

Republic of Lebanon  
National Council for Scientific Research

# Provisional Seismological Bulletin

from the

## NATIONAL SEISMIC NETWORK

January

2004

Prepared by  
The National Centre for Geophysical Research  
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## GENERAL BULLETIN INFORMATION

The National Centre for Geophysical Research is a governmental agency established 1975 in Lebanon by the National Council for Scientific Research (CNRS). The mission of the Centre, among other assignments, is the monitoring of seismic activity within the national territory. Currently, the national seismic network is under deployment; it has been officially registered as GRAL, an acronym for Geophysical Research Arrays of Lebanon. Station coordinates and status are given below.

Since 1993, the Centre has been participating in a regional initiative by the UNESCO and the USGS known as RELEMR, i.e. Reducing Earthquake Losses in the Eastern Mediterranean Region.

Within this framework, the Centre routinely contributes to the database set up for this purpose and maintained by the Euro-Mediterranean Seismological Centre (EMSC). For coherence, the Centre has adopted the recommended seismic analysis system SEISAN developed by Jens Havskov and Lars Ottemoller from the University of Bergen, Norway.

The localization program currently used for locating earthquakes is Hypocenter (Lienert et al., 1986). Plane parallel layers are assumed for local and regional events, while the IASPEI travel time tables are used for distant events.

The velocity model used for all local and regional events is the one currently adopted by the RELEMR initiative.

| P-wave velocity<br>(km/sec) | depth to top of layer<br>(km) |
|-----------------------------|-------------------------------|
| 6.2                         | 0.0                           |
| 6.8                         | 14.0                          |
| 8.05                        | 34.0                          |
| 8.25                        | 50.0                          |
| 8.5                         | 80.0                          |

Magnitudes are calculated from the coda duration. The coda wave magnitude is estimated via the formula:

$$M_c = 0.08 + 1.63 * \log_{10}(T) + 0.0009 * D.$$

where T is the coda duration (sec) and D is the epicentral distance (km). The coefficients above were adopted at the outset of our Centre in 1980 and thus are still in use for the sake of continuity.

All available coda values are used for magnitude calculations. No station corrections are used for either travel times or magnitudes calculations. The Vp/Vs velocity ratio used in both layered models above is 1.74.

As a general policy, neither depths, nor epicenters, are fixed unless stated otherwise since this might restrict later use of the data. Consequently, some event locations might be unrealistic such as zero depth earthquakes or teleseismic locations off by 1000 km. However, the locations are based on the available data and reflect the localization procedure and the models used.

## STATIONS USED

The stations listed below are operated by the National Centre for Geophysical Research. They constitute the basic setup of the National Seismic Network of Lebanon.

However, readings from other cooperating agencies are also used in locating the events and thus more stations may appear in the event lists than in the station list; it is worth mentioning the systematic use of arrival times from the Cypriot seismic network CSS in order to constrain events corresponding to an active zone off the Lebanese shorelines.

| STATION | LATITUDE | LONGITUDE | HEIGHT(m) | NAME    | COMMENTS        |
|---------|----------|-----------|-----------|---------|-----------------|
| BHL     | 3354.25N | 3539.25E  | 1000      | BHANNES | Opened May 1980 |
| HWQ     | 3416.68N | 3556.78E  | 1161      | HAWQA   | Opened Jan 2001 |
| MATL    | 3329.32N | 3519.78E  | 5         | MATARIH | Opened Nov 2000 |
| FKH     | 3414.13N | 3624.11E  | 1170      | FAKEHEH | Scheduled 2003  |
| RCY     | 3329.08N | 3549.13E  | 1360      | RACHAYA | Scheduled 2003  |
| DWR     | 3323.13N | 3524.08E  | 420       | DWEIR   | Scheduled 2003  |

## MACROSEISMIC DATA

Macroseismic data, if available, are included in the bulletin.

## MONTHLY EPICENTER MAPS

Maps will be found on the last page.

