI: 2.4
- 2010-03-10 08:41:41 MI: 1.6
- 2010-03-09 00:26:15 MI: 1.4
- 2010-03-07 19:13:43 MI: 1.6
- 2010-03-07 15:26:30 MI: 2.2
- 2010-03-07 04:27:48 MI: 3.4
- 2010-03-06 23:36:15 MI: 2.0

download static map

**Caption**

M < 3.5 3.5 < M < 4.5 4.5 < M < 5.5 M > 5.5

0-12 hours 12-24 hours 1-3 days 3-7 days 7-14 days

# 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

CO Meeting Organizer EGU2011 - Mozilla Firefox

File Modifica Visualizza Cronologia Segnalibri Strumenti Aiuto

http://meetingorganizer.copernicus.org/EGU2011/session/7340

CO Meeting Organizer EGU2011

 **European Geosciences Union**  
**General Assembly 2011**  
Vienna | Austria | 03 - 08 April 2011

EGU.eu

**Menu**

- Home
- Information
- Programme
  - How to access the Programme
  - Meeting Programme
  - Session Programme
  - Personal Programme
  - Schedules & Programme (PDF)
  - Papers of Special Interest
- Special Events
- Abstract Management
- Guidelines
- EGU on Renewables
- Registration
- Accommodation
- Venue
- Floor Plans
- Letter of Invitation
- Job & Education Market

[Back]

**SM1.3/G3.8/GD3.7/GI-19/TS8.7**

**Improving seismic networks performances: from site selection to data integration**

Convener: Damiano Pesaresi  
Co-Conveners: John Clinton, Robert Busby  
[Convener Login](#)

**Oral Programme** / Room 26 / Mon, 04 Apr, 12:00-15:00  
**Poster Programme** / Halls X/Y / Attendance Mon, 04 Apr, 17:30-19:00 / Display 08:00-19:30

The number and quality of seismic stations and networks in Europe continually improves, nevertheless there is always scope to optimise their performance. In this session we welcome contributions from all aspects of seismic network installation, operation and management. This includes site selection; equipment testing and installation; planning and implementing communication paths; policies for redundancy in data acquisition, processing and archiving; and integration of different datasets including GPS and OBS.

Poster Summaries & Discussions: **PSD144** - SM1.3/G3.8/GD3.7/GI-19/TS8.7

Room 25 / Mon, 04 Apr, 12:15-13:00

Completato



# THANKS!

[dpesaresi@inogs.it](mailto:dpesaresi@inogs.it)

+39-0432-522433

Damiano Pesaresi, Pier Luigi Bragato, Paolo Comelli, Dario Slejko,  
Angela Saraò, Paolo Di Bartolomeo, Giorgio Duri, Paolo Bernardi,  
Michele Bertoni, Elvio Del Negro  
and all the **OGS-CRS** team!