

Republic of Lebanon
National Council for Scientific Research

Provisional Seismological Bulletin

from the

NATIONAL SEISMIC NETWORK

March

2005

Prepared by
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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 (km/sec) | depth to top of layer (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:

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

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 | Opened Dec 2004 |
| 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 is available for download in pdf format on:
<http://www.cnrs.edu.lb/grdownload.html>

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*(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.

March 2 2005 Hour: 10:32 58.9 BANDA SEA M=7.1 **Agency: REL Distant**

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| HWQ | SZ | | | EP | | 1055 | 21.75 | | | | | | | | |
| BHL | BZ | | | EP | | 1055 | 22.69 | | | | | | | | |

March 2 2005 Hour: 12:15 10.6 Lat: 33.62N Lon: 35.82E Depth: 0 Agency: REL Local Magnitudes: 2.9MC REL Rms: 0.6 secs

| | | | | | | | | | | | | | | | |
|------|---------|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| BHL | SZ35.51 | 334 | IPG | | | 1215 | 15.66 | -0.7 | 48 | | | | | | 1.0 |
| BHL | SN35.51 | 334 | ISG | | | 1215 | 20.52 | -0.1 | | | | | | | 1.0 |
| MATL | SZ47.91 | 253 | IPG | | | 1215 | 18.83 | 0.5 | | | | | | | 1.0 |
| HWQ | SZ74.26 | 9 | IPG | | | 1215 | 22.00 | -0.6 | | | | | | | 1.0 |
| HWQ | SE74.26 | 9 | ISG | | | 1215 | 32.28 | 0.8 | | | | | | | 1.0 |

March 2 2005 Hour: 23:56 1.3 Lat: 34.35N Lon: 38.06E Depth: 34 Agency: REL Local Magnitudes: 3.6MC REL Rms: 0.7 secs

| | | | | | | | | | | | | | | | |
|------|---------|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| KFRA | SZ150.4 | 310 | IPG | | | 2356 | 24.12 | -0.5 | | | | | | | 1.0 |
| KFRA | SZ150.4 | 310 | ISG | | | 2356 | 41.68 | -0.2 | | | | | | | 1.0 |
| JHLN | SZ151.2 | 13 | IPG | | | 2356 | 25.16 | 0.4 | | | | | | | 1.0 |
| JHLN | SZ151.2 | 13 | ISG | | | 2356 | 42.87 | 0.8 | | | | | | | 1.0 |
| QASN | SZ188.2 | 242 | IPG | | | 2356 | 30.61 | 0.5 | | | | | | | 1.0 |
| HWQ | SZ195.0 | 268 | IPG | | | 2356 | 30.30 | -0.8 | 106 | | | 80 | -6 | 21.6 | 1.0 |
| HWQ | SE195.0 | 268 | ISG | | | 2356 | 53.84 | 0.6 | | | | | | | 1.0 |
| WRDH | SZ198.5 | 311 | IPG | | | 2356 | 31.29 | -0.3 | | | | | | | 1.0 |
| WRDH | SZ198.5 | 311 | ISG | | | 2356 | 53.52 | -0.6 | | | | | | | 1.0 |
| SALA | SZ219.4 | 215 | IPG | | | 2356 | 34.24 | -0.5 | | | | | | | 1.0 |
| SALA | SZ219.4 | 215 | ISG | | | 2356 | 59.68 | 0.2 | | | | | | | 1.0 |
| BARV | SZ221.2 | 243 | IPG | | | 2356 | 34.79 | -0.2 | | | | | | | 1.0 |
| BHL | SZ227.6 | 258 | IPG | | | 2356 | 35.02 | -0.9 | | | | | | | 1.0 |
| BHL | SN227.6 | 258 | ISG | | | 2357 | 3.05 | 1.5 | | | | | | | 1.0 |

