

Republic of Lebanon
National Council for Scientific Research

Provisional Seismological Bulletin

from the

NATIONAL SEISMIC NETWORK

December

2012

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 (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 V_p/V_s 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	3414.69N	3624.61E	1152	FAKEHEH	Opened Dec 2004
RCY	3329.79N	3550.14E	1370	RACHAYA	Opened Jun 2006
DWR	3323.13N	3524.08E	420	DWEIR	Scheduled 2003
BEYL	3352.30N	3529.59E	49	BEIRUT	Opened Jul 2006
NAQL	3307.02N	3508.46E	83	NAQOURA	Opened Jul 2008
DQRL	3342.34N	3534.21E	963	DEIR QAMAR	Opened Mar 2010
QRWL	3332.86N	3540.93E	875	QARAOUN	Opened Oct 2011
SHBL	3320.90N	3544.63E	1422	CHEBAA	Opened Oct 2011

REGIONAL AND DISTANT EARTHQUAKES

Because regional events and teleseisms are not localized, but simply identified, EMSC determination data are given along with phase arrivals (in general first arrival) at the stations of our network.

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: REL throughout the bulletin, aka. REsearch Lebanon

MAGNITUDES: Up to 3 different magnitudes can be given followed by type and reporting agency, e.g. 3.1 MC REL - coda magnitude calculated according to above mentioned formula.

EMSC: Euro-Mediterranean Seismological Centre.

OT: Origin Time

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.

December 1 2012 Hour: 11:32 46.0

Agency: Regional

EMSC OT=11:32:46.0 34.38N 32.08E 10Km M=3.8 CYPRUS REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
HWQ	SZ			EP		1133	38.69								
RCY	SZ			EP		1133	38.16								

December 1 2012 Hour: 13:35 41.2 Lat: 34.54N Lon: 36.19E Depth: 9 Agency: REL Local
Magnitudes: 3.1MC REL Rms: 0.1 secs

AKKAR

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
HWQ	SZ	36	217	EP		1335	47.21-0.11		68						1.0
HWQ	SN	36	217	ES		1335	51.87 0.05								1.0
BHL	BZ	86	215	EP		1335	55.19 0.03								1.0
DQRL	SZ	108	212	EP		1335	58.59 0.10								1.0
DQRL	SN	108	212	ES		1336	11.20-0.06								1.0
RCY	SZ	120	196	EP		1336	0.21-0.01								1.0
RCY	SN	120	196	ES		1336	14.27 0.01								1.0

December 3 2012 Hour: 11:42 24.3 Lat: 33.25N Lon: 35.88E Depth: 0 Agency: REL Local
Magnitudes: 2.3MC REL Rms: 0.0 secs

MOUNT HERMON REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
SHBL	BZ	17	311	EP		1142	27.00-0.08		23						1.0
SHBL	BN	17	311	ES		1142	29.12 0.01								1.0
RCY	SZ	28	351	EP		1142	28.83-0.02								1.0
RCY	SE	28	351	ES		1142	32.23 0.04								1.0

December 3 2012 Hour: 18:24 22.1 Lat: 33.79N Lon: 35.76E Depth: 0 Agency: REL Local
Magnitudes: 2.8MC REL Rms: 0.0 secs

BEIRUT REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BHL	BZ	16	323	EP		1824	24.64-0.03		43						1.0
BHL	BE	16	323	ES		1824	26.66 0.06								1.0
DQRL	SZ	20	242	EP		1824	25.24-0.04								1.0
DQRL	SE	20	242	ES		1824	27.61-0.04								1.0
BEYL	BZ	26	290	EP		1824	26.25-0.07								0.2
HWQ	SZ	57	18	EP		1824	31.21-0.04								1.0

December 13 2012 Hour: 11:53 12.8 Lat: 33.80N Lon: 35.78E Depth: 17 Agency: REL Local
Magnitudes: 2.5MC REL Rms: 0.0 secs