## ELECTRONIC PUBLICATION

This provisional bulletin will be available for download in pdf format on:  
<http://www.cnrs.edu.lb/geophysicalresearch/>

## REFERENCES

- Havskov, J. and Ottemoller, L.(2001). SEISAN: The Earthquake Analysis Software.  
-version 7.2-  
Institute of Solid Earth Physics, University of Bergen.  
<http://www.ifjf.uib.no/seismo/software/seisan.html>
- Lienert, B.R., Berg, E. and Frazer, L.N.(1986). Hypocenter: An earthquake location method using centered, scaled, and adaptively least squares. Bull. Seism. Soc. Am., 76., pp 771-783.

## Abbreviations:

TIME: Origin time in UTC (hr. min. and sec.) or data file onset time if event is not located.

LAT: Latitude of epicenter

LON: Longitude of epicenter

DEPTH: Focal depth in kilometer (trailing F indicates fixed depth)

AGENCY: GRL throughout the bulletin, aka. Geophysical Research Lebanon

MAGNITUDES: Up to 3 different magnitudes can be given followed by type and reporting agency, e.g. 3.1 MC GRL - coda magnitude calculated according to GRL standard parameters.

RMS: Root mean square value of travel time residuals

STAT: Station code

CO: Component; S:short period, L:long period, B:broadband.

DIST: Epicenter distance (km)

AZI: Azimuth from source to station

PHAS: Phase; The first letter characterizes onset E(mergent) or I(mpulsive)

P: Polarity ( C for compression, D for dilatation )

HR: Hour

MN: Minute

SECON: Seconds

TRES: Residual (seconds)

CODA: Signal duration in seconds

AMPL: Ground Amplitude ( $0.5 \times (\text{peak to peak})$ ), (nm) at period PERI

PERI: Period where amplitude is measured

BAZ: Back azimuth (station to event)

ARES: Back azimuth residual

VELO: Apparent phase velocity (km/sec)

WT: Weight of phase in the location

\*: An asterisk before the phase arrival time implies a potential timing error. If an S phase is read, differential S-P times will be used in the hypocenter location.

January 1 2004 Hour: 12: 7 49.8 Lat: 34.22N Lon: 35.71E Depth:148 Agency: REL Local  
Magnitudes: 3.4MC REL Rms: 0.7 secs

| STAT | CO | DIST  | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT  |
|------|----|-------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| HWQ  | SZ | 22.73 | 73  | IPG   |   | 12 8 | 9.53  | 0.5  | 74   |      |      |     |      |      | 1.0 |
| HWQ  | SE | 22.73 | 73  | ISG   |   | 12 8 | 22.57 | -0.8 |      |      |      |     |      |      | 1.0 |
| BHL  | SZ | 35.38 | 188 | IPG   |   | 12 8 | 9.87  | 0.5  |      |      |      |     |      |      | 1.0 |
| BHL  | SE | 35.38 | 188 | ISG   |   | 12 8 | 24.45 | 0.6  |      |      |      |     |      |      | 1.0 |
| MATL | SZ | 88.39 | 204 | IPG   |   | 12 8 | 10.82 | -0.9 |      |      |      |     |      |      | 1.0 |

January 1 2004 Hour: 13:33 0.9 Lat: 36.13N Lon: 36.06E Depth: 15 Agency: REL Regional  
Magnitudes: 3.4MC REL Rms: 0.9 secs

| STAT | CO | DIST  | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT  |
|------|----|-------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| HWQ  | SZ | 205.6 | 183 | EPN   |   | 1333 | 30.51 | -0.5 | 61   |      |      | 238 | 125  | 58.2 | 1.0 |
| HWQ  | SE | 205.6 | 183 | SN    |   | 1333 | 52.13 | -1.2 |      |      |      |     |      |      | 1.0 |
| BHL  | SZ | 249.6 | 189 | EPN   |   | 1333 | 37.07 | 0.6  |      |      |      |     |      |      | 1.0 |
| BHL  | SE | 249.6 | 189 | SN    |   | 1334 | 3.93  | 1.1  |      |      |      |     |      |      | 1.0 |

