



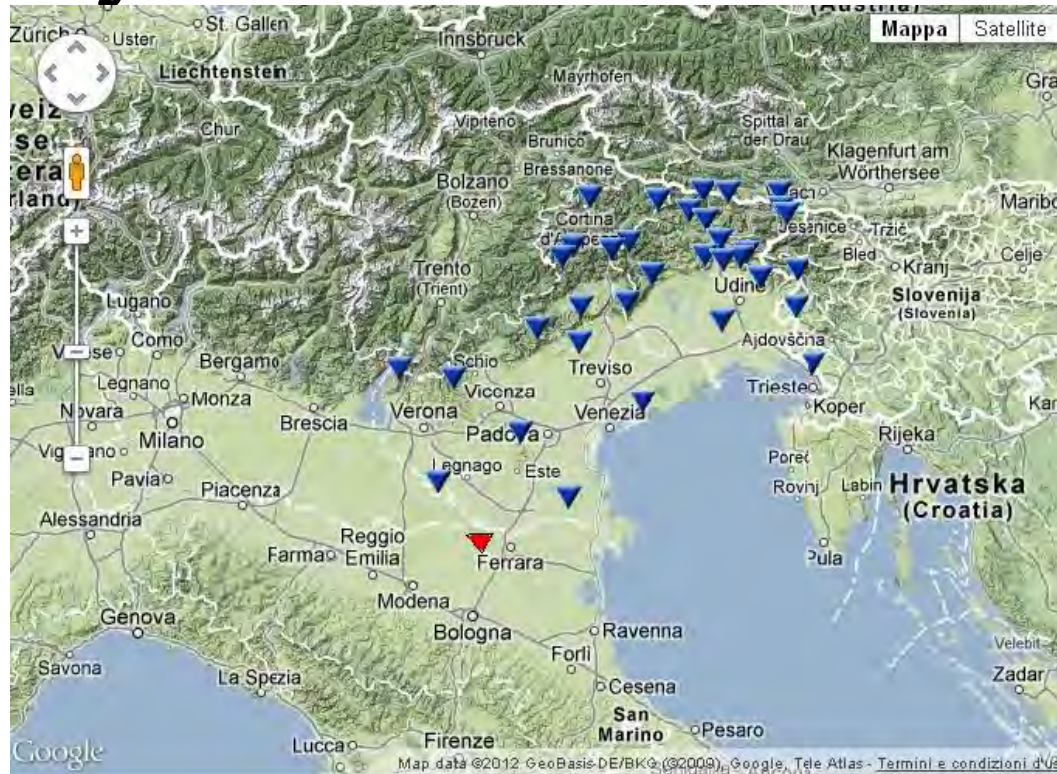
# 2013 status of the Northeast Italy Seismic Network

