

Republic of Lebanon  
National Council for Scientific Research

# Provisional Seismological Bulletin

from the

## NATIONAL SEISMIC NETWORK

December

2019

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:

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

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	Nov2000-Sep2012
FKH	3414.69N	3624.61E	1152	FAKEHEH	Opened Dec 2004
RCY	3329.79N	3550.14E	1370	RACHAYA	Opened Jun 2006
BEYL	3352.30N	3529.59E	49	BEIRUT	Opened Jul 2006
NAQL	3307.02N	3508.46E	83	NAQOURA	Jul2008-Jan2012
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
ZAHL	3351.48N	3553.12E	1211	ZAHLE	Opened Aug 2015
BEIL	3432.50N	3611.08E	572	BEINO	Opened Jan 2017

## 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 2 2019 Hour: 12:48 15.5 Lat: 35.08N Lon: 36.71E Depth: 20 Agency: REL Regional**  
**Magnitudes: 3.0MC REL Rms: 0.1 secs**

**SYRIA REGION**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BEIL	SZ	77	219	EP		1248	27.88	0.05	55						1.0
BEIL	SN	77	219	ES		1248	36.94	-0.04							1.0
FKH	SZ	97	197	EP		1248	30.72	-0.07							1.0
FKH	SN	97	197	ES		1248	42.18	0.04							1.0
HWQ	BZ	114	218	EP		1248	33.23	0.02							1.0
RCY	SZ	194	205	EP		1248	43.66	-0.10							1.0
QRWL	SZ	195	209	EP		1248	43.88	0.01							1.0
SHBL	SZ	212	205	EP		1248	46.15	0.09							1.0

**December 2 2019 Hour: 19:12 11.0 Lat: 35.90N Lon: 35.46E Depth: 10 Agency: REL Regional**  
**Magnitudes: 3.2MC REL Rms: 0.1 secs**

**OFFSHORE SYRIA**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BEIL	SZ	165	156	EP		1912	36.59	0.14	64						1.0
BEIL	SN	165	156	ES		1912	55.20	-0.07							1.0
HWQ	BZ	186	166	EP		1912	38.81	-0.33							1.0
FKH	SZ	203	154	EP		1912	41.34	0.00							1.0
FKH	SN	203	154	ES		1913	3.85	0.08							1.0
BHL	BZ	222	175	EP		1912	43.78	0.09							1.0
ZAHL	SZ	230	170	EP		1912	44.67	-0.00							1.0
DQRL	SZ	244	178	EP		1912	46.36	0.00							1.0
QRWL	SZ	262	175	EP		1912	48.74	0.14							1.0
RCY	SZ	269	173	EP		1912	49.54	0.01							1.0
SHBL	SZ	285	175	EP		1912	51.38	-0.07							1.0

**December 3 2019 Hour: 9:46 0.6 Agency: REL Regional**  
**EMSC OT=09:46:00.6 35.16N 27.13E 10Km M=4.0 DODECANESE ISLANDS, GREECE**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
QRWL	SZ			EP		947	43.88								
HWQ	BZ			EP		947	45.13								
ZAHL	SZ			EP		947	45.88								
RCY	SZ			EP		947	45.88								
BEIL	SZ			EP		947	46.71								
FKH	SZ			EP		947	50.62								

**December 4 2019 Hour: 2:53 47.8 Lat: 33.54N Lon: 35.72E Depth: 0 Agency: REL Local**  
**Magnitudes: 2.6MC REL Rms: 0.0 secs**

**RACHAYA REGION**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
QRWL	SZ	3	288	EP		253	48.26	-0.07	35						1.0
RCY	SZ	12	113	EP		253	49.77	0.00							1.0
SHBL	SZ	21	173	EP		253	51.29	0.05							1.0
SHBL	SN	21	173	ES		253	53.76	-0.02							1.0
DQRL	SZ	23	324	EP		253	51.55	0.06							1.0
DQRL	SN	23	324	ES		253	54.25	0.03							1.0
ZAHL	SZ	39	24	EP		253	54.04	-0.01							1.0
BHL	BZ	41	352	EP		253	54.35	-0.05							1.0

**December 4 2019 Hour: 10:45 0.4 Agency: REL Regional**  
**EMSC OT=10:45:00.4 34.36N 32.15E 20Km M=3.1 CYPRUS REGION**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
SHBL	SZ			EP		1045	49.50								
RCY	SZ			EP		1045	48.68								
HWQ	BZ			EP		1045	50.39								
BEIL	SZ			EP		1045	51.13								