March 3 2005 Hour: 11: 9 2.0 Lat: 33.53N Lon: 36.61E Depth: 0 Agency: REL Local Magnitudes: 2.8MC REL Rms: 1.5 secs

| | | | | | | | | | | | | | | | |
|------|---------|------|-----|-------|---|------|-------|-------|------|------|------|-----|------|------|-----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| BHL | SZ97.59 | 295 | IPG | | | 11 | 9 | 15.47 | -2.3 | 42 | | | | | 1.0 |
| BHL | SN97.59 | 295 | ISG | | | 11 | 9 | 28.72 | -0.7 | | | | | | 1.0 |
| HWQ | SZ103.0 | 324 | IPG | | | 11 | 9 | 18.30 | -0.4 | | | | | | 1.0 |
| HWQ | SE103.0 | 324 | ISG | | | 11 | 9 | 32.28 | 1.3 | | | | | | 1.0 |
| MATL | SZ118.8 | 268 | IPG | | | 11 | 9 | 23.24 | 2.0 | | | | | | 1.0 |

March 3 2005 Hour: 17:19 8.4 Lat: 33.61N Lon: 35.42E Depth: 15 Agency: REL Local Magnitudes: 2.5MC REL Rms: 1.1 secs

| | | | | | | | | | | | | | | | |
|------|---------|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| MATL | SZ15.72 | 212 | IPG | | | 1719 | 11.23 | -0.7 | | | | | | | 1.0 |
| BHL | SZ39.32 | 33 | IPG | | | 1719 | 16.44 | 1.2 | | | | | | | 1.0 |
| BHL | SN39.32 | 33 | ISG | | | 1719 | 20.29 | 0.1 | | | | | | | 1.0 |
| HWQ | SZ88.78 | 33 | IPG | | | 1719 | 23.44 | 1.0 | 27 | | | | | | 1.0 |
| HWQ | SN88.78 | 33 | ISG | | | 1719 | 31.23 | -1.6 | | | | | | | 1.0 |

March 4 2005 Hour: 19:14 34.2 INDONESIA M=6.1 **Agency: REL Distant**

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| HWQ | SZ | | | EP | | 1918 | 8.87 | | | | | | | | |
| BHL | BZ | | | EP | | 1918 | 10.28 | | | | | | | | |

March 4 2005 Hour: 21:54 1.0 INDONESIA M=5.1 **Agency: REL Distant**

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| BHL | BZ | | | EP | | 2155 | 29.13 | | | | | | | | |

March 6 2005 Hour: 2:37 1.5 Agency: REL Regional
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL SZ EPN 237 5.57
 HWQ SZ EPN 237 8.21

March 6 2005 Hour: 5:19 1.9 ZEMLYA M=6.3 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ EP 531 8.03
 HWQ SZ EP 531 5.65

March 8 2005 Hour: 20:41 59.7 Lat: 34.62N Lon: 36.15E Depth: 0 Agency: REL Local Magnitudes: 2.8MC REL Rms: 1.3 secs
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 HWQ SZ41.93 206 IPG 2042 6.49 0.0 43 343 43 30.4 1.0
 HWQ SN41.93 206 ISG 2042 9.33 -2.2 1.0
 BHL SZ91.22 210 IPG 2042 15.61 1.2 1.0
 BHL SN91.22 210 ISG 2042 26.32 1.0 1.0

March 9 2005 Hour: 10:35 12.1 Lat: 33.33N Lon: 35.26E Depth: 6 Agency: REL Local Magnitudes: 2.7MC REL Rms: 0.5 secs
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 MATL SZ18.56 21 IPG 1035 15.07 -0.2 37 1.0
 MATL SZ18.56 21 ISG 1035 17.81 0.2 1.0
 BHL SZ73.27 30 IPG 1035 23.97 0.0 1.0
 BHL SN73.27 30 ISG 1035 31.87 -0.9 1.0
 HWQ SZ122.7 31 IPG 1035 32.06 0.2 1.0
 HWQ SN122.7 31 ISG 1035 47.25 0.7 1.0