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AUG Oman March 2012

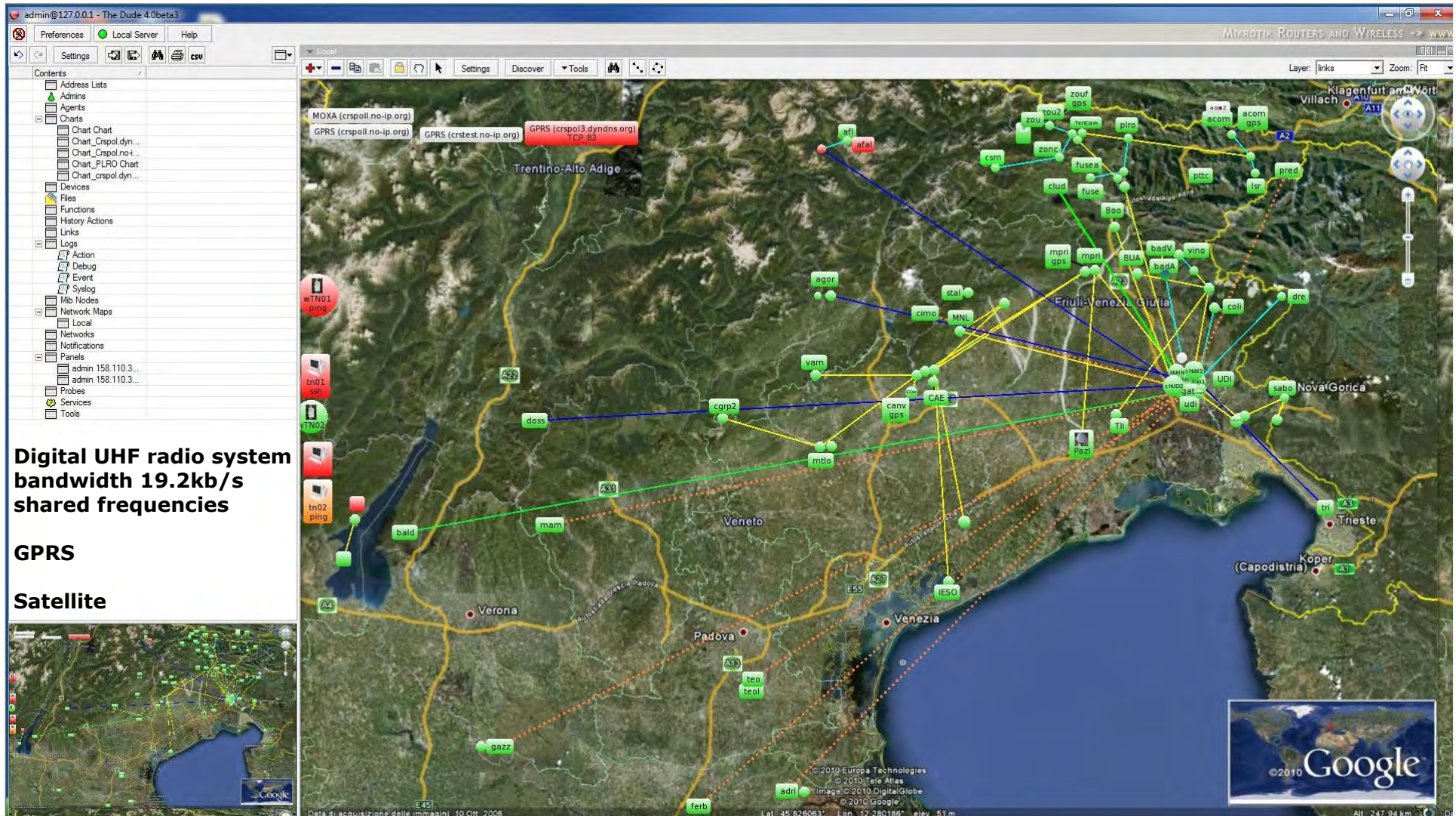
# NE Italy Seismic Network - OGS



- 17 BB stations
  - Q330 + STS-2/Trillium 40/120s
    - DM24 + CMG-3TB
  - real time, continuous

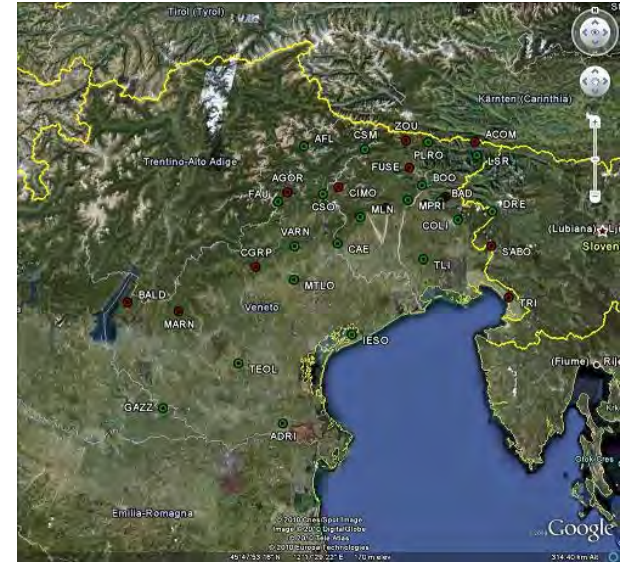
- 19 SP stations
  - Mars88 + Lennartz 1sec
  - real time, on trigger

