

Republic of Lebanon
National Council for Scientific Research

Provisional Seismological Bulletin

from the

NATIONAL SEISMIC NETWORK

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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:

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

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	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 ($0.5 \times (\text{peak to peak})$), (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.

February 2 2005 Hour: 23:18 23.6 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 2328 39.85
 BHL BZ EPN 2328 45.64
 MATL SZ EPN 2328 46.03

February 3 2005 Hour: 24:21 1.1 TURKEY M=4.7 Agency: REL Regional
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 HWQ SZ EPN 2421 44.36
 BHL BZ EPN 2421 51.38

February 5 2005 Hour: 12:20 38.9 PHILIPPINE M=6.9 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ EP 1235 1.20

February 7 2005 Hour: 10:27 1.6 Lat: 31.00N Lon: 35.25E Depth: 0 Agency: REL Regional
Magnitudes: 3.6MC REL Rms: 3.3 secs
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ324.1 7 EPN 1027 45.81 -2.2 100 1.0
 BHL SZ324.1 7 EPN 1027 46.63 -1.4 1.0
 BHL SN324.1 7 SN 1028 26.43 4.1 1.0
 HWQ SZ369.1 10 EPN 1027 55.32 1.7 1.0
 HWQ SE369.1 10 SN 1028 39.24 7.1 1.0

February 7 2005 Hour: 17:9 38.4 Lat: 34.35N Lon: 36.29E Depth: 15 Agency: REL Local
Magnitudes: 2.5MC REL Rms: 0.1 secs
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 HWQ SZ32.49 256 IPG 17 9 44.30 0.1 29 23 -52 32.4 1.0
 HWQ SE32.49 256 ISG 17 9 48.51 0.0 1.0
 BHL SZ76.60 230 IPG 17 9 50.59 0.0 **Poor localization** 1.0
 BHL SN76.60 230 ISG 17 9 59.63 -0.1 1.0

February 8 2005 Hour: 14:41 22.9 VANUATU ISLANDS M=6.7 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ EP 15 7 13.22

February 8 2005 Hour: 16:38 29.1 Lat: 34.19N Lon: 26.74E Depth: 0 Agency: REL Regional
Magnitudes: 4.7MC REL Rms: 0.7 secs
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 PPCY SZ520.0 80 EP 1639 39.2 -0.1 1.0
 ALFC SZ547.3 77 EP 1639 42.0 -0.6 1.0
 MAMC SZ603.2 78 EP 1639 49.6 0.2 1.0
 CSS SZ610.5 80 EP 1639 50.6 0.3 1.0
 PHNC SZ674.6 80 EP 1639 59.6 1.6 1.0
 BHL SZ823.2 90 EPN 1640 15.52 -1.9 1.0
 BHL BZ823.2 90 EPN 1640 16.66
 BHL SE823.2 90 SN 1641 37.12 -0.5 1.0
 HWQ SZ847.7 87 EPN 1640 20.03 -0.5 237 1.0
 HWQ SE847.7 87 SN 1641 43.62 0.6 1.0

February 9 2005 Hour: 5:13 43.0 EASTERN MED SEA Agency: REL Regional
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ EPN 514 41.72
 HWQ SZ EPN 514 43.95

February 9 2005 Hour: 13:11 22.9 NORTHERN SUMATRA 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 1337 41.64

February 9 2005 Hour: 18:41 22.9 BONIN ISLANDS 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 1859 4.65

February 10 2005 Hour: 16:41 22.9 LOYALTY ISLANDS 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 1712 46.01

February 11 2005 Hour: 23:34 6.2 Lat: 34.84N Lon: 36.65E Depth: 0 Agency: REL Local
Magnitudes: 2.6MC REL Rms: 0.3 secs
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 FKH SZ70.79 199 IPG 2334 17.86 0.2 32 1.0
 FKH SE70.79 199 ISG 2334 25.90 -0.2 1.0
 HWQ SZ89.91 226 IPG 2334 20.74 0.0 1.0
 HWQ SN89.91 226 ISG 2334 31.11 -0.3 1.0
 BHL SZ138.6 222 IPG 2334 28.36 -0.2 1.0
 BHL SN138.6 222 ISG 2334 45.64 0.5 1.0

February 12 2005 Hour: 23:46 0.1 Lat: 35.90N Lon: 35.47E Depth: 15 Agency: REL Local
Magnitudes: 3.5MC REL Rms: 0.7 secs
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 HWQ SZ185.3 166 IPG 2346 28.44 0.1 1.0
 HWQ SE185.3 166 ISG 2346 48.46 -0.8 **Poor localization** 1.0
 BHL SZ222.2 176 IPG 2346 33.54 -0.3 94 281 -74 34.1 1.0
 BHL SE222.2 176 ISG 2346 59.71 1.0 1.0