March 10 2005 Hour: 10:22 28.8 Lat: 33.80N Lon: 37.15E Depth: 15 Agency: REL Local Magnitudes: 3.4MC REL Rms: 0.4 secs
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 HWQ SZ122.9 296 IPG 1022 48.06 0.2 97 94 -20 17.1 1.0
 HWQ SE122.9 296 ISG 1023 2.42 0.4 1.0
 BHL SZ138.8 275 IPG 1022 50.12 -0.1 1.0
 BHL SN138.8 275 ISG 1023 5.51 -0.5 1.0

March 12 2005 Hour: 7:32 5.9 TURKEY M=5.4 Agency: REL Regional
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 HWQ SZ EPN 737 46.71
 BHL BZ EPN 737 52.85

March 12 2005 Hour: 22:42 0.6 INDONESIA M=5.3 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ EP 2243 26.19

March 13 2005 Hour: 3:17 7.9 IRAN M=5.8 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ EP 336 30.48
 HWQ SZ EP 336 28.90

March 13 2005 Hour: 11:14 49.5 Lat: 34.71N Lon: 35.22E Depth: 15 Agency: REL Local Magnitudes: 2.8MC REL Rms: 2.8 secs
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 HWQ SZ81.69 125 IPG 1115 5.23 2.7 1.0
 HWQ SE81.69 125 ISG 1115 14.99 2.9 1.0
 BHL SZ97.38 156 IPG 1115 1.87 -2.9 43 60 84 38.5 1.0
 BHL SN97.38 156 ISG 1115 13.49 -2.6 1.0

March 13 2005 Hour: 14:51 1.2 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ EP 1452 33.18

March 13 2005 Hour: 15:26 0.5 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ EP 1527 35.37
 HWQ SZ EP 1527 36.23

March 13 2005 Hour: 22:22 0.4 NICOBAR M=5.6 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ EP 2222 57.83
 HWQ SZ EP 2222 56.69

March 14 2005 Hour: 1:54 28.8 TURKEY M=5.4 Agency: REL Regional
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 FKH SZ EPN 157 30.94
 HWQ SZ EPN 157 33.43
 BHL BZ EPN 157 39.77

March 14 2005 Hour: 4:57 45.8 TURKEY M=4.6 Agency: REL Regional
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 HWQ SZ EPN 459 44.76
 BHL BZ EPN 459 50.52

March 14 2005 Hour: 11:11 0.4 Agency: REL Local
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL SZ IPG 1112 57.32
 HWQ SZ IPG 1112 58.81
 BHL SN ISG 1113 9.20
 HWQ SN ISG 1113 10.46

March 14 2005 Hour: 12:44 29.9 Lat: 34.93N Lon: 35.88E Depth: 15 Agency: REL Local Magnitudes: 3.2MC REL Rms: 0.6 secs
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 HWQ SZ 72.64 175 IPG 12 4 53.84 -0.7 77 261 -93 9.4 1.0
 HWQ SN 72.64 175 ISG 12 5 3.21 0.0 1.0
 BHL SZ 115.7 190 IPG 12 5 1.55 0.7 1.0

March 15 2005 Hour: 11:641.3 Lat: 33.13N Lon: 35.89E Depth: 15 Agency: REL Local Magnitudes: 3.0MC REL Rms: 1.4 secs
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 MATL SZ 65.37 307 IPG 11 6 52.88 1.0 55 1.0
 BHL SZ 88.28 346 IPG 11 6 55.10 -0.2 1.0
 BHL SN 88.28 346 ISG 11 7 3.98 -1.6 1.0
 HWQ SZ 127.1 2 IPG 11 6 59.67 -1.3 1.0
 HWQ SN 127.1 2 ISG 11 7 17.63 2.1 1.0

March 15 2005 Hour: 20:17 5.9 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ EP 2033 19.52