# How is data transmitted?



# 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  $M > 4.5$

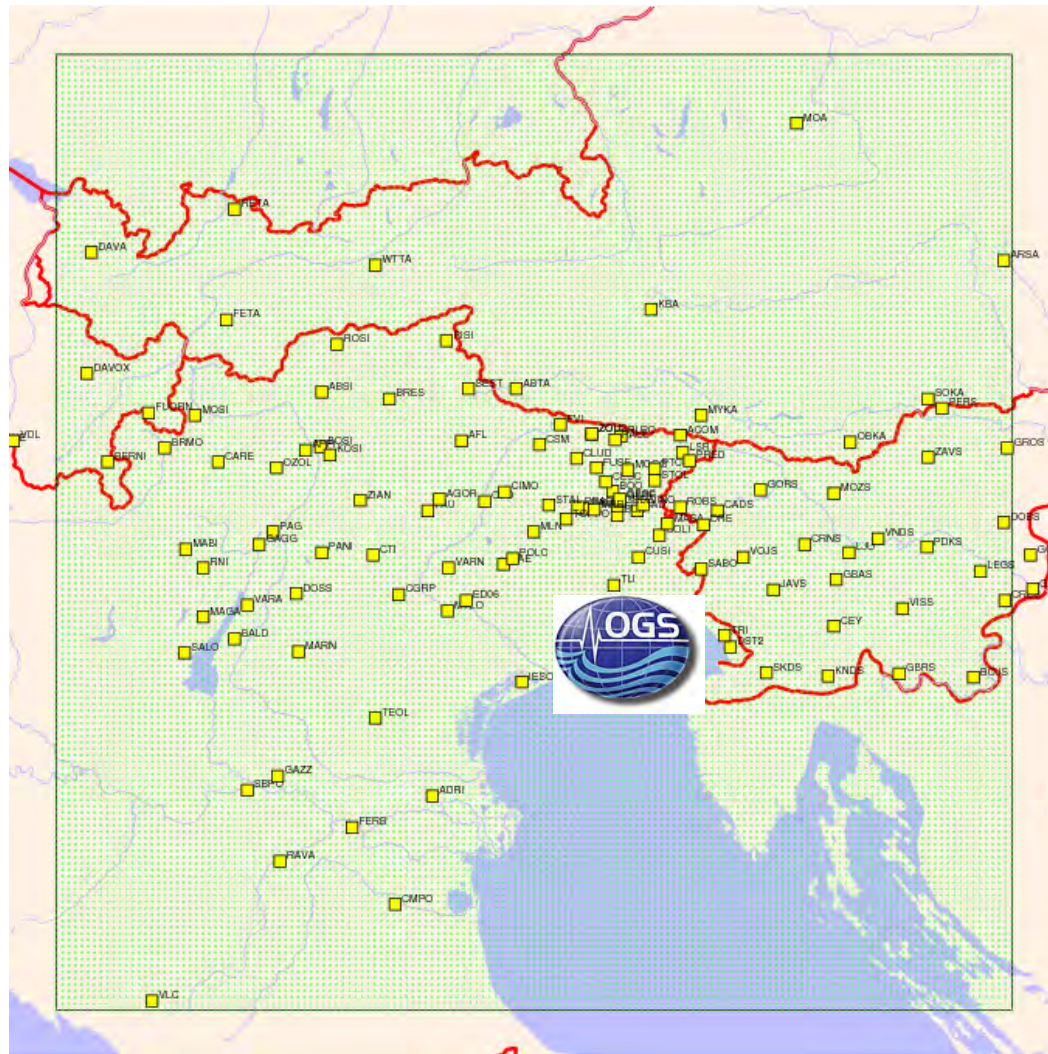


*CRS headquarters in Udine (Italy)*

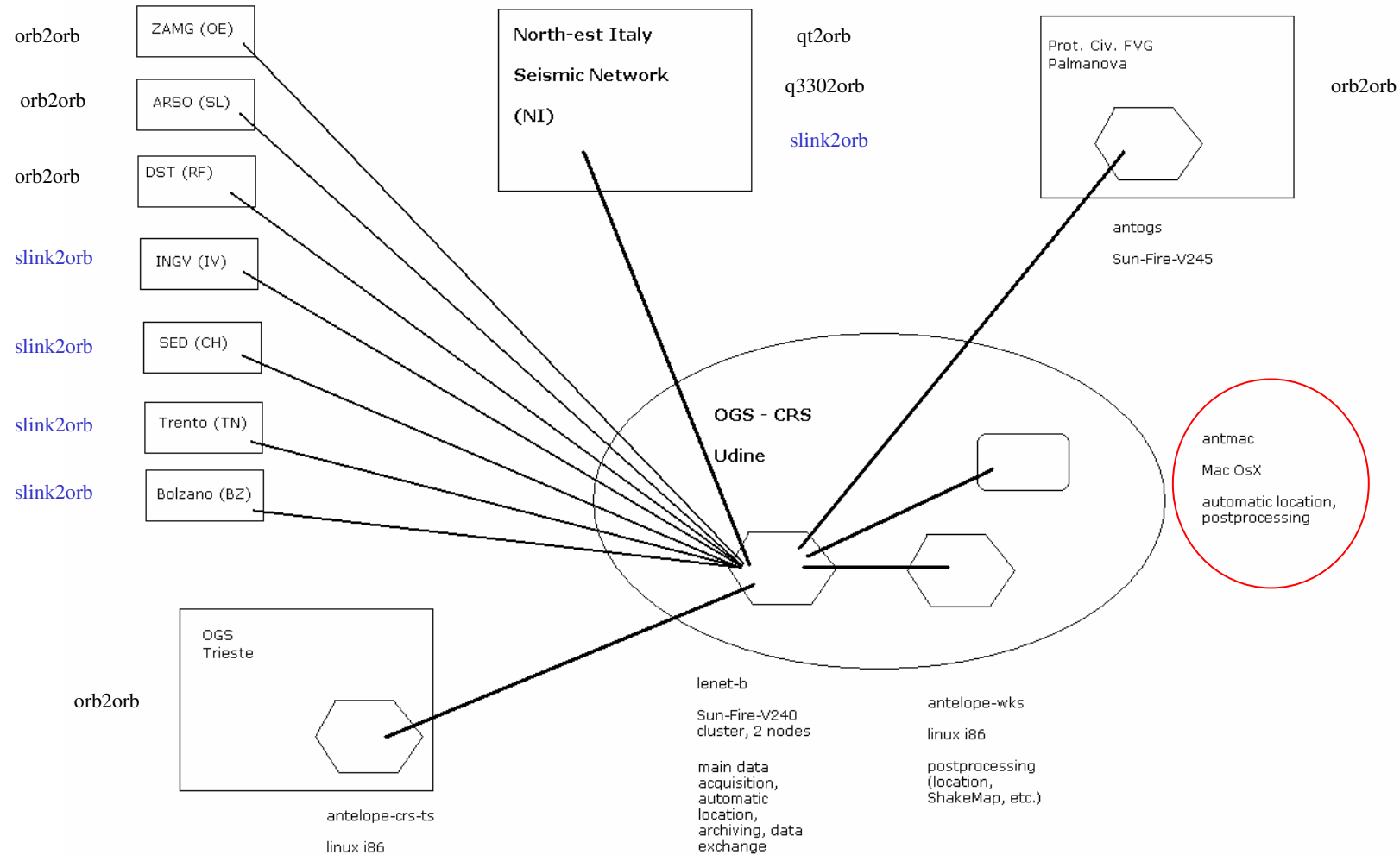
## Intervention at CRS headquarters for:

