



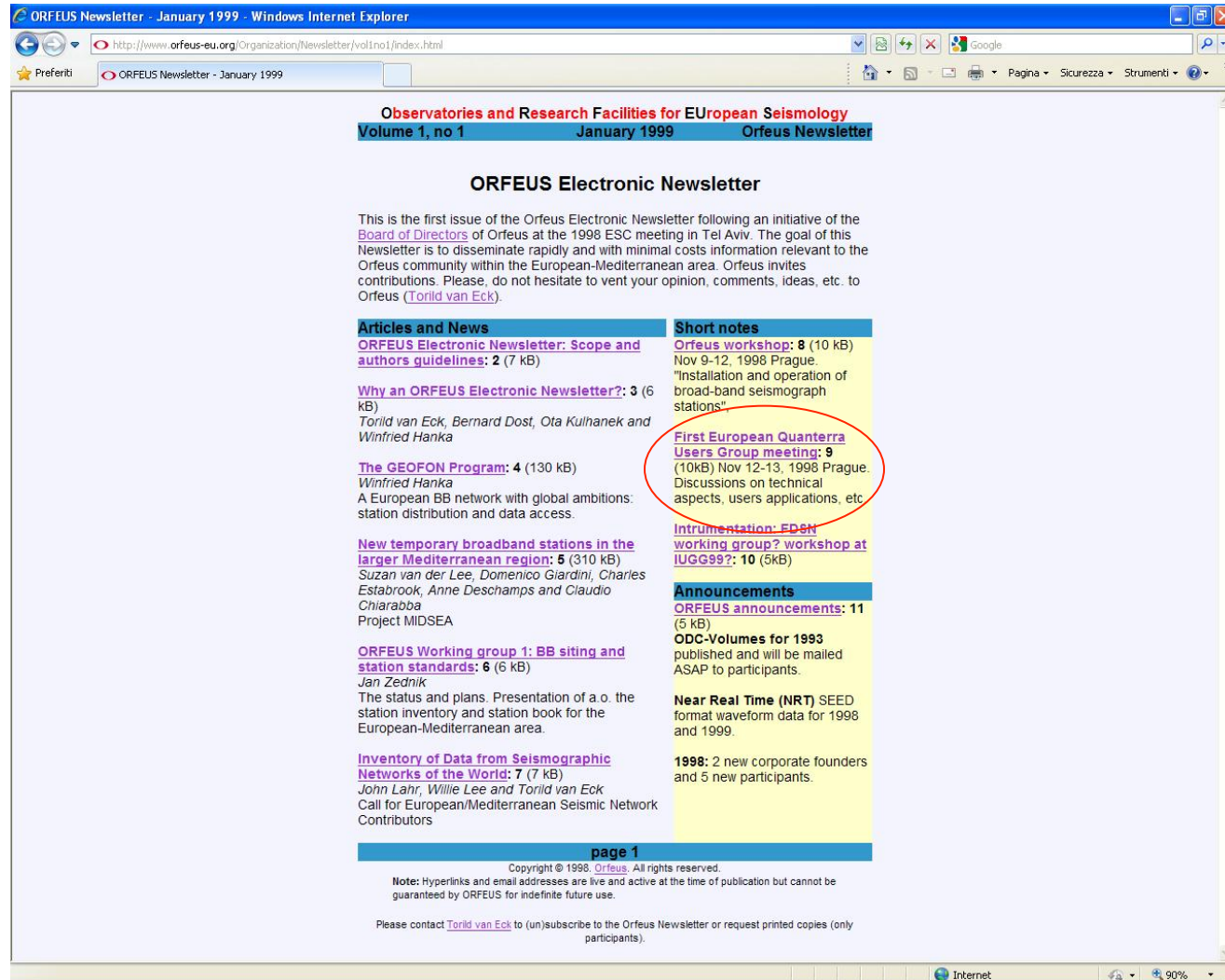
# Antelope usage @ OGS

Damiano Pesaresi

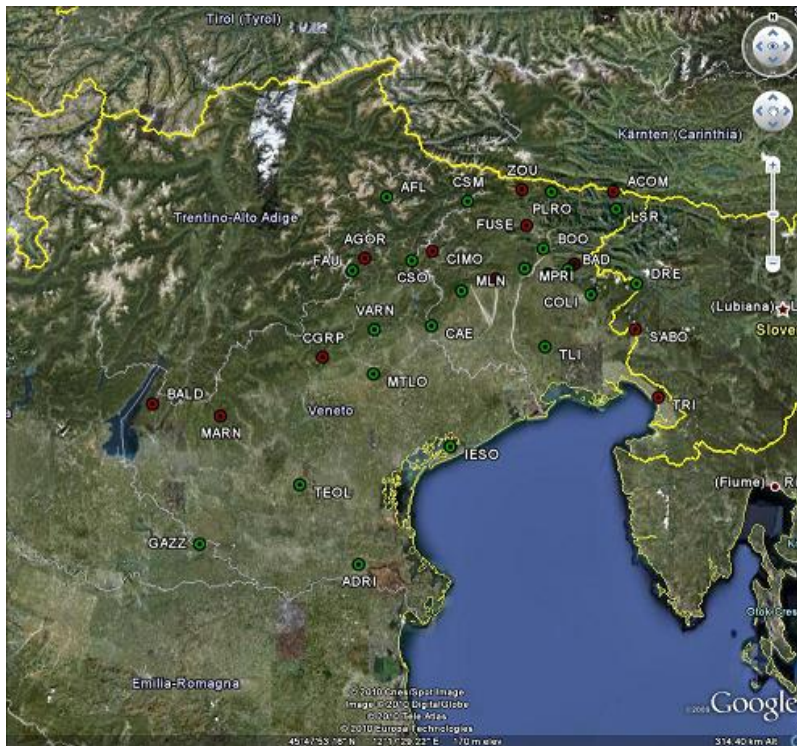
[dpesaresi@inogs.it](mailto:dpesaresi@inogs.it)