March 16 2005 Hour: 3:59 1.7 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ EP 4 0 12.57
 HWQ SZ EP 4 0 11.64

March 16 2005 Hour: 11:32 13.4 Lat: 33.40N Lon: 36.60E Depth: 17 Agency: REL Local Magnitudes: 2.9MC REL

| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
|------|----|-------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| FKH | SZ | 94.28 | 349 | IPG | | 1132 | 28.08 | -0.2 | 46 | | | | | | 1.0 |
| FKH | SN | 94.28 | 349 | ISG | | 1132 | 39.44 | 0.1 | | | | | | | 1.0 |
| BHL | SN | 103.9 | 303 | ISG | | 1132 | 41.74 | 0.0 | | | | | | | 1.0 |
| HWQ | SZ | 114.4 | 328 | IPG | | 1132 | 31.48 | 0.2 | | | | | | | 1.0 |
| HWQ | SN | 114.4 | 328 | ISG | | 1132 | 44.34 | -0.1 | | | | | | | 1.0 |

March 16 2005 Hour: 13:29 58.4 KURIL M=5.8 Agency: REL Distant

| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| BHL | BZ | | | EP | | 1335 | 42.18 | | | | | | | | |
| FKH | SZ | | | EP | | 1335 | 39.21 | | | | | | | | |

March 16 2005 Hour: 15:36 6.2 Lat: 33.25N Lon: 36.58E Depth: 0 Agency: REL Local Magnitudes: 3.0MC REL Rms: 4.7 secs

| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
|------|----|-------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| BHL | SZ | 112.6 | 311 | IPG | | 1536 | 15.51 | -8.8 | | | | | | | 1.0 |
| BHL | SE | 112.6 | 311 | ISG | | 1536 | 37.79 | 0.0 | | | | | | | 1.0 |
| MATL | SZ | 119.4 | 283 | IPG | | 1536 | 29.88 | 4.4 | | | | | | | 1.0 |
| HWQ | SZ | 128.5 | 333 | IPG | | 1536 | 30.11 | 3.2 | 53 | | | | | | 1.0 |
| HWQ | SE | 128.5 | 333 | ISG | | 1536 | 43.47 | 1.2 | | | | | | | 1.0 |

March 17 2005 Hour: 23:30 1.3 INDONESIA M=5.7 Agency: REL Distant

| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| BHL | BZ | | | EP | | 2331 | 5.51 | | | | | | | | |

March 18 2005 Hour: 10: 5 0.0 Agency: REL Local

| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
|------|----|------|-----|-------|---|------|-------|-------|------|------|------|-----|------|------|----|
| HWQ | SZ | | | IPG | | 10 | 5 | 53.39 | | | | | | | |
| HWQ | SE | | | ISG | | 10 | 6 | 0.52 | | | | | | | |
| BHL | SE | | | ISG | | 10 | 6 | 3.17 | | | | | | | |

March 18 2005 Hour: 18:13 31.3 Lat: 33.74N Lon: 35.58E Depth: 0 Agency: REL Local Magnitudes: 2.8MC REL Rms: 0.7 secs

| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
|------|----|-------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| BHL | SZ | 20.12 | 21 | IPG | | 1813 | 33.63 | -0.9 | 45 | | | | | | 1.0 |
| BHL | SN | 20.12 | 21 | ISG | | 1813 | 37.16 | 0.2 | | | | | | | 1.0 |
| MATL | SZ | 35.64 | 220 | IPG | | 1813 | 37.50 | 0.5 | | | | | | | 1.0 |
| HWQ | SZ | 69.27 | 29 | IPG | | 1813 | 41.74 | -0.7 | | | | | | | 1.0 |
| HWQ | SE | 69.27 | 29 | ISG | | 1813 | 51.74 | 1.0 | | | | | | | 1.0 |

March 19 2005 Hour: 15: 4 31.9 TONGA M=6.0 Agency: REL Distant

| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| BHL | BZ | | | EP | | 1522 | 34.24 | | | | | | | | |