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

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



# OGS Antelope configuration



# main rtextec processes table

```
Processes &Tbl{
orbserver      orbserver -p $ORB orbserver
orbexport      orbserver -p $ORBEXPORT orbexport
orbbinIV       orbserver -p $ORBINIV orbbinIV
qt2orb         qt2orb -dataorb $ORB -cmdorb $ORB -calib_db $DB
q3302orb       q3302orb -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
TNsecond2orb   slink2orb -v -dc $DB -dm $DB -S state/TNsecond2orb -pf pf/TNsecond2orb.pf $TNSEISCOMP2 $ORB
MN2orb         slink2orb -v -dc $DB -dm $DB -S state/MN2orb -pf pf/MN2orb.pf discovery.rm.ingv.it:39962 $ORB
IV_TEOL2orbinIV slink2orb -v -dc dbmaster/dbINGV -dm dbmaster/dbINGV -S state/IV_TEOL2orb -pf pf/IV_TEOL2orb.pf discovery.rm.ingv.it:39962 $ORBINIV
orbbinIV2orb   orb2orb -S state/orbinIV2orb -m '(IV_TEOL|EV_ED06)_H.*' -X pf/X.pf $ORBINIV@ $ORB@
DST2orb        orb2orb -m '(RF_(CESC|GEDE|GEPF|GESC|MASA|MOGG|PAUL|PRAD|STOL|TARC)|MN_TRI|NI_(DST2|PALA|POLC|PURA))_(H|E|S)(H|L|G|N)(Z|N|E).*'
-r 'RF_MORT.*' -S state/DST2orb $DSTORB@ $ORB@
ARSO2orb       orb2orb -m 'SL_(CADS|CEY|GBAS|GORS|JAVS|KNDS|LJU|MOZS|ROBS|SKDS|VNDS|VOJS).*_ (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@
orb2export     orb2orb -m
'FV_.*|MN_TRI_H.*|NI_VINO/log|NI_(AGOR|ACOM|BALD|CGRP|CLUD|CIMO|DRE|FUSE|PRED|SABO|VARN|VINO|ZOU2)_(H|E|S)(H|L|G|N)(Z|N|E).*' -S
state/orb2export -r '/.*|.*pf.*' $ORB $ORBEXPORT
orbbinIV_FERB2orb orb2orb -S state/orbinIV_FERB2orb -m 'NI_FERB_.*' -X pf/Y.pf $ORBINIV $ORB
CH2orb         slink2orb -v -dc $DB -dm $DB -S state/CH2orb -pf pf/CH2orb.pf seedlink.ethz.ch:18000 $ORB
Collalto2orbinIV slink2orb -v -dc dbmaster/EV/dbEvin -dm dbmaster/EV/dbEvin -S state/Collalto2orbinIV -pf pf/Collalto2orbinIV.pf 158.110.30.171:18000 $ORBINIV
FERB2orbinIV   slink2orb -v -dc dbmaster/NI/FERB -dm dbmaster/NI/FERB -S state/FERB2orbinIV -pf pf/FERB2orbinIV.pf crs-fe01.dyndns.org:18000 $ORBINIV
cdorb2db       cdorb2db -v -S state/cdorb2db -r 'FV_.*' $ORB $DB
orb2dbt        orb2dbt -v -state state/orb2dbt -overwrite $ORB $DB
orbdetect      orbdetect -onypicks -out $ORB $ORB $DB
orbassoc       orbassoc -v -select /db/detection $ORB $ORB dbmaster/ttgrid
orbvproc       orbvproc -v -state state/orbevproc $ORB@ $ORB@ $DB
orb_quake_email orb_quake_email $ORB
orb_alert_friuli orbptrigger -background -select "/pf/orbmag" -state state/orbptrigger_friuli $ORB /database/AlertFriuli/alert_friuli @origin.evid@ @origin.orid@
@origin.ml@
orb_alert_veneto orbptrigger -background -select "/pf/orbmag" -state state/orbptrigger_veneto $ORB /database/AlertVeneto/alert_veneto @origin.evid@ @origin.orid@
@origin.ml@
orb_alert_TN    orbptrigger -background -select "/pf/orbmag" -state state/orbptrigger_TN $ORB /database/AlertTrentino/alert_trentino @origin.evid@ @origin.orid@
@origin.ml@
orb_alert_CRS   orbptrigger -background -select "/pf/orbmag" -state state/orbptrigger_CRS $ORB /database/AlertCRS/alert_CRS @origin.evid@ @origin.orid@
@origin.ml@
orbtrigger_topkserver orbptrigger -background -select "/pf/orbmag" -state state/orbptrigger_topkserver $ORB /database/topkserver/orbtrigger_topkserver
@origin.evid@ @origin.orid@ @origin.time@ @origin.lat@ @origin.lon@ @origin.depth@ @origin.ml@ @origin.lddate@ @origin.auth@
orbtrigger_orb2db_evid orbptrigger -background -select "/db/origin" -state state/orbptrigger_orb2db_evid $ORB /database/evdb/orb2db_evid @origin.evid@
orbtrigger_towebpcfv orbptrigger -background -select "/pf/orbmag" -state state/orbptrigger_towebpcfv $ORB /database/towebpcfv/towebpcfv.pl
@origin.evid@ @origin.orid@
orbtrigger_toShakeMap orbptrigger -background -select "/pf/orbmag" -state state/orbptrigger_toShakeMap $ORB
/database/toShakeMap/orbtrigger_toShakeMap @origin.evid@ @origin.orid@ @origin.ml@
}
```