QAUG Prague March 2010

# Nice to be back since 1998!

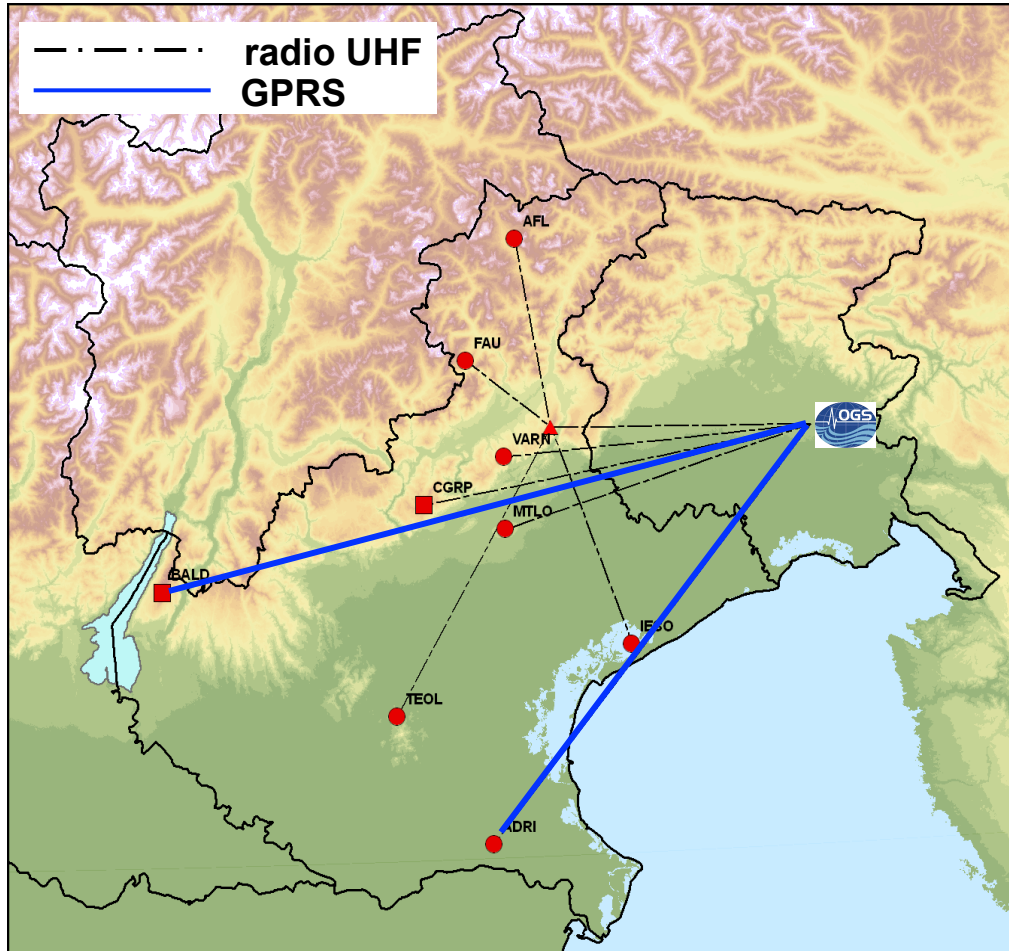


# NE Italy Seismic Network - OGS



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

# How is data transmitted?

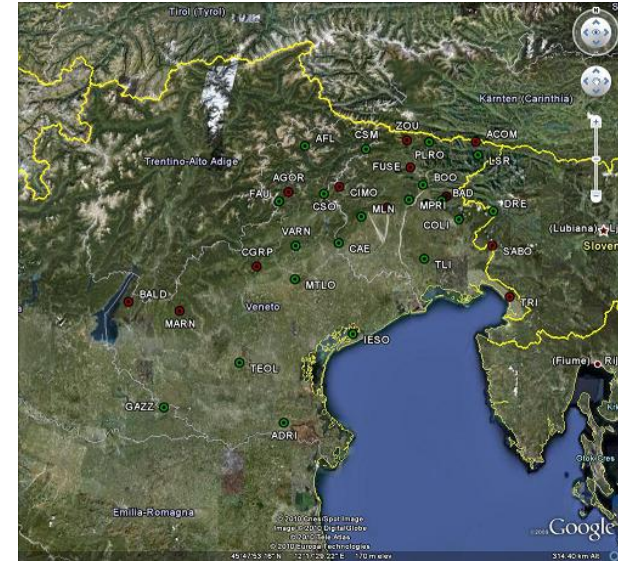


- UHF radio system with digital transmission
  - bandwidth 19.2kb/s
  - shared frequencies
- GPRS modem
- *Satellite currently under test*



# OGS-CRS: monitoring NE Italy seismicity

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



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 regional structures of the Civil Protection