December 4 2019 Hour: 19:51 10.5 Lat: 33.77N Lon: 35.76E Depth: 13 Agency: REL Local  
Magnitudes: 2.3MC REL Rms: 0.0 secs

**ALEY REGION**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
ZAHL	SZ	15	50	EP		1951	13.84	-0.00							1.0
BHL	BZ	18	325	EP		1951	14.20	0.01	22						1.0
DQRL	SZ	19	248	EP		1951	14.36	-0.03							1.0
DQRL	SN	19	248	ES		1951	17.30	0.02							1.0
QRWL	SZ	26	197	EP		1951	15.25	-0.03							1.0
QRWL	SN	26	197	ES		1951	18.84	0.00							1.0
RCY	SZ	31	168	EP		1951	16.07	-0.01							1.0
SHBL	SZ	47	182	EP		1951	18.49	0.04							1.0

December 4 2019 Hour: 20:10 3.1

Agency: REL Distant

**EMSC OT=20:10:03.1 19.02S 169.59E 260Km M=6.0 VANUATU**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
HWQ	BZ			EP		2028	53.89								
BEIL	SZ			EP		2028	54.13								
SHBL	SZ			EP		2028	54.79								
BHL	BZ			EP		2028	54.91								
DQRL	SZ			EP		2028	55.40								

December 5 2019 Hour: 2: 3 17.9

Agency: REL Distant

**EMSC OT=02:03:17.9 45.36N 150.20E 30Km M=5.6 KURIL ISLANDS**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BEIL	SZ			EP		215	28.51								
FKH	SZ			EP		215	29.16								
HWQ	BZ			EP		215	28.98								
ZAHL	SZ			EP		215	31.99								
BHL	BZ			EP		215	31.22								
DQRL	SZ			EP		215	33.58								
QRWL	SZ			EP		215	33.58								
RCY	SZ			EP		215	33.63								
SHBL	SZ			EP		215	34.28								

December 5 2019 Hour: 2:54 42.7 Lat: 33.53N Lon: 35.71E Depth: 0 Agency: REL Local  
Magnitudes: 2.3MC REL Rms: 0.1 secs

**RACHAYA REGION**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
QRWL	SZ	3	309	EP		254	43.06	-0.06	23						1.0
RCY	SZ	13	108	EP		254	44.59	-0.13							1.0
RCY	SN	13	108	ES		254	46.25	0.01							1.0
SHBL	SZ	21	170	EP		254	46.05	0.06							1.0
DQRL	SZ	23	327	EP		254	46.48	0.11							1.0
DQRL	SN	23	327	ES		254	49.03	-0.08							1.0
ZAHL	SZ	40	25	EP		254	49.16	0.08							1.0
BHL	BZ	42	353	EP		254	49.37	0.01							1.0

December 5 2019 Hour: 16:14 57.5 Lat: 34.75N Lon: 33.38E Depth: 72 Agency: REL Regional  
Magnitudes: 3.5MC REL Rms: 0.1 secs

**CYPRUS REGION**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BHL	BZ	230	114	EP		1615	29.32	0.06							1.0
DQRL	SZ	233	119	EP		1615	29.61	-0.05							1.0
HWQ	BZ	242	102	EP		1615	30.72	0.00							1.0
HWQ	BN	242	102	ES		1615	55.35	0.03							1.0
ZAHL	SZ	251	113	EP		1615	31.98	0.11							1.0
QRWL	SZ	251	121	EP		1615	31.83	0.03							1.0
BEIL	SZ	258	94	EP		1615	32.47	-0.19	89						1.0
RCY	SZ	266	121	EP		1615	33.74	0.07							1.0
RCY	SN	266	121	ES		1616	0.40	-0.05							1.0
SHBL	SZ	268	125	EP		1615	33.81	-0.12							1.0
FKH	SZ	284	101	EP		1615	35.92	0.10							1.0

December 5 2019 Hour: 23:24 57.6 Lat: 34.21N Lon: 36.28E Depth: 1 Agency: REL Local  
Magnitudes: 3.0MC REL Rms: 0.0 secs