January 3 2004 Hour: 17:19 1.6 Agency: REL Regional

| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| HWQ  | SZ |      |     | EPN   |   | 1720 | 31.75 |      |      |      |      |     |      |      |    |
| HWQ  | SN |      |     | SN    |   | 1721 | 42.51 |      |      |      |      |     |      |      |    |
| BHL  | SE |      |     | SN    |   | 1721 | 39.10 |      |      |      |      |     |      |      |    |

January 3 2004 Hour: 17:53 55.5 Lat: 34.67N Lon: 36.25E Depth: 15 Agency: REL Local  
Magnitudes: 2.7MC REL Rms: 0.4 secs

| STAT | CO | DIST  | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT  |
|------|----|-------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| HWQ  | SZ | 51.51 | 213 | IPG   |   | 1754 | 4.79  | 0.7  | 48   |      |      | 302 | 91   | 17.8 | 1.0 |
| HWQ  | SN | 51.51 | 213 | ISG   |   | 1754 | 10.22 | -0.2 |      |      |      |     |      |      | 1.0 |
| BHL  | SZ | 101.0 | 213 | IPG   |   | 1754 | 10.86 | -0.4 |      |      |      |     |      |      | 1.0 |
| BHL  | SE | 101.0 | 213 | ISG   |   | 1754 | 22.90 | -0.1 |      |      |      |     |      |      | 1.0 |

January 5 2004 Hour: 9:15 17.5 Lat: 33.75N Lon: 35.77E Depth: 15 Agency: REL Local  
Magnitudes: 2.0MC REL Rms: 0.2 secs

| STAT | CO | DIST  | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT  |
|------|----|-------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| BHL  | SZ | 20.63 | 328 | IPG   |   | 915  | 21.99 | 0.3  | 25   |      |      | 262 | 114  | 41.3 | 1.0 |
| BHL  | SN | 20.63 | 328 | ISG   |   | 915  | 24.44 | -0.4 |      |      |      |     |      |      | 1.0 |
| HWQ  | SZ | 61.23 | 15  | IPG   |   | 915  | 27.62 | 0.1  |      |      |      |     |      |      | 1.0 |
| HWQ  | SN | 61.23 | 15  | ISG   |   | 915  | 34.90 | 0.0  |      |      |      |     |      |      | 1.0 |

January 5 2004 Hour: 12:35 48.9 Lat: 33.51N Lon: 35.74E Depth: 0 Agency: REL Local  
Magnitudes: 2.7MC REL Rms: 1.0 secs

| STAT | CO | DIST  | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT  |
|------|----|-------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| MATL | SZ | 38.59 | 266 | IPG   |   | 1235 | 55.91 | 0.8  |      |      |      |     |      |      | 1.0 |
| BHL  | SZ | 44.23 | 349 | IPG   |   | 1235 | 54.89 | -1.2 | 49   |      |      |     |      |      | 1.0 |
| BHL  | SE | 44.23 | 349 | ISG   |   | 1236 | 0.96  | -0.4 |      |      |      |     |      |      | 1.0 |
| HWQ  | SZ | 86.95 | 12  | IPG   |   | 1236 | 2.26  | -0.7 |      |      |      |     |      |      | 1.0 |
| HWQ  | SE | 86.95 | 12  | ISG   |   | 1236 | 14.83 | 1.5  |      |      |      |     |      |      | 1.0 |

January 6 2004 Hour: 10:36 42.2 Agency: REL Regional

| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT  |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| HWQ  | SZ | 1767 | 206 | EP    |   | 1040 | 25.07 | -0.4 |      |      |      |     |      |      | 1.0 |
| BHL  | SZ | 1815 | 207 | EP    |   | 1040 | 31.80 | 0.8  |      |      |      |     |      |      | 1.0 |
| MATL | SZ | 1869 | 207 | EP    |   | 1040 | 36.69 | -0.3 |      |      |      |     |      |      | 1.0 |