*CRS headquarters in Udine (Italy)*

# Data acquisition with Antelope @ OGS: how it all started

*INTERREG III A Italia-Austria*

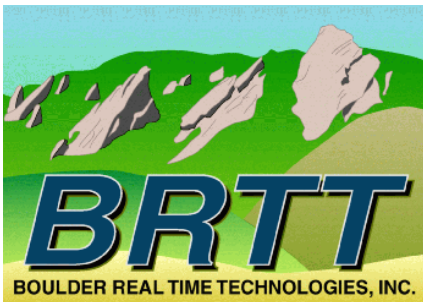
*2000-2006*

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



Participants:

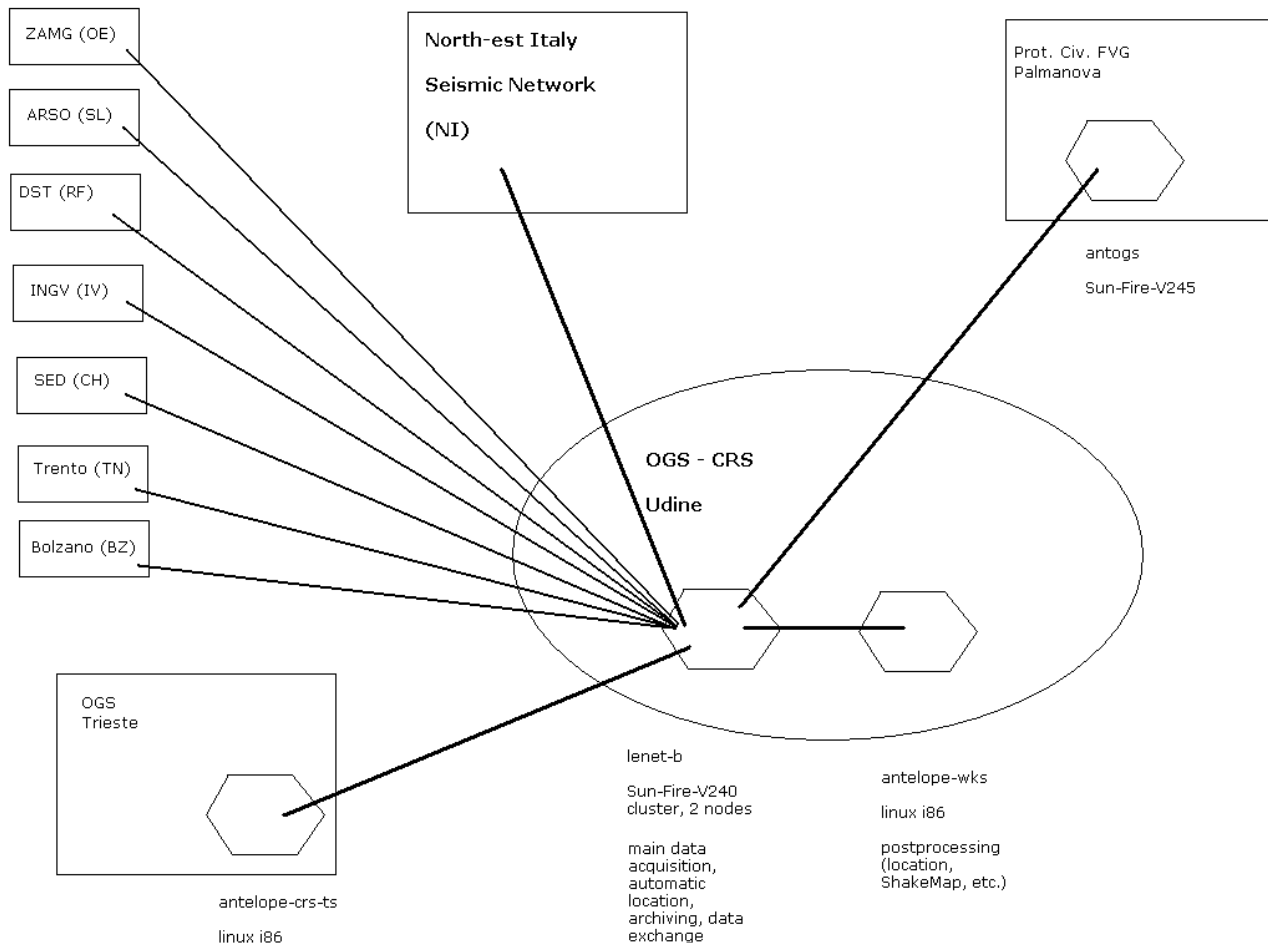
- ZAMG (Vienna, Austria)
  - OGS (Udine, Italy)
  - DST (Trieste, Italy)
- ARSO (Ljubljana, Slovenia), external