BEIRUT REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BHL	BZ	17	314	EP		1153	16.79 0.00		29						1.0
BHL	BN	17	314	ES		1153	19.73-0.00								1.0
DQRL	SZ	23	242	EP		1153	17.44-0.00								1.0
DQRL	SN	23	242	ES		1153	20.88 0.00								1.0
RCY	SZ	34	172	EP		1153	18.99-0.00								1.0

December 14 2012 Hour: 12:14 19.4 Lat: 33.37N Lon: 35.69E Depth: 11 Agency: REL Local
Magnitudes: 2.4MC REL Rms: 0.0 secs

MOUNT HERMON REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
SHBL	BZ	5	113	EP		1214	21.53-0.08								1.0
SHBL	BN	5	113	ES		1214	23.27 0.03								1.0
RCY	SZ	20	42	EP		1214	23.15-0.02		27						1.0
RCY	SN	20	42	ES		1214	25.99 0.04								1.0
DQRL	SZ	39	343	EP		1214	26.07-0.00								1.0
DQRL	SN	39	343	ES		1214	30.99-0.01								1.0
HWQ	SZ	104	13	EP		1214	35.95 0.08								0.2

December 15 2012 Hour: 12:48 17.4 Lat: 33.38N Lon: 35.65E Depth: 1 Agency: REL Local
Magnitudes: 2.5MC REL Rms: 0.0 secs

MOUNT HERMON REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
SHBL	BZ	9	113	EP		1248	18.93	0.03	31						1.0
SHBL	BN	9	113	ES		1248	19.99	-0.02							1.0
DQRL	SZ	37	348	EP		1248	23.30	-0.06							1.0
DQRL	SN	37	348	ES		1248	27.80	0.03							1.0
BHL	BZ	58	360	EP		1248	26.78	0.01							1.0
HWQ	SZ	103	15	EP		1248	34.03	-0.00							0.2

December 16 2012 Hour: 7:03 36.0

Agency: REL Regional

EMSC OT=07:03:11.0 35.30N 27.73E 20Km M=4.4 DODECANESE ISLANDS

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
DQRL	SZ			EP		7 4	47.83								
HWQ	SZ			EP		7 4	49.86								
RCY	SZ			EP		7 4	51.10								

December 16 2012 Hour: 13:40 18.4 Lat: 33.46N Lon: 35.71E Depth: 13 Agency: REL Local
Magnitudes: 2.6MC REL Rms: 0.0 secs

MOUNT HERMON REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
SHBL	BZ	12	165	EP		1340	21.51	0.01							1.0
SHBL	BN	12	165	ES		1340	23.82	-0.01							1.0
RCY	SZ	13	69	EP		1340	21.53	0.01	32						1.0
DQRL	SZ	31	335	EP		1340	23.84	0.02							1.0
DQRL	SE	31	335	ES		1340	27.85	-0.01							1.0
HWQ	SZ	94	13	EP		1340	33.17	-0.01							1.0

December 16 2012 Hour: 14:34 0.0

Agency: REL Local

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
DQRL	SZ			EP		1434	30.65								
SHBL	BZ			EP		1434	29.63								

December 16 2012 Hour: 15:55 56.3 Lat: 33.82N Lon: 35.66E Depth: 7 Agency: REL Local
Magnitudes: 2.7MC REL Rms: 0.0 secs

BEIRUT REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BHL	BZ	9	359	EP		1555	58.38	0.02	40						1.0
BHL	BN	9	359	ES		1555	59.88	0.00							1.0
DQRL	SZ	15	212	EP		1555	59.10	0.01							1.0
DQRL	SN	15	212	ES		1556	1.12	-0.03							1.0
BEYL	BZ	16	291	EP		1555	59.24	0.04							1.0
HWQ	SZ	57	28	EP		1556	5.64	-0.04							1.0

December 17 2012 Hour: 3:40 31.6 Lat: 33.71N Lon: 35.69E Depth: 5 Agency: REL Local
Magnitudes: 2.5MC REL Rms: 0.0 secs