# main OGS Antelope load averages

load averages: 1.36, 1.57, 1.60; up 167+12:31:32  
17:29:41

104 processes: 101 sleeping, 1 running, 2 on cpu

CPU states: 85.9% idle, 8.9% user, 5.3% kernel, 0.0% iowait, 0.0% swap

Memory: 4096M phys mem, 64M free mem, 20G total swap, 14G free swap

PID	USERNAME	LWP	PRI	NICE	SIZE	RES	STATE	TIME	CPU	COMMAND
4856	rt	91 41	0	1048M	625M	cpu/1	113.5H	8.04%		orbserver
5384	rt	1 59	0	191M	17M	sleep	17.0H	1.32%		orbdetect
5042	rt	59 59	0	41M	17M	run	673:29	0.96%		q3302orb
26989	rt	1 59	0	44M	26M	sleep	272:40	0.86%		cdorb2db
4868	rt	12 59	0	110M	78M	sleep	377:26	0.58%		orbserver
5398	rt	1 59	0	6216K	1744K	sleep	145:14	0.22%		orb2orb
21764	rt	1 59	0	3056K	1992K	cpu/0	0:00	0.15%		top
5277	rt	1 59	0	6232K	2104K	sleep	50:44	0.08%		orb2orb
5261	rt	1 59	0	6256K	2616K	sleep	54:47	0.07%		orb2orb
4843	rt	1 59	0	23M	11M	sleep	46:55	0.06%		perl
5251	rt	1 59	0	6248K	2032K	sleep	54:11	0.06%		orb2orb
13509	rt	1 59	0	76M	7128K	sleep	30:36	0.06%		slink2orb
5271	rt	1 59	0	6232K	1960K	sleep	47:37	0.05%		orb2orb
5040	rt	13 59	0	26M	4040K	sleep	63:03	0.05%		qt2orb
5214	rt	1 59	0	208M	34M	sleep	25:25	0.04%		slink2orb



# main OGS orb sources & clients

orbserver 2/27/2013 (058) 16:32:26.699

Version 'Release 5.1-64 SunOS 5.10 2011-04-28 '