# Data contribution: ~100 stations!



# OGS Antelope configuration





# main rtexec processes table

```
Processes &Tbl{
orbserver
orbexport
orbvino
orbsor
orbasain
qt2orb
q3302orb
TN2orb
MN2orb
DST2orb
    DST2orb $DSTORB $ORB
ARSO2orb
    $ORB
ZAMG2orb
SI2orb
CH2orb
orb2db
orb2db_FV
orb2dbt
orbdetect
orbassoc
orbmb
orbml
    make_magtables $ORB $ORB $ORB
orbms
orb2export
exportVINO
orb2sor
orb_alert_friuli
orb_alert_veneto
orb_alert_TN
orbtrigger_topkserver
    %lon% %depth% %ml% %lddate%
orbtrigger_orb2db_evid
orbtrigger_towebpcfv
orbtrigger_toShakeMap
    %time% %lat% %lon% %depth% %ml% %lddate%
}

orbserver -p $ORB orbserver
orbserver -p $ORBEXPORT orbexport
orbserver -p $ORBVINO orbvino
orbserver -p $ORBSOR orbsor
orbserver -p $ORBASAIN orbasain
qt2orb -dataorb $ORB -cmdorb $ORB -calib_db $SDB -v
q3302orb -v -calib_db $SDB -S state/q3302orb -v OGS dataorb $ORB
slink2orb -v -dc $SDB -dm $SDB -S state/TN2orb -pf pf/TN2orb.pf $TNSEISCOMP $ORB
slink2orb -v -dc $SDB -dm $SDB -S state/MN2orb -pf pf/MN2orb.pf $INGVSC $ORB
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/
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
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
orb2orb -S state/SL2orb -m 'SI_.*_(H|E|S)(H|L|G|N)(Z|N|E).*' $SIORB $ORB
slink2orb -v -dc $SDB -dm $SDB -S state/CH2orb -pf pf/CH2orb.pf $SEDSC $ORB
orb2db -v -S state/orb2db -r 'FV_.*' $ORB $SDB
orb2db -v -S state/orb2db_FV -m 'FV_.*' -p pf/orb2db_FV.pf $ORB $SDB
orb2dbt -v -state state/orb2dbt -overwrite $ORB $SDB
orbdetect -v -onlypicks -out $ORB $ORB $SDB
orbassoc -v -select /db/detection $ORB $ORB dbmaster/ttgrid
orbampmag -pf pf/orbmb -v -state state/orbmb -use_if_not_defining -auth_expr mb -next_target_orbmag orbml -make_magtables $ORB $ORB $ORB
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 $ORB
orbampmag -pf pf/orbms -v -state state/orbms -use_if_not_defining -auth_expr ms -target_orbmag orbms -make_magtables $ORB $ORB $ORB
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
orb2orb -m 'NI_VINO_.*|qt2orb.*' -S state/exportVINO $ORB $ORBVINO
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
orbpttrigger -background -select "/pf/orbmag" -state state/orbpttrigger_friuli $ORB /database/AlertFriuli/alert_friuli @origin.evid@ @origin.oid@
orbpttrigger -background -select "/pf/orbmag" -state state/orbpttrigger_veneto $ORB /database/AlertVeneto/alert_veneto @origin.evid@ @origin.oid@
orbpttrigger -background -select "/pf/orbmag" -state state/orbpttrigger_TN $ORB /database/AlertTrentino/alert_trentino @origin.evid@ @origin.oid@
orbpttrigger -background -select "/db/origin" -state state/orbpttrigger_topkserver $ORB /database/topkserver/orbtrigger_topkserver %evid% %oid% %time% %lat%
    %lon% %depth% %ml% %lddate%
orbpttrigger -background -select "/db/origin" -state state/orbpttrigger_orb2db_evid $ORB /database/evdb/orb2db_evid %evid%
orbpttrigger -background -select "/pf/orbmag" -state state/orbpttrigger_towebpcfv $ORB /database/towebpcfv/towebpcfv.pl @origin.evid@ @origin.oid@
orbpttrigger -background -select "/db/origin" -state state/orbpttrigger_toShakeMap $ORB /database/toShakeMap/orbtrigger_toShakeMap %evid% %oid% %auth%
```

# main OGS Antelope load averages

load averages: 1.59, 1.50, 1.45;  
14:38:25

up 162+03:36:56

138 processes: 136 sleeping, 2 on cpu

CPU states: 26.9% idle, 67.3% user, 5.9% kernel, 0.0% iowait, 0.0% swap

Memory: 4096M phys mem, 241M free mem, 20G total swap, 19G free swap

| PID  | USERNAME | LWP | PRI | NICE | SIZE  | RES   | STATE | TIME   | CPU    | COMMAND   |
|------|----------|-----|-----|------|-------|-------|-------|--------|--------|-----------|
| 7754 | rt       | 1   | 0   | 40M  | 31M   | cpu/0 | 0:13  | 45.20% |        | perl      |
| 3829 | rt       | 95  | 59  | 0    | 1042M | 498M  | sleep | 42.9H  | 18.21% | orbserver |
| 1268 | root     | 27  | 59  | 0    | 874M  | 746M  | sleep | 860:45 | 2.37%  | java      |
| 4013 | rt       | 1   | 49  | 0    | 133M  | 34M   | sleep | 615:14 | 1.67%  | orbdetect |
| 3937 | rt       | 1   | 59  | 0    | 107M  | 39M   | sleep | 211:35 | 1.28%  | orb2db    |
| 6852 | rt       | 1   | 59  | 0    | 16M   | 9136K | sleep | 0:00   | 0.75%  | dtterm    |
| 3867 | rt       | 35  | 59  | 0    | 57M   | 8720K | sleep | 150:22 | 0.46%  | q3302orb  |
| 3859 | rt       | 4   | 59  | 0    | 108M  | 94M   | sleep | 99:00  | 0.25%  | orbserver |
| 3879 | rt       | 1   | 59  | 0    | 49M   | 2680K | sleep | 34:43  | 0.17%  | slink2orb |
| 7843 | rt       | 1   | 59  | 0    | 3088K | 1888K | cpu/1 | 0:00   | 0.15%  | top       |
| 4054 | rt       | 1   | 59  | 0    | 5248K | 1768K | sleep | 51:51  | 0.12%  | orb2orb   |
| 3838 | rt       | 8   | 59  | 0    | 108M  | 54M   | sleep | 31:43  | 0.11%  | orbserver |
| 1410 | sysop    | 1   | 59  | 0    | 3968K | 2240K | sleep | 318:27 | 0.09%  | seedlink  |
| 3825 | rt       | 1   | 59  | 0    | 25M   | 5120K | sleep | 20:21  | 0.07%  | perl      |
| 3877 | rt       | 1   | 59  | 0    | 49M   | 2600K | sleep | 14:44  | 0.06%  | slink2orb |