January 6 2004 Hour: 13:36 24.8 Lat: 33.80N Lon: 35.59E Depth: 34 Agency: REL Local  
Magnitudes: 2.5MC REL Rms: 1.9 secs

| STAT | CO | DIST  | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT  |
|------|----|-------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| BHL  | SZ | 12.86 | 28  | IPG   |   | 1336 | 30.73 | 0.2  |      |      |      |     |      |      | 1.0 |
| BHL  | SN | 12.86 | 28  | ISG   |   | 1336 | 35.27 | 0.5  |      |      |      |     |      |      | 1.0 |
| MATL | SZ | 42.24 | 215 | IPG   |   | 1336 | 32.17 | -0.9 |      |      |      |     |      |      | 1.0 |
| HWQ  | SZ | 62.29 | 32  | IPG   |   | 1336 | 38.80 | 3.1  | 38   |      |      |     |      |      | 1.0 |
| HWQ  | SN | 62.29 | 32  | ISG   |   | 1336 | 40.95 | -2.8 |      |      |      |     |      |      | 1.0 |

January 10 2004 Hour: 12:45 23.7 Lat: 33.69N Lon: 35.76E Depth: 6 Agency: REL Local  
Magnitudes: 2.0MC REL Rms: 0.6 secs

| STAT | CO | DIST  | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT  |
|------|----|-------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| BHL  | SZ | 26.06 | 338 | IPG   |   | 1245 | 27.40 | -0.7 | 24   |      |      | 158 | 0    | 16.9 | 1.0 |
| BHL  | SE | 26.06 | 338 | ISG   |   | 1245 | 31.80 | 0.4  |      |      |      |     |      |      | 1.0 |
| HWQ  | SZ | 67.98 | 15  | IPG   |   | 1245 | 35.51 | 0.7  |      |      |      |     |      |      | 1.0 |
| HWQ  | SE | 67.98 | 15  | ISG   |   | 1245 | 42.53 | -0.4 |      |      |      |     |      |      | 1.0 |

January 12 2004 Hour: 16:41 26.2 Lat: 36.44N Lon: 36.43E Depth: 15 Agency: REL Regional  
Magnitudes: 4.1MC REL Rms: 1.0 secs

| STAT | CO | DIST  | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT  |
|------|----|-------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| HWQ  | SZ | 243.5 | 191 | EPN   |   | 1642 | 0.80  | -0.3 |      |      |      | 234 | 136  | 31.6 | 1.0 |
| HWQ  | SE | 243.5 | 191 | SN    |   | 1642 | 27.80 | 0.9  |      |      |      |     |      |      | 1.0 |
| BHL  | SZ | 289.8 | 194 | EPN   |   | 1642 | 5.02  | -1.8 | 96   |      |      | 18  | 4    | 33.7 | 1.0 |
| BHL  | SE | 289.8 | 194 | SN    |   | 1642 | 37.44 | 0.6  |      |      |      |     |      |      | 1.0 |
| MATL | SZ | 342.2 | 197 | EPN   |   | 1642 | 13.77 | 0.6  |      |      |      |     |      |      | 1.0 |

January 12 2004 Hour: 20:9 30.5 Lat: 34.42N Lon: 32.50E Depth: 0 Agency: REL Regional  
Magnitudes: 4.0MC REL Rms: 0.4 secs

| STAT | CO | DIST  | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT  |
|------|----|-------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| MATL | SZ | 281.2 | 111 | EPN   |   | 2010 | 11.86 | 0.4  | 90   |      |      |     |      |      | 1.0 |
| MATL | SZ | 281.2 | 111 | SN    |   | 2010 | 41.71 | -0.1 |      |      |      |     |      |      | 1.0 |
| BHL  | SZ | 296.4 | 100 | EPN   |   | 2010 | 13.79 | 0.3  |      |      |      |     |      |      | 1.0 |
| BHL  | SN | 296.4 | 100 | SN    |   | 2010 | 44.91 | -0.4 |      |      |      |     |      |      | 1.0 |
| HWQ  | SZ | 317.5 | 92  | EPN   |   | 2010 | 15.48 | -0.6 |      |      |      |     |      |      | 1.0 |
| HWQ  | SE | 317.5 | 92  | SN    |   | 2010 | 50.34 | 0.5  |      |      |      |     |      |      | 1.0 |