Pid 4856 @ crs-v240-b:/database (158.110.30.133), port #7000

Started Mon 2013-035 Feb 04 16:30:10 by rt, running 23 days

ring buffer last initialized Thu 2012-257 Sep 13 4:01:28

Maximum 1000.0 Mbytes packet data

Maximum 2500010 packets

Maximum 1000 sources

56 clients

519 sources

511551 opens 511495 closes 0 errors 7 rejections

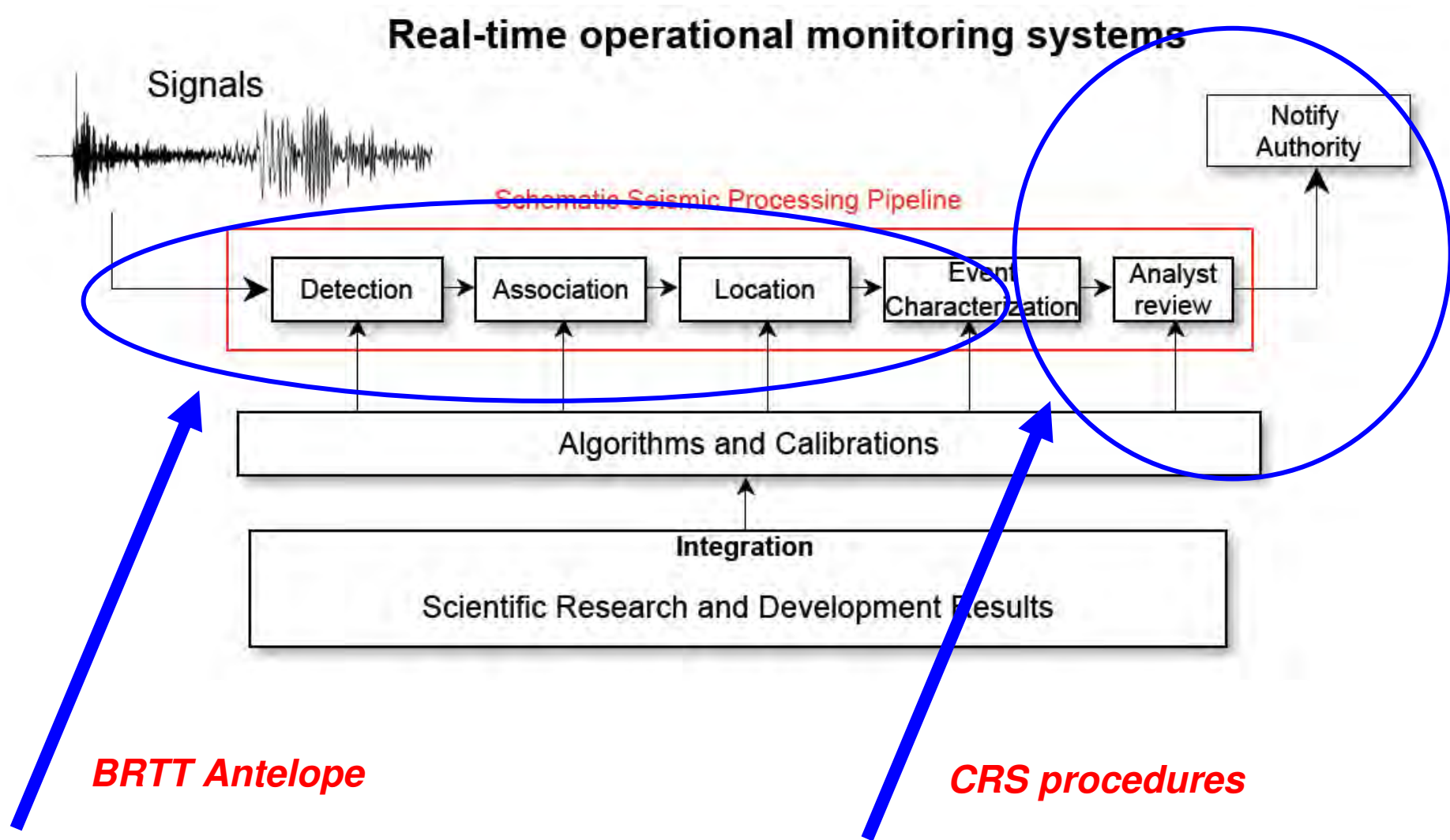
Total Output rate = 2070.524 kbps

Total Input rate = 121.852 kbps

Total Output packet rate = 1263.238 pkts/s

Total Input packet rate = 203.656 pkts/s

# Earthquake detection and notification



# OGS adds-on for Antelope

- PickServer (using 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 (v. 2)

CRS Pickserver: dpesaresi - Mozilla Firefox

pickserver.crs.inogs.it/pickserver.php

CRS Pickserver: dpesaresi

EVENT SELECT

Antelope antelope\_15min

2010 01 All

Filter by Label: none

- 11 21:35:01 Md=2.6 CASINA (EMILIA)
- 12 12:48:39 Md=2.7 LUN (PAG) (CROAZIA)
- 12 13:35:42 Md= ?
- 12 22:00:32 Md= ? CIMA DI GRION (ALTO ADIGE)
- 12 22:12:51 Md=2.6 POSTOJNA (SLOVENIA)
- 13 00:27:45 Md=2.1 POSTOJNA (SLOVENIA)
- 13 02:17:59 Md=1.7 GOLFO DI TRIESTE
- 13 03:03:12 Md=2.1 POSTOJNA (SLOVENIA)
- 14 02:13:26 Md=2.2 POSTOJNA (SLOVENIA)
- 14 04:34:48 Md=2.5 FICAROLO (VENETO)
- 14 19:05:33 Md=2.1 MERANO (ALTO ADIGE)
- 15 14:20:54 Md=4.0 POSTOJNA (SLOVENIA)
- 15 14:31:11 Md=2.0 POSTOJNA (SLOVENIA)

ORIGIN MAP

PICKING SETS/ORIGINS

Clone to my Current Add to my Current

Picks	Origin time UTC	Site	Mp	Ml	Lat Lon	Depth (kn)	ΔN-S	ΔE-W	Hor. Err	Gsp	RMS	Qual.	Owner	Label	Last change (UTC)	Agent	Pin	Slot
33	2010-01-30 19:20:34.51	PIELINGO (FRIULI)	1.85		46.3263 12.8583	9.5 ± 1	0	0	0.4	114	0.16	BBB	PickServer 1		2011-03-29 10-16-03	H71	A	1
33	2010-01-30 19:20:34.51	PIELINGO (FRIULI)	1.85		46.3263 12.8583	9.5 ± 1	0	0	0.4	114	0.16	BBB	asnidarcy (current)		2011-03-29 10-16-03	H71	A	2

Send prelim. ALARM Send Final ALARM

PICK & LOCATE

SAC download SG2K read-only

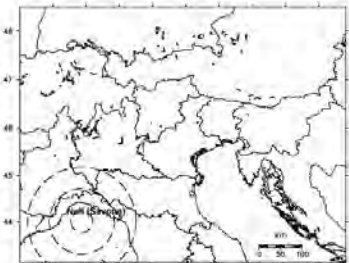
Net	Station	Ch	Z	N	E	P	i/e	±	P time	P Res	P Err.	H71 wgt	W2	Auth	S	i/e	S time	S Res	S err	H71 W	W2	Auth	S-P	Coda	Coda time	Auth	Md	WA	Ml	Dist km
EMIS	FUSE	HH					e	+	19:20:37.225	-0.29	0.0076	0	0	none		*	19:20:19.610	-0.24	0.0051	2	2	none	2.38	19:21:07.760	none	1.8			15	
EMIS	MPRI	SH					i	-	19:20:37.350	-0.03	0.0049	0	0	none		*	19:20:19.658	-0.24	0.1158	2	2	none	2.51	19:21:05.428	none	1.8			14	
DST	PALA	HH					j	-	19:20:37.031	0.06	0.0019	0	0	none		*	19:20:18.964	-0.02	0.072	2	2	none	1.83	19:21:10.487	none	1.9			11	