# main OGS orb sources & clients

orbserver 3/19/2010 (078) 13:59:17.697

Version 'Release 4.10 SunOS 5.10 2008-05-02 '

Pid 3829 @ lenet-b:/database (158.110.30.6), port #XXXX

Started Tue 2010-068 Mar 09 13:22:16 by rt, running 10  
days 0.6 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

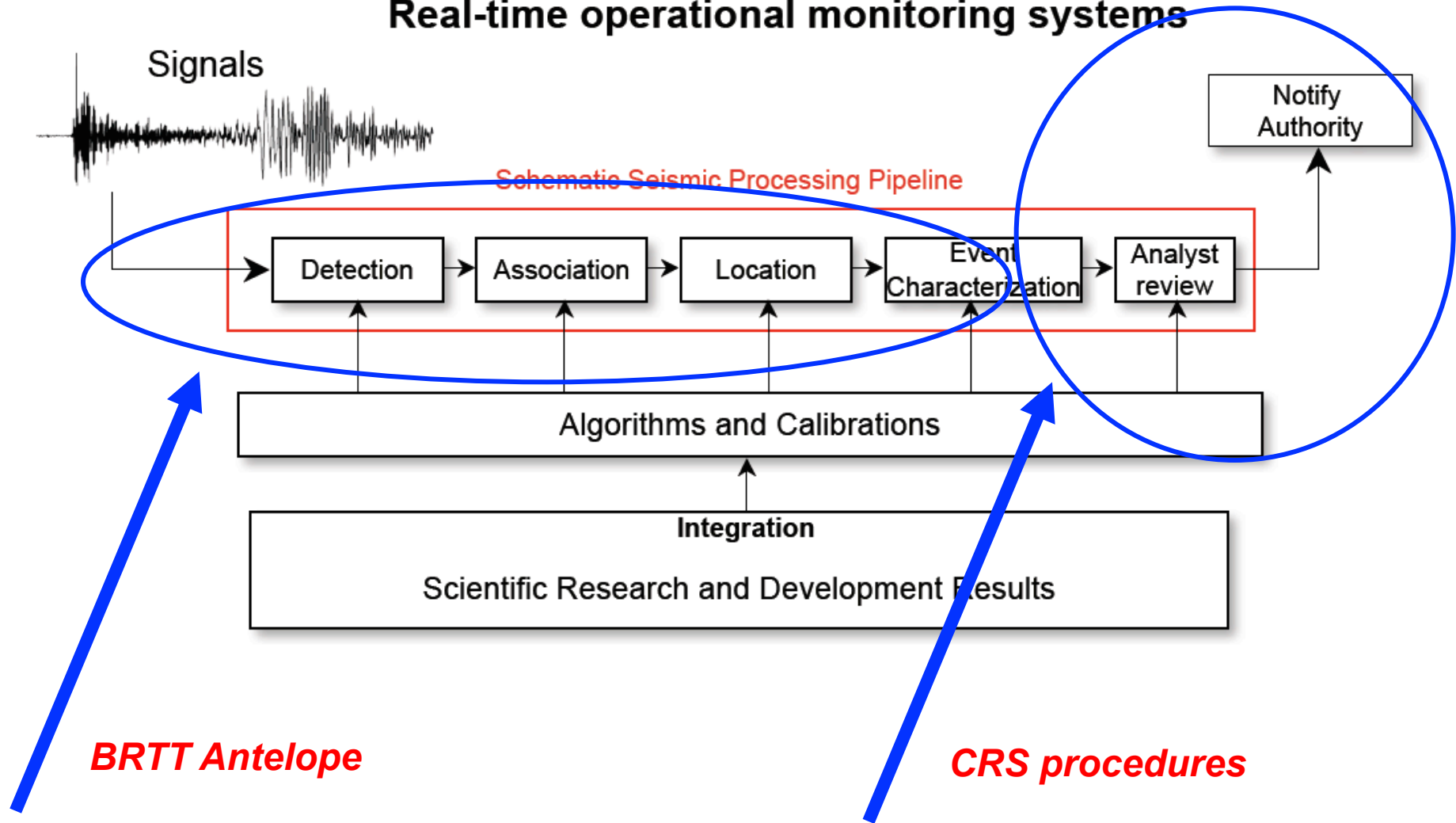
**58 clients**

**376 sources**

291079 opens 291021 closes 0 errors 0 rejections

# Earthquake detection and notification

## Real-time operational monitoring systems





# OGS customized sw for Antelope

- PickServer
- Comprehensive Alarm routines with re-location control
  - Output: email, fax, SMS, web
- M882orb and ORION2orb plugins
- data archive
- 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=Antelope7&dir=antelope\_15min/2010/03/18/22-13-43?cid=m2qdZSuIthoAAGs6RGAAAAAC