March 19 2005 Hour: 17:34 31.9 FIJI M=5.8 Agency: REL Distant

| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| BHL | BZ | | | EP | | 1753 | 23.37 | | | | | | | | |

March 19 2005 Hour: 22:59 49.7 Lat: 31.05N Lon: 35.36E Depth: 0 Agency: REL Regional Magnitudes: 3.8MC REL Rms: 3.9 secs

| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
|------|----|-------|-----|-------|---|------|-------|-------|------|------|------|-----|------|------|-----|
| MATL | SZ | 270.8 | 359 | EPN | | 23 | 0 | 28.39 | -1.0 | | | | | | 1.0 |
| BHL | BZ | 318.1 | 5 | EPN | | 23 | 0 | 34.53 | -0.9 | | | | | | 1.0 |
| BHL | BN | 318.1 | 5 | SN | | 23 | 1 | 14.58 | 5.4 | | | | | | 1.0 |
| HWQ | SZ | 362.5 | 9 | EPN | | 23 | 0 | 40.94 | 0.0 | 126 | | | | | 1.0 |
| HWQ | SE | 362.5 | 9 | SN | | 23 | 1 | 28.81 | 10.0 | | | | | | 1.0 |

March 20 2005 Hour: 1:34 31.9 JAPAN M=5.6 Agency: REL Distant

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|-------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| BHL | BZ | | | EP | | | | 2 | 5 | 29.14 | | | | | |
| HWQ | SZ | | | EP | | | | 2 | 5 | 27.26 | | | | | |

March 21 2005 Hour: 12:38 52.9 ARGENTINA M=6.8 Agency: REL Distant

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| BHL | BZ | | | EP | | | | 1242 | | 6.01 | | | | | |

March 21 2005 Hour: 17:25 1.2 Agency: REL Distant

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|-------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| BHL | BZ | | | EP | | | | 1725 | | 48.83 | | | | | |
| FKH | SZ | | | EP | | | | 1725 | | 47.97 | | | | | |

March 23 2005 Hour: 21:43 17.8 TURKEY M=5.4 Agency: REL Regional

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|-------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| HWQ | SZ | | | EPN | | | | 2146 | | 28.74 | | | | | |
| BHL | BZ | | | EPN | | | | 2146 | | 34.18 | | | | | |
| MATL | SZ | | | EPN | | | | 2146 | | 40.33 | | | | | |

March 23 2005 Hour: 22:5 0.3 Agency: REL Regional

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| HWQ | SZ | | | EPN | | | | 22 | 6 | 1.16 | | | | | |
| BHL | SZ | | | EPN | | | | 22 | 6 | 8.08 | | | | | |

March 23 2005 Hour: 23:43 55.7 TURKEY M=4.7 Agency: REL Regional

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|-------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| BHL | BZ | | | EPN | | | | 2345 | | 49.91 | | | | | |
| HWQ | SZ | | | EPN | | | | 2345 | | 19.42 | | | | | |

March 24 2005 Hour: 14:55 1.1 Agency: REL Local

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|-------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| HWQ | SZ | | | IPG | | | | 1455 | | 33.38 | | | | | |
| BHL | SN | | | ISG | | | | 1455 | | 55.84 | | | | | |
| HWQ | SN | | | ISG | | | | 1455 | | 42.16 | | | | | |
| BHL | SZ | | | IPG | | | | 1455 | | 40.48 | | | | | |

March 25 2005 Hour: 1:10 59.6 NICOBAR M=6.0 Agency: REL Distant

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| BHL | BZ | | | EP | | | | 115 | | 5.11 | | | | | |
| HWQ | SZ | | | EP | | | | 115 | | 3.83 | | | | | |

March 25 2005 Hour: 6:15 1.5 TURKEY M=4.3 Agency: REL Regional

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|-------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| HWQ | SZ | | | EPN | | | | 615 | | 15.67 | | | | | |