January 12 2004 Hour: 22:51 48.8 Lat: 34.84N Lon: 36.34E Depth: 14 Agency: REL Local  
Magnitudes: 2.5MC REL Rms: 0.3 secs

| STAT | CO | DIST  | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT  |
|------|----|-------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| HWQ  | SZ | 72.03 | 210 | IPG   |   | 2252 | 0.43  | -0.3 | 38   |      |      | 323 | 67   | 61.0 | 1.0 |
| HWQ  | SE | 72.03 | 210 | ISG   |   | 2252 | 9.13  | -0.3 |      |      |      |     |      |      | 1.0 |
| BHL  | SZ | 121.4 | 211 | IPG   |   | 2252 | 8.62  | 0.1  |      |      |      |     |      |      | 1.0 |
| BHL  | SE | 121.4 | 211 | ISG   |   | 2252 | 23.66 | 0.5  |      |      |      |     |      |      | 1.0 |

January 13 2004 Hour: 4:36 1.3 Agency: REL Regional

| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| HWQ  | SZ |      |     | EPN   |   | 436  | 31.58 |      |      |      |      |     |      |      |    |
| HWQ  | SE |      |     | SN    |   | 436  | 57.65 |      |      |      |      |     |      |      |    |
| BHL  | SN |      |     | SN    |   | 437  | 6.12  |      |      |      |      |     |      |      |    |

January 15 2004 Hour: 13:36 0.6 Agency: REL Local

| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| HWQ  | SZ |      |     | IPG   |   | 1337 | 7.85  |      |      |      |      |     |      |      |    |
| BHL  | SZ |      |     | IPG   |   | 1337 | 15.13 |      |      |      |      |     |      |      |    |
| HWQ  | SE |      |     | ISG   |   | 1337 | 16.42 |      |      |      |      |     |      |      |    |
| BHL  | SN |      |     | ISG   |   | 1337 | 27.80 |      |      |      |      |     |      |      |    |

January 16 2004 Hour: 20:38 14.6 Lat: 34.90N Lon: 36.44E Depth: 19 Agency: REL Local  
Magnitudes: 3.2MC REL Rms: 0.5 secs

| STAT | CO | DIST  | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT  |
|------|----|-------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| HWQ  | SZ | 82.12 | 213 | IPG   |   | 2038 | 27.43 | -0.3 | 77   |      |      |     |      |      | 1.0 |
| HWQ  | SE | 82.12 | 213 | ISG   |   | 2038 | 36.67 | -0.8 |      |      |      |     |      |      | 1.0 |
| BHL  | SZ | 131.6 | 213 | IPG   |   | 2038 | 35.43 | 0.5  |      |      |      |     |      |      | 1.0 |
| BHL  | SE | 131.6 | 213 | ISG   |   | 2038 | 50.74 | 0.7  |      |      |      |     |      |      | 1.0 |
| MATL | SZ | 186.6 | 213 | EPN   |   | 2038 | 41.75 | -0.2 |      |      |      |     |      |      | 1.0 |

January 16 2004 Hour: 22:36 44.2 Lat: 33.88N Lon: 36.09E Depth: 14 Agency: REL Local  
 Magnitudes: 2.2MC REL Rms: 0.5 secs  
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT  
 BHL SZ40.65 273 IPG 2236 51.53 0.3 28 178 85 17.8 1.0  
 BHL SN40.65 273 ISG 2236 55.91 -0.5 1.0  
 HWQ SZ45.86 343 IPG 2236 52.69 0.7 1.0  
 HWQ SN45.86 343 ISG 2236 57.11 -0.6 1.0

January 18 2004 Hour: 11: 8 0.8 Agency: REL Local  
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT  
 BHL SZ IPG 11 8 34.86  
 HWQ SZ IPG 11 8 39.89  
 BHL SN ISG 11 8 49.77  
 HWQ SE ISG 11 8 51.95