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

| FY SP_ID |       | FY SP_ID |       | 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 | MYKA  | 75.7  |
| ILI      | 83.7  | PUSE     | 84.1  | TRI     | 81.4  | DDG   | 233.3 | KOSI  | 221.1 | PVI     | 123.4 | GORS(2) | 31.8 | ABTA  | 148.4 |
| BOO      | 88.9  | DRE(3)   | 43.9  | DST2    | 84.4  | PAG   | 243.4 | ROSI  | 226.2 | SEST    | 169.7 | CAD6(1) | 39.5 | FITA  | 285.7 |
| IESO     | 141.3 | COLI     | 83.4  | CUSI    | 72.4  | OZOL  | 244.7 | ABSI  | 232.5 | CTI     | 196.4 | CEY(1)  | 40.6 | DAVA  | 396.2 |
| MTLO     | 164.4 | LSR(2)   | 68.5  | VINO(1) | 73.4  | VAR   | 236.3 | ROSI  | 232.7 | BRES    | 201.5 | ROB5    | 56.3 |       |       |
| FAU      | 172.0 | BAD      | 75.5  | ACOM    | 74.5  | CARE  | 272.0 | MOSE  | 236.4 | APPI    | 232.7 | SKDS(1) | 59.3 |       |       |
|          |       | MDRI     | 84.9  | GEFF    | 84.4  | RNI   | 276.1 |       |       | MAGA    | 277.8 | KNDS    | 61.4 |       |       |
|          |       | PIRO     | 86.4  | EUSE    | 99.4  |       |       |       |       | SBFO    | 278.8 |         |      |       |       |
|          |       | ZOU      | 108.5 | FALA    | 99.9  |       |       |       |       | RAVA    | 280.8 |         |      |       |       |
|          |       | MLN      | 122.1 | KOU2    | 108.9 |       |       |       |       | MAH     | 284.1 |         |      |       |       |
|          |       | CSM      | 128.5 | PURA    | 118.8 |       |       |       |       | SALO    | 288.7 |         |      |       |       |
|          |       | CAE      | 135.7 | FOLC    | 131.4 |       |       |       |       | BRMO    | 297.4 |         |      |       |       |
|          |       | CSO      | 145.9 | CIMO(1) | 137.4 |       |       |       |       | VLC     | 296.3 |         |      |       |       |
|          |       | YARN     | 161.5 | ASOR    | 167.1 |       |       |       |       | TUE     | 275.6 |         |      |       |       |
|          |       | AFI      | 163.5 | CGRE    | 186.3 |       |       |       |       |         |       |         |      |       |       |
|          |       | CGRP     | 196.3 | MARN    | 226.1 |       |       |       |       |         |       |         |      |       |       |
|          |       | ADRI     | 204.4 | BALD    | 264.9 |       |       |       |       |         |       |         |      |       |       |
|          |       | TEOL     | 210.8 |         |       |       |       |       |       |         |       |         |      |       |       |
|          |       | GAZZ     | 263.4 |         |       |       |       |       |       |         |       |         |      |       |       |

### Pickings

1155 bytes

.picks

JAYS BB Z ? P ? 20100318 2213 47.066 GAU 0.2 0.0

JAYS BB Y ? \_CODA ? 20100318 2214 17.854 GAU 0.1

GORS BB Z ? P ? 20100318 2213 48.842 GAU 0.2 0.0

GORS BB Y ? \_CODA ? 20100318 2214 17.854 GAU 0.1

last modified: 2010-03-19 13:00:07.0

### Hypocentral Location

event.blt 1583 bytes

O.G.S. Boll. Friuli-V. Giulie

1 1 2010 MAR 18 22h13m42.7s

46 03.9 N 14 11.5 E

EPICENTRAL AREA: 21RI (SLOVENIA)

h= 12.5km +/- 3.5km MD= 2.2 G8

sta phase time res wt

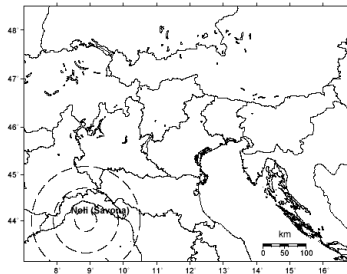
Internet 60%

# Alarms



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

Fax n.7681\_1  
Prima Segnalazione



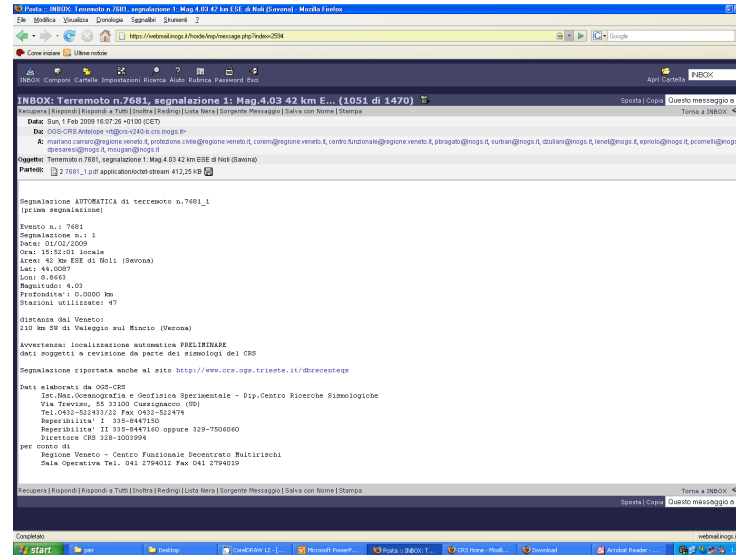
Data: 01/02/2009  
Ora: 15:52:01 locale  
Area: 42km ESE di Noli (Savona)  
Epicentro: 44.009°lat (44°00'31")  
8.866°lon(08°51'58")  
Magnitudo: 4.0 (ML Richter)  
Profondità: 0.0 km