# Alarms

**REGIONE DEL VENETO**  
 Centro Funzionale Decentrato Multirischio  
 Data Operativa Tel. 041 2794072 Fax 041 2794074

**SEGNALAZIONE DI TERREMOTO** Fax n. 7681, 1  
Pagine Segnalazione

**Evento n. 7681**  
 del 01/02/2009 ore 15:52:01

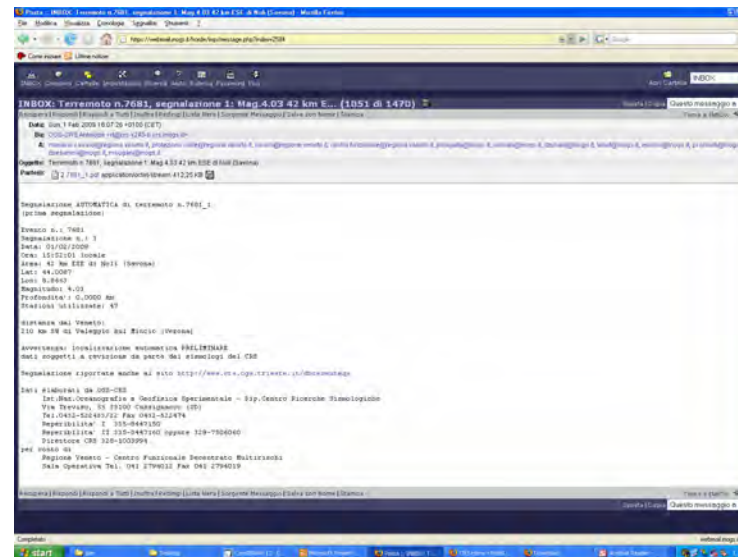


Data: 01/02/2009	Epicentro: 44.009°lat (44°00'31"")
Ora: 15:52:01 locale	8.866°lon (08°51'58"")
Area: 42km ESE di Noli (Savona)	Magnitudo: 4.0 (ML Richter)
	Profondità: 0.0 km

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

Struttura responsabile dell'elaborazione dell'Avviso: OGS-CRS  
 Via Mar. Oceanografia e Geofisica Sperimentale - Via Caio Plautio Sordani 15  
 Tel. 0422-30243/322 Fax 0422-302474  
 Repertorio I 7335447150 Repertorio II 3335447150 oppure 329-700400  
 Direzione CRS Ed. 1301394  
 Segnalazione pubblicata sul sito <http://www.crs.mi.it>

fax



**INBOX: terremoto n.7681 segnalazione 1: Mag:4.03 42 km ESE (1051 di 1470)**

Mag: 4.03 (ML Richter)

Area: 42km ESE di Noli (Savona)

Evento n. 7681  
 Segnalazione n. 1  
 Data: 01/02/2009  
 Ora: 15:52:01 locale  
 Area: 42km ESE di Noli (Savona)  
 Lat: 44.009  
 Lon: 8.866  
 Profondità: 0.000 km  
 Profondità: 0.000 km

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**



**OGS-CRS**  
 Istituto Nazionale di Oceanografia e di Geofisica Sperimentale

**Earthquake: NORTHERN ITALY**

web

# OGS dbheli



# OGS Real Time Seismology:

<http://rts.crs.inogs.it/>

RealTime Seismology - Windows Internet Explorer

http://rts.crs.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

**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)

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

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
- 2010-03-16 19:09:41 MI: 1.9
- 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

Internet 110%

# Done (☺):

- 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
- orbdetect tuning
  - BB continuous, SP trigger, Local/teleaseismic bandwidth, S phases
- Antelope migration to 5.2-64



## Work in progress (☺):

- orbassoc tuning (grid, windows, station weighting and grouping, etc.)
- Migration core Antelope (SUN cluster) from 5.1-64 to 5.2-64 (need OS patch)
- Migration from cdorb2db + db2msd to orbwf
- Implement orbxchange with neighbors

# The OGS Antelope Real-Time Team



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Seismic Monitoring Networks  
And Data Management  
Responsible  
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# The OGS Antelope Real-Time Team



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Paolo Di Bartolomeo  
PickServer,  
Web display  
pdibartolomeo@inogs.it