January 18 2004 Hour: 13:17 44.4 Lat: 33.90N Lon: 35.69E Depth: 15 Agency: REL Local  
 Magnitudes: 2.0MC REL Rms: 0.3 secs  
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT  
 BHL SZ3.722 269 IPG 1317 46.61 -0.4 25 250 162 39.0 1.0  
 BHL SE3.722 269 ISG 1317 49.26 0.3 1.0  
 HWQ SZ47.47 29 IPG 1317 52.75 0.4 1.0  
 HWQ SN47.47 29 ISG 1317 58.13 -0.2 1.0

January 19 2004 Hour: 12:13 1.3 Agency: REL Local  
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT  
 HWQ SZ IPG 1213 52.05  
 BHL SE ISG 1214 14.03  
 HWQ SE ISG 1214 1.79  
 BHL SZ IPG 1213 59.38

January 21 2004 Hour: 2:51 3.3 Lat: 33.59N Lon: 35.79E Depth: 0 Agency: REL Local  
 Magnitudes: 2.5MC REL Rms: 0.6 secs  
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT  
 BHL SZ37.05 340 IPG 251 8.55 -0.8 41 1.0  
 BHL SE37.05 340 ISG 251 13.73 0.0 1.0  
 MATL SZ44.23 255 IPG 251 10.94 0.5 1.0  
 HWQ SZ77.67 11 IPG 251 15.48 -0.4 1.0  
 HWQ SE77.67 11 ISG 251 25.89 0.7 1.0

January 21 2004 Hour: 12:48 0.3 Agency: REL Local  
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT  
 HWQ SZ IPG 1248 42.85  
 HWQ SN ISG 1248 52.23  
 BHL SZ IPG 1248 49.61

January 28 2004 Hour: 21:49 10.5 Lat: 34.68N Lon: 35.88E Depth: 15 Agency: REL Local  
 Magnitudes: 2.5MC REL Rms: 0.2 secs  
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT  
 HWQ SZ44.84 172 IPG 2149 18.35 0.3 38 59 67 44.1 1.0  
 HWQ SN44.84 172 ISG 2149 23.69 0.0 1.0  
 BHL SZ88.37 194 IPG 2149 24.25 -0.2 1.0  
 BHL SN88.37 194 ISG 2149 34.78 0.0 1.0

January 31 2004 Hour: 1:53 0.4 Lat: 34.15N Lon: 33.38E Depth: 16 Agency: REL Regional  
 Magnitudes: 4.2MC REL Rms: 1.8 secs  
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT  
 BHL SZ212.3 97 EPN 153 33.53 2.2 167 -99 9.8 1.0  
 BHL SE212.3 97 SN 153 53.18 -1.0 1.0  
 HWQ SZ237.4 86 EPN 153 35.46 1.0 130 1.0  
 HWQ SN237.4 86 SN 153 57.28 -2.3 1.0

**January 31 2004 Hour: 18:19 22.2 Lat: 33.80N Lon: 36.70E Depth: 0 Agency: REL Local**  
**Magnitudes: 3.3MC REL Rms: 0.0 secs**

| STAT | CO | DIST  | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT  |
|------|----|-------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| HWQ  | SZ | 87.63 | 308 | IPG   |   | 1819 | 36.25 | 0.0  | 87   |      |      |     |      |      | 1.0 |
| HWQ  | SE | 87.63 | 308 | ISG   |   | 1819 | 46.79 | 0.0  |      |      |      |     |      |      | 1.0 |
| BHL  | SZ | 97.37 | 277 | IPG   |   | 1819 | 37.85 | 0.0  |      |      |      |     |      |      | 1.0 |
| BHL  | SN | 97.37 | 277 | ISG   |   | 1819 | 49.45 | 0.0  |      |      |      |     |      |      | 1.0 |
| MATL | SZ | 131.5 | 255 | IPG   |   | 1819 | 43.40 | 0.0  |      |      |      |     |      |      | 1.0 |

# Seismic Events of January 2004 as recorded by the GRAL network