BEIRUT REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
DQRL	SZ	11	267	EP		340	33.66	-0.05	30						1.0
DQRL	SN	11	267	ES		340	35.26	0.02							1.0
BHL	BZ	22	351	EP		340	35.27	-0.01							1.0
BHL	BN	22	351	ES		340	38.00	0.02							1.0
HWQ	SZ	67	20	EP		340	42.52	0.00							1.0

December 19 2012 Hour: 11:39 0.0

Agency: REL Local

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
RCY	SZ			EP		1139	41.48								
SHBL	BZ			EP		1139	39.69								

December 23 2012 Hour: 12: 4 56.5 Lat: 33.78N Lon: 35.78E Depth: 4 Agency: REL Local
Magnitudes: 2.7MC REL Rms: 0.0 secs

BEIRUT REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BHL	BZ	18	320	EP		12 4	59.50	-0.04	41						1.0
BHL	BN	18	320	ES		12 5	1.74	-0.02							1.0
DQRL	SZ	21	246	EP		12 5	0.03	-0.01							1.0
DQRL	SN	21	246	ES		12 5	2.68	0.05							1.0
RCY	SZ	32	170	EP		12 5	1.82	0.00							1.0
RCY	SN	32	170	ES		12 5	5.71	-0.01							1.0
HWQ	SZ	57	16	EP		12 5	5.87	0.05							1.0

December 24 2012 Hour: 12:19 0.0 Agency: REL Local

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
RCY	SZ			EP		1220	4.72								
SHBL	BZ			EP		1220	4.73								

December 25 2012 Hour: 14: 8 38.8 Lat: 33.35N Lon: 35.41E Depth: 5 Agency: REL Local
Magnitudes: 2.7MC REL Rms: 0.0 secs

SOUTH LEBANON

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
SHBL	BZ	31	90	EP		14 8	43.88	-0.03							1.0
SHBL	BN	31	90	ES		14 8	47.68	0.02							1.0
DQRL	SZ	42	20	EP		14 8	45.68	-0.03	37						1.0
DQRL	SN	42	20	ES		14 8	50.80	0.02							1.0
BHL	BZ	65	20	EP		14 8	49.45	0.00							1.0
HWQ	SZ	114	25	EP		14 8	57.24	0.01							1.0

December 26 2012 Hour: 12:43 18.5 Lat: 33.82N Lon: 35.51E Depth: 22 Agency: REL Local
Magnitudes: 2.6MC REL Rms: 0.1 secs

BEIRUT REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
DQRL	SZ	14	154	EP		1243	22.96	0.14							1.0
DQRL	SN	14	154	ES		1243	25.93	-0.05							1.0
BHL	BZ	17	55	EP		1243	23.03	-0.05	36						1.0
RCY	SZ	47	139	EP		1243	26.73	-0.00							1.0
SHBL	BZ	56	157	EP		1243	28.09	0.02							1.0
SHBL	BN	56	157	ES		1243	35.12	-0.00							1.0
HWQ	SZ	65	38	EP		1243	29.31	-0.00							1.0

December 26 2012 Hour: 13:50 32.6 Lat: 33.80N Lon: 35.78E Depth: 15 Agency: REL Local
Magnitudes: 2.5MC REL Rms: 0.0 secs

BEIRUT REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BHL	BZ	17	315	EP		1350	36.30	0.01	29						1.0
BHL	BN	17	315	ES		1350	39.03	-0.01							1.0
DQRL	SZ	22	242	EP		1350	36.96	-0.01							1.0
DQRL	SN	22	242	ES		1350	40.24	0.01							1.0
RCY	SZ	34	171	EP		1350	38.61	-0.02							1.0
RCY	SN	34	171	ES		1350	43.13	0.01							1.0
HWQ	SZ	55	16	EP		1350	41.72	0.01							1.0

December 26 2012 Hour: 14: 0 23.9 Lat: 32.88N Lon: 35.03E Depth: 25 Agency: REL Local
Magnitudes: 2.8MC REL Rms: 0.0 secs