March 26 2005 Hour: 11:49 1.0 Agency: REL Local

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|-------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| HWQ | SZ | | | IPG | | | | 1149 | | 52.29 | | | | | |
| BHL | SN | | | ISG | | | | 1150 | | 1.49 | | | | | |
| HWQ | SE | | | ISG | | | | 1150 | | 2.93 | | | | | |
| BHL | SZ | | | IPG | | | | 1149 | | 49.69 | | | | | |

March 26 2005 Hour: 12:14 0.5 Agency: REL Local

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|-------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| BHL | SZ | | | IPG | | | | 1214 | | 56.99 | | | | | |
| HWQ | SZ | | | IPG | | | | 1215 | | 4.80 | | | | | |
| HWQ | SE | | | ISG | | | | 1215 | | 15.32 | | | | | |
| BHL | SE | | | ISG | | | | 1215 | | 6.85 | | | | | |

March 26 2005 Hour: 12:44 1.6 Agency: REL Local

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| HWQ | SZ | | | IPG | | 1244 | 12.15 | | | | | | | | |
| BHL | SN | | | ISG | | 1244 | 33.55 | | | | | | | | |
| HWQ | SE | | | ISG | | 1244 | 20.40 | | | | | | | | |
| BHL | SZ | | | IPG | | 1244 | 17.85 | | | | | | | | |

March 26 2005 Hour: 22:32 14.3 Lat: 34.29N Lon: 36.53E Depth: 10 Agency: REL Local Magnitudes: 2.3MC REL Rms: 0.2 secs

| | | | | | | | | | | | | | | | |
|------|---------|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| FKH | SZ13.49 | 242 | IPG | | | 2232 | 17.39 | 0.2 | 21 | | | | | | 1.0 |
| FKH | SE13.49 | 242 | ISG | | | 2232 | 19.17 | -0.1 | | | | | | | 1.0 |
| HWQ | SZ53.85 | 268 | IPG | | | 2232 | 22.98 | -0.2 | | | | | | | 1.0 |
| HWQ | SE53.85 | 268 | ISG | | | 2232 | 29.89 | 0.1 | | | | | | | 1.0 |
| BHL | SN91.68 | 242 | ISG | | | 2232 | 40.24 | 0.0 | | | | | | | 1.0 |

March 27 2005 Hour: 4:56 58.1 Lat: 33.97N Lon: 36.05E Depth: 32 Agency: REL Local Magnitudes: 2.6MC REL Rms: 0.0 secs

| | | | | | | | | | | | | | | | |
|------|---------|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|-----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| HWQ | SZ35.40 | 345 | IPG | | | 457 | 5.64 | 0.0 | 35 | | | | | | 1.0 |
| HWQ | SE35.40 | 345 | ISG | | | 457 | 11.15 | 0.0 | | | | | | | 1.0 |
| BHL | BZ36.99 | 259 | IPG | | | 457 | 5.83 | 0.1 | | | | | | | 1.0 |
| BHL | BE36.99 | 259 | ISG | | | 457 | 11.41 | 0.0 | | | | | | | 1.0 |
| FKH | SZ44.08 | 48 | IPG | | | 457 | 6.56 | -0.1 | | | | | | | 1.0 |
| FKH | SE44.08 | 48 | ISG | | | 457 | 12.96 | 0.0 | | | | | | | 1.0 |

March 27 2005 Hour: 4:59 0.9 Agency: REL Local

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| BHL | SZ | | | IPG | | 459 | 46.03 | | | | | | | | |
| HWQ | SZ | | | IPG | | 459 | 45.82 | | 26 | | | | | | |
| BHL | SN | | | ISG | | 459 | 51.64 | | | | | | | | |
| HWQ | SN | | | ISG | | 459 | 51.50 | | | | | | | | |