# The OGS Antelope Real-Time Team



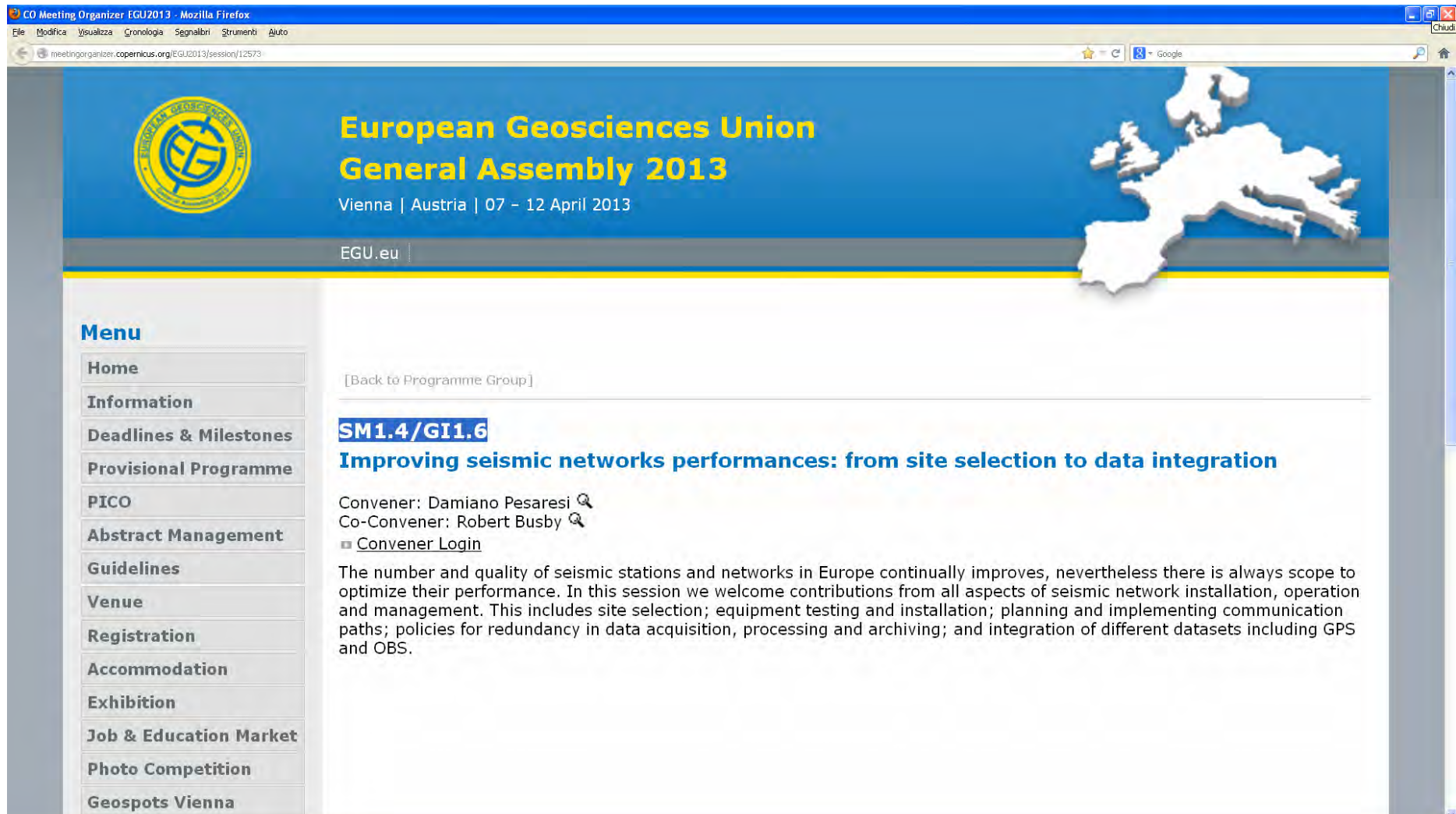
Denis Sandron  
Magnitudo,  
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Luca Moratto  
ShakeMaps,  
RT configuration  
lmoratto@inogs.it

# EGU2013 SM1.4/GI1.6

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




The screenshot shows a web browser window displaying the EGU2013 website. The browser's address bar shows the URL: [meetingorganizer.copernicus.org/EGU2013/session/12573](http://meetingorganizer.copernicus.org/EGU2013/session/12573). The website header features the EGU logo on the left, the text "European Geosciences Union General Assembly 2013" in the center, and a map of Europe on the right. Below the header, the text "Vienna | Austria | 07 - 12 April 2013" and "EGU.eu" are visible. A left-hand menu lists various site sections: Home, Information, Deadlines & Milestones, Provisional Programme, PICO, Abstract Management, Guidelines, Venue, Registration, Accommodation, Exhibition, Job & Education Market, Photo Competition, and Geospots Vienna. The main content area includes a link "[Back to Programme Group]", a session title "SM1.4/GI1.6" in a blue box, and the session title "Improving seismic networks performances: from site selection to data integration". The convener is listed as Damiano Pesaresi and the co-convener as Robert Busby, with a "Convener Login" link. A paragraph of text describes the session's focus on seismic network performance optimization.

CO Meeting Organizer EGU2013 - Mozilla Firefox

File Modifica Visualizza Cronologia Segnalibri Strumenti Aiuto

meetingorganizer.copernicus.org/EGU2013/session/12573

Google

 **European Geosciences Union**  
**General Assembly 2013**  
Vienna | Austria | 07 - 12 April 2013

EGU.eu



**Menu**

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- Guidelines
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- Registration
- Accommodation
- Exhibition
- Job & Education Market
- Photo Competition
- Geospots Vienna

[Back to Programme Group]

**SM1.4/GI1.6**

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

Convener: Damiano Pesaresi   
Co-Convener: Robert Busby 

[Convener Login](#)

The number and quality of seismic stations and networks in Europe continually improves, nevertheless there is always scope to optimize 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.

# THANKS!

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Damiano Pesaresi, Pier Luigi Bragato, Marco Mucciarelli, Angela Saraò, Paolo Di Bartolomeo, Giorgio Durì, Paolo Bernardi, Michele Bertoni, Elvio Del Negro, Denis Sandron, Luca Moratto  
and all the **OGS-CRS** team!