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

Struttura responsabile dell'elaborazione dell'Avviso: OGS-CRS  
Ist.Naz.Oceanografia e Geofisica Sperimentale-Dip.Centro Ricerche Sismologiche  
Tel. 0432-52243/22 Fax 0432 522474  
Reperibilità 13358447150 Reperibilità 13358447160 oppure 3297506060  
Direttore CRS 329 1003964  
Segnalazione pubblicata sul sito <http://www.crs.inogs.it>



fax



e-mail

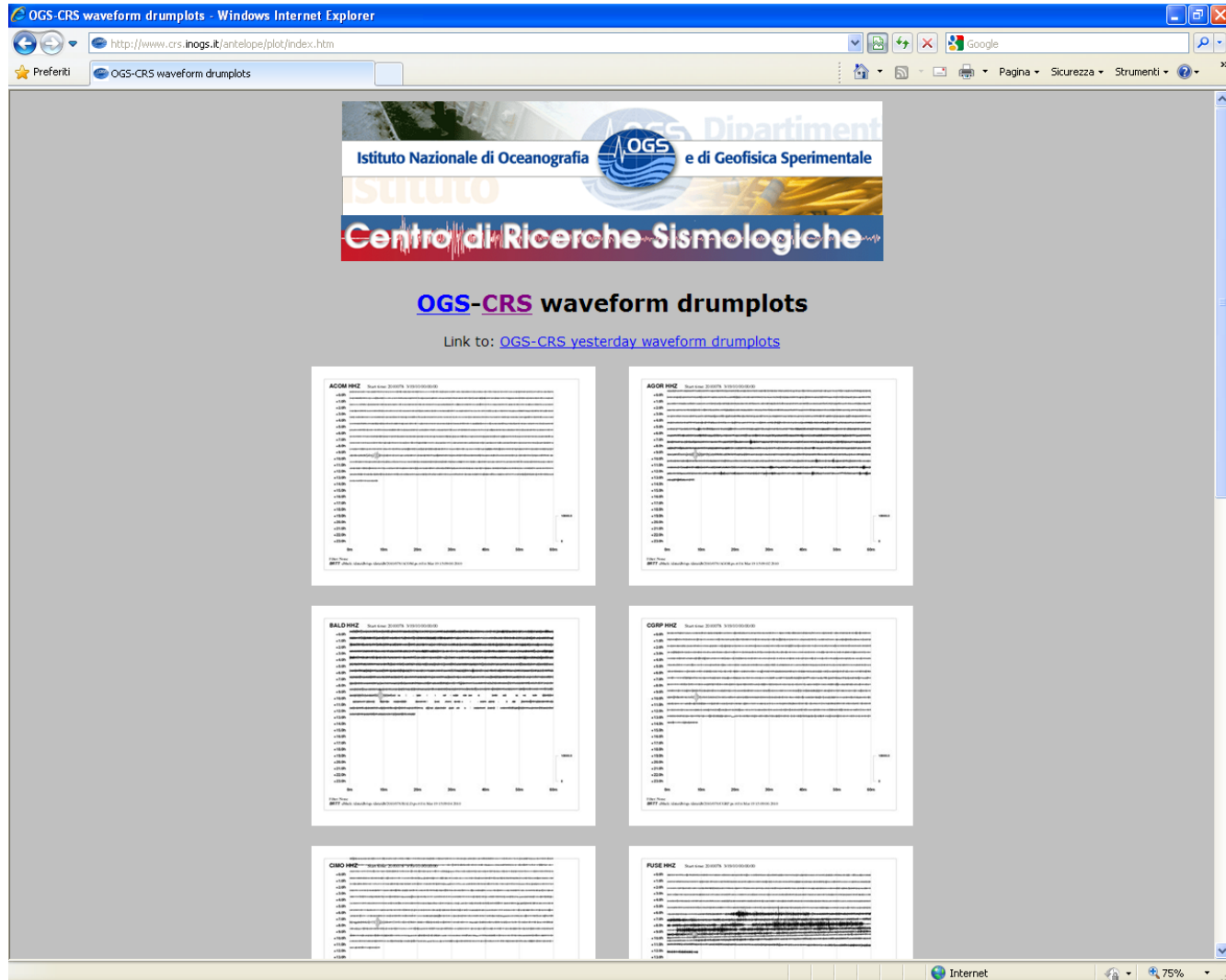
sms

**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**

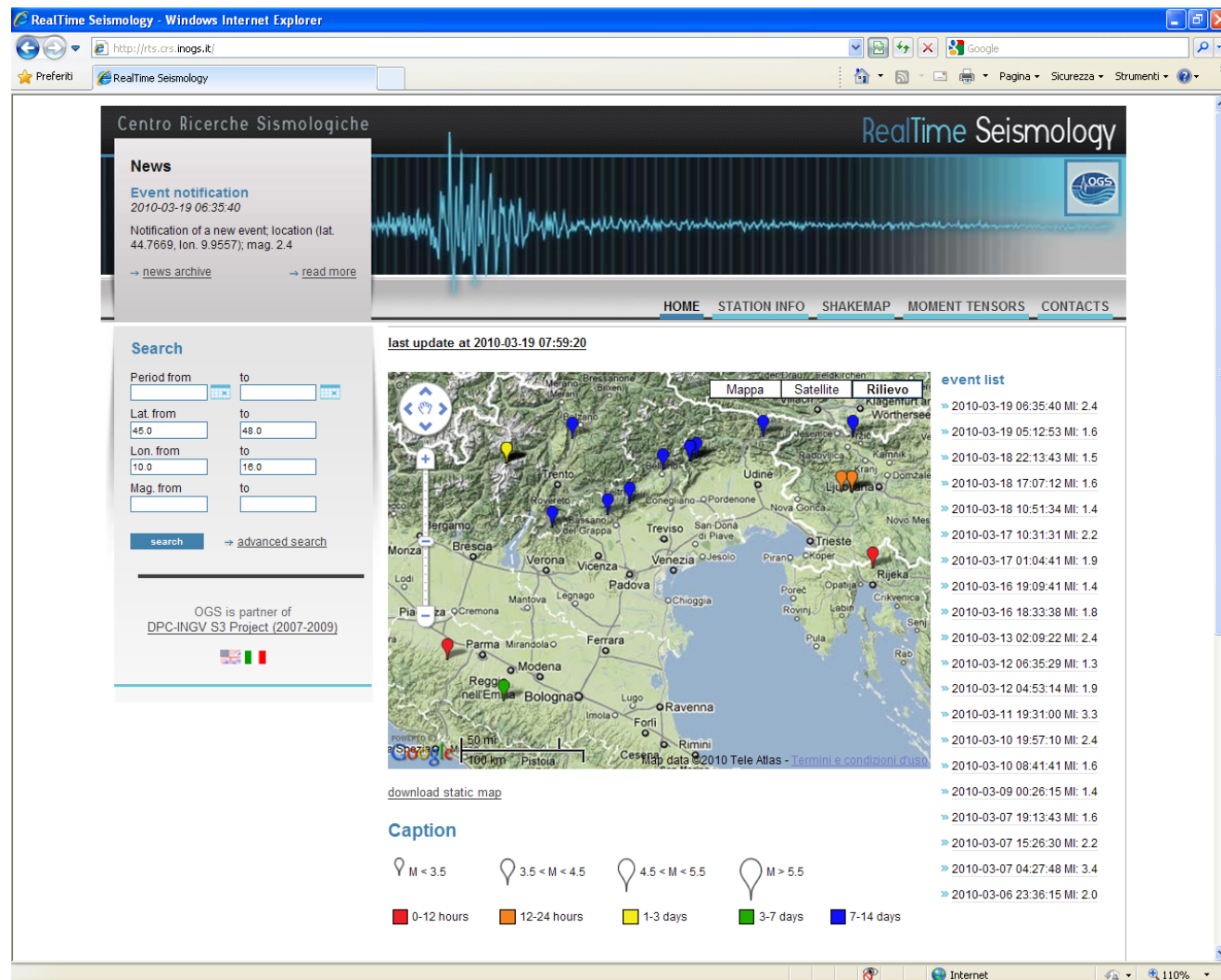


web

# OGS dbheli



# OGS Real Time Seismology



# To do:

- Migration from 4.10 to 4.11 (wait 4.12?)
- Migration from orbampmag to orbevproc
- Archive policy revision (back to rtbackup?)
- dbdetect tuning
  - BB continuous
  - SP trigger
  - S phases?
- orbassoc tuning (grid, windows, etc.)



# EGU2010 SM1.3

## Seismic Centers Data Acquisition

The screenshot shows a Windows Internet Explorer browser window displaying the EGU2010 website. The address bar shows the URL <http://meetingorganizer.copernicus.org/EGU2010/session/2427>. The page header features the European Geosciences Union logo, the text "European Geosciences Union General Assembly 2010", and the location "Vienna, Austria, 02 - 07 May 2010". A sidebar on the left contains a navigation menu with links such as Home, Information, Programme, Special Events, and Registration. The main content area displays the session title "SM1.3 Seismic Centers Data Acquisition" with convener and co-convener names. It also includes a paragraph about seismic data acquisition systems, public information about a poster walk-through, and a list of related events.