March 28 2005 Hour: 15:51 23.9 INDONESIA M=8.6 Agency: REL Distant

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| BHL | BZ | | | EP | | 1620 | 16.71 | | | | | | | | |

March 28 2005 Hour: 22:51 23.9 INDONESIA M=5.7 Agency: REL Distant

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| BHL | BZ | | | EP | | 2323 | 47.75 | | | | | | | | |

March 29 2005 Hour: 4:17 59.5 INDONESIA M=5.3 Agency: REL Distant

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| BHL | BZ | | | EP | | 419 | 59.31 | | | | | | | | |

March 29 2005 Hour: 5:24 55.3 INDONESIA M=5.8 Agency: REL Distant

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| BHL | BZ | | | EP | | 527 | 5.64 | | | | | | | | |

March 29 2005 Hour: 12:11 1.7 Agency: REL Local

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| HWQ | SZ | | | IPG | | 1211 | 32.74 | | | | | | | | |
| HWQ | SE | | | ISG | | 1211 | 42.33 | | | | | | | | |
| BHL | SN | | | ISG | | 1211 | 55.68 | | | | | | | | |

March 29 2005 Hour: 14:47 1.6 Agency: REL Local

| | | | | | | | | | | | | | | | |
|------|----|------|-----|-------|---|------|-------|------|------|------|------|-----|------|------|----|
| STAT | CO | DIST | AZI | PHASE | P | HRMN | SECON | TRES | CODA | AMPL | PERI | BAZ | ARES | VELO | WT |
| HWQ | SN | | | ISG | | 1448 | 18.30 | | | | | | | | |
| BHL | SZ | | | IPG | | 1448 | 20.67 | | | | | | | | |
| BHL | SE | | | ISG | | 1448 | 34.62 | | | | | | | | |
| HWQ | SZ | | | IPG | | 1448 | 11.42 | | | | | | | | |

March 30 2005 Hour: 0:59 57.9 INDONESIA M=5.6 **Agency: REL Distant**

STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
BHL BZ EP 123 58.08

March 30 2005 Hour: 10:58 25.2 Lat: 34.21N Lon: 35.14E Depth: 15 Agency: REL Local Magnitudes: 2.4MC REL Rms: 0.4 secs

STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
BHL BZ 58.56 126 IPG 1058 35.19 0.4 24 259 -46 22.7 1.0
BHL BE58.56 126 ISG 1058 41.92 0.0
HWQ SZ74.71 84 IPG 1058 37.49 0.3
HWQ SN74.71 84 ISG 1058 45.45 -0.6 1.0

March 30 2005 Hour: 16:18 39.9 INDONESIA M=6.4 **Agency: REL Distant**

STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
BHL BZ EP 1630 10.22

March 30 2005 Hour: 16:50 59.5 **Agency: REL Distant**

STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
BHL BZ EP 1651 10.49
FKH SZ EP 1651 7.96

March 30 2005 Hour: 17:59 3.8 **Agency: REL Distant**

STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
FKH SZ EP 18 0 31.49
BHL BZ EP 18 0 31.58
HWQ SZ EP 18 0 34.07

March 30 2005 Hour: 19:21 31.0 Lat: 35.20N Lon: 35.37E Depth: 93 Agency: REL Local Magnitudes: 3.1MC REL Rms: 0.8 secs

STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
HWQ SZ114.7 153 IPG 1921 51.92 1.2 63 357 24 48.1 1.0
HWQ SE114.7 153 ISG 1922 5.51 0.3
BHL BZ145.7 170 IPG 1921 52.93 -0.9
BHL BN145.7 170 ISG 1922 10.11 -0.6 1.0

March 31 2005 Hour: 1:30 39.9 **Agency: REL Distant**

STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
BHL BZ EP 158 31.78

March 31 2005 Hour: 7:23 56.9 INDONESIA M=5.8 **Agency: REL Distant**

STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
BHL BZ EP 734 37.55

Epicentral Map of Lebanon

MARCH 2005