February 13 2005 Hour: 1:31 17.8 SUMATRA M=5.9 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ EP 132 24.01
 HWQ SZ EP 132 23.97

February 14 2005 Hour: 10:54 0.0 Agency: REL Local
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL SZ IPG 1055 7.80
 BHL SN ISG 1055 10.77
 HWQ SN ISG 1055 11.85

February 16 2005 Hour: 20:18 59.9 MID ATLANTIC RIDGE M=6.5 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ EP 2040 30.26

February 18 2005 Hour: 19:38 47.2 SUMATRA M=5.9 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 HWQ SZ EP 1943 57.11
 BHL BZ EP 1943 58.01
 MATL SZ EP 1943 59.31

February 18 2005 Hour: 23:47 53.9 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 2417 44.65
 HWQ SZ EP 2417 44.46

February 22 2005 Hour: 2:25 42.9 IRAN M=6.3 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 FKH BZ EP 229 29.55
 HWQ SZ EP 229 33.53
 BHL BZ EP 229 35.39
 MATL SZ EP 229 39.09

February 23 2005 Hour: 16:58 32.2 Lat: 34.16N Lon: 34.94E Depth: 15 Agency: REL Local
 Magnitudes: 2.4MC REL Rms: 1.5 secs
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ72.40 113 IPG 1658 44.14 0.3 25 243 -49 86.0 1.0
 BHL BN72.40 113 ISG 1658 51.75 -0.7 1.0
 HWQ SZ94.10 82 IPG 1658 49.16 2.2 1.0
 HWQ SE94.10 82 ISG 1658 56.16 -1.8 1.0

February 24 2005 Hour: 3:23 45.2 Lat: 34.60N Lon: 35.80E Depth: 15 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
 HWQ SZ38.56 160 IPG 323 52.48 0.6 36 1.0
 HWQ SN38.56 160 ISG 323 56.21 -0.6 1.0
 BHL BZ78.81 190 IPG 323 58.97 1.2 1.0
 BHL BE78.81 190 ISG 324 7.62 0.5 1.0
 MATL SZ131.2 200 IPG 324 3.82 -1.6 1.0

February 25 2005 Hour: 9:2 17.7 Lat: 33.94N Lon: 35.59E Depth: 14 Agency: REL Local
 Magnitudes: 2.6MC REL Rms: 1.5 secs
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ7.072 123 IPG 9 2 16.94 -3.5 36 307 4 18.4 0.5
 BHL BE7.072 123 ISG 9 2 22.55 0.1 1.0
 HWQ SZ49.98 41 IPG 9 2 25.62 -0.5 0.5
 HWQ SE49.98 41 ISG 9 2 33.24 0.9 1.0

February 25 2005 Hour: 20:40 32.3 Lat: 32.91N Lon: 36.75E Depth: 17 Agency: REL Local
 Magnitudes: 3.1MC REL Rms: 0.5 secs
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL SZ149.8 318 IPG 2040 54.82 -0.5 1.0
 BHL SN149.8 318 ISG 2041 12.53 0.1 Poor localization 1.0
 HWQ SZ168.7 334 IPG 2040 57.82 -0.3 60 30 -99 35.0 1.0
 HWQ SN168.7 334 ISG 2041 17.92 0.7 1.0

February 25 2005 Hour: 23:3 47.4 TAJIKISTAN Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 FKH SZ EP 23 9 58.48
 HWQ SZ EP 2310 1.38
 BHL BZ EP 2310 4.64
 MATL SZ EP 2310 8.13

February 26 2005 Hour: 7:37 1.5 Agency: REL Local
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 FKH SE ISG 737 34.60
 HWQ SE ISG 737 43.49
 FKH SZ IPG 737 33.30 18

February 26 2005 Hour: 12:44 29.2 EASTERN HONSHU M=5.9 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 HWQ SZ EP 1249 39.13
 BHL SZ EP 1249 41.46
 MATL SZ EP 1249 44.48

February 26 2005 Hour: 12:50 45.9 SUMATRA M=6.7 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL BZ EP 13 7 21.81

February 27 2005 Hour: 5:12 0.5 FIJI M=5.5 Agency: REL Distant
 STAT CO DIST AZI PHASE P HRMN SECON TRES CODA AMPL PERI BAZ ARES VELO WT
 BHL SZ EP 513 27.57
 HWQ SZ EP 513 26.11

February 28 2005 Hour: 20:21 0.5

Agency: REL Local

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BHL	SZ			IPG		2021	34.05								
HWQ	SZ			IPG		2021	40.89								
BHL	SN			ISG		2021	44.21								
HWQ	SN			ISG		2021	55.15								

Epicentral Map of Lebanon

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