CO Meeting Organizer EGU2010 - Windows Internet Explorer

<http://meetingorganizer.copernicus.org/EGU2010/session/2427>

EGU2010

CO Meeting Organizer EGU2010

European Geosciences Union  
**General Assembly 2010**  
Vienna, Austria, 02 - 07 May 2010

EGU.eu

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### SM1.3 Seismic Centers Data Acquisition

Convener: Damiano Pesaresi  
Co-Convener: Reinoud Sleeman

[Convener Login](#) [Oral Programme](#) [Poster Programme](#)

While the number and quality of seismic stations and networks installed is quite satisfactory, the choice of available seismic data acquisition systems for medium size data centers is de facto restricted to two public domain software suites (namely SeisComP and EarthWorm) plus a commercial one (Antelope). With SeisComP version 3.0 starting a licensing program and adding early warning capabilities, experiences in the management of seismic data acquisition centers are welcome.

**Public Information:** Poster walk-through on Wednesday May 5 starting at 18:00!

**Related events:** [SM4.1/NH4.11 - Earthquake and Tsunami Early Warnings \(co-organized\)](#)  
[SM2.6/AS4.8 - Research and Development in Nuclear Explosion Monitoring \(co-organized\)](#)  
[PSD74 - SM1.3](#)

# THANKS!

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