NORTH GALILEE

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
SHBL	BZ	85	52	EP		14 0	37.54	0.01							1.0
SHBL	BN	85	52	ES		14 0	47.67	0.03							1.0
RCY	SZ	102	47	EP		14 0	39.96	-0.03	40						1.0
RCY	SN	102	47	ES		14 0	51.90	-0.03							1.0
DQRL	SZ	105	29	EP		14 0	40.40	0.01							1.0
BHL	BZ	128	27	EP		14 0	43.49	0.00							1.0
HWQ	SZ	177	28	EP		14 0	49.68	0.05							0.2

December 27 2012 Hour: 9:54 40.1 Lat: 33.81N Lon: 35.78E Depth: 24 Agency: REL Local
Magnitudes: 2.5MC REL Rms: 0.0 secs

BEIRUT REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BHL	BZ	15	311	EP		954	44.71	-0.04	28						1.0
BHL	BN	15	311	ES	*	954	47.87	-0.31							0.0
DQRL	SZ	23	238	EP		954	45.42	-0.02							1.0
DQRL	SN	23	238	ES		954	49.41	0.03							1.0
RCY	SZ	36	171	EP		954	46.99	0.01							1.0
RCY	SN	36	171	ES		954	52.07	-0.01							1.0
HWQ	SZ	54	17	EP		954	49.35	0.02							1.0

December 27 2012 Hour: 9:42 2.0

Agency: REL Distant

EMSC OT=09:42:02.0 18.24S 173.63W 41Km M=5.3 TONGA

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BHL	BZ			EP		10 1	48.67								
SHBL	BZ			EP		10 1	49.40								

December 27 2012 Hour: 11:24 30.6 Lat: 33.79N Lon: 35.77E Depth: 0 Agency: REL Local
Magnitudes: 2.6MC REL Rms: 0.0 secs

BEIRUT REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BHL	BZ	17	319	EP		1124	33.35	0.00	35						1.0
DQRL	SZ	21	244	EP		1124	34.02	-0.01							1.0
DQRL	SN	21	244	ES		1124	36.54	-0.00							1.0
RCY	SZ	33	170	EP		1124	35.94	-0.01							1.0
RCY	SN	33	170	ES		1124	39.89	-0.01							1.0
SHBL	BZ	49	183	EP		1124	38.60	0.06							1.0
SHBL	BN	49	183	ES		1124	44.37	-0.02							1.0
HWQ	SZ	56	16	EP		1124	39.72	-0.01							1.0

December 27 2012 Hour: 11:45 0.0

Agency: REL Local

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
RCY	SZ			EP		1146	11.74								
SHBL	BZ			EP		1146	9.96								

December 27 2012 Hour: 12:23 0.0

Agency: REL Local

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
RCY	SZ			EP		1224	15.36								
SHBL	BZ			EP		1224	14.70								

December 29 2012 Hour: 10:15 0.0

Agency: REL Local

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
RCY	SZ			EP		1015	58.65								
SHBL	BZ			EP		1015	56.71								

December 31 2012 Hour: 15:18 43.7 Lat: 33.90N Lon: 35.76E Depth: 14 Agency: REL Local
Magnitudes: 2.9MC REL Rms: 0.0 secs

BEIRUT REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BHL	BZ	10	274	EP		1518	46.65	-0.02	49						1.0
BHL	BE	10	274	ES		1518	48.83	-0.01							1.0
BEYL	BE	25	264	EP		1518	48.38	-0.03							1.0
DQRL	SZ	28	220	EP		1518	48.90	0.06							1.0
DQRL	SE	28	220	ES		1518	52.63	0.02							1.0
HWQ	SZ	45	22	EP		1518	51.46	0.02							1.0
SHBL	BZ	61	182	EP		1518	53.68	-0.04							1.0

Epicentral Map of Lebanon

DECEMBER 2012

- Magnitudes**
- MI = 2
 - MI = 3
 - MI = 4
 - MI = 5
 - ★ Felt