**BAALBECK REGION**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
FKH	SZ	13	73	EP		2324	59.61	-0.05	64						1.0
FKH	SN	13	73	ES		2325	1.25	0.03							1.0
HWQ	BZ	31	284	EP		2325	2.57	-0.07							1.0
HWQ	BN	31	284	ES		2325	6.43	0.03							1.0
BEIL	SZ	38	347	EP		2325	3.70	0.05							1.0
ZAHL	SZ	53	223	EP		2325	6.16	-0.01							1.0
BHL	BZ	67	240	EP		2325	8.27	-0.08							1.0
DQRL	SZ	86	230	EP		2325	11.52	0.07							1.0
RCY	SZ	89	207	EP		2325	11.92	-0.03							1.0
RCY	SN	89	207	ES		2325	22.62	0.03							1.0
QRWL	SZ	92	217	EP		2325	12.43	0.04							1.0
SHBL	SZ	108	207	EP		2325	14.93	-0.00							1.0

December 6 2019 Hour: 8:45 41.4

Agency: REL Regional

**EMSC OT=08:45:41.4 35.11N 23.78E 10Km M=4.5 CRETE, GREECE**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
QRWL	SZ			EP		848	0.81								
HWQ	BZ			EP		848	3.31								
BEIL	SZ			EP		848	4.32								
FKH	SZ			EP		848	8.85								

December 7 2019 Hour: 3:14 34.6 Lat: 33.52N Lon: 35.70E Depth: 0 Agency: REL Local  
Magnitudes: 2.5MC REL Rms: 0.1 secs

**WEST BEKAA REGION**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
QRWL	SZ	3	328	EP		314	35.18	-0.05	32						1.0
QRWL	SN	3	328	ES		314	35.70	0.03							1.0
RCY	SZ	13	103	EP		314	36.65	-0.08							1.0
SHBL	SZ	20	168	EP		314	37.79	-0.04							1.0
SHBL	SN	20	168	ES		314	40.28	0.07							1.0
DQRL	SZ	24	329	EP		314	38.41	-0.04							1.0
ZAHL	SZ	41	25	EP		314	41.33	0.10							1.0
BHL	BZ	43	354	EP		314	41.50	0.01							1.0

December 8 2019 Hour: 21: 9 7.9 Lat: 35.64N Lon: 31.26E Depth: 0 Agency: REL Regional  
Magnitudes: 3.9MC REL Rms: 0.1 secs

**EASTERN MEDITERRANEAN SEA**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BHL	BZ	446	114	EP		2110	9.32	0.04							1.0
HWQ	BZ	454	108	EP		2110	10.28	0.01							1.0
BEIL	SZ	465	104	EP		2110	11.70	0.11	124						1.0
BEIL	SN	465	104	ES		2110	58.67	-0.03							1.0
ZAHL	SZ	467	114	EP		2110	11.64	-0.26							1.0
QRWL	SZ	467	118	EP		2110	11.90	0.04							1.0
RCY	SZ	483	118	EP		2110	13.80	0.05							1.0
RCY	SN	483	118	ES		2111	2.47	0.03							1.0
SHBL	SZ	484	120	EP		2110	13.92	-0.00							1.0

December 8 2019 Hour: 23:48 40.7 Lat: 33.87N Lon: 35.88E Depth: 6 Agency: REL Local  
Magnitudes: 2.5MC REL Rms: 0.1 secs

**ZAHLE REGION**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
ZAHL	SZ	2	144	EP		2348	41.85	-0.06	32						1.0
ZAHL	SN	2	144	ES		2348	42.83	0.03							1.0
BHL	BZ	21	281	EP		2348	44.19	-0.07							1.0
BHL	BN	21	281	ES		2348	46.95	0.06							1.0
DQRL	SZ	34	237	EP		2348	46.19	-0.05							1.0
QRWL	SZ	40	207	EP		2348	47.27	0.03							1.0
RCY	SZ	42	185	EP		2348	47.47	-0.04							1.0

RCY	SN	42	185	ES		2348	52.52	-0.02									1.0
HWQ	BZ	46	8	EP		2348	48.13	-0.05									1.0
SHBL	SZ	59	192	EP		2348	50.40	0.09									1.0
BEIL	SZ	80	21	EP		2348	53.70	0.07									1.0

**December 10 2019 Hour: 0:55 31.4**

**Agency: REL Regional**

**EMSC OT=00:55:31.4 35.31N 28.52E 40Km M=3.4 EASTERN MEDITERRANEAN SEA**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
QRWL	SZ			EP		056	59.22								
ZAHL	SZ			EP		057	0.19								
SHBL	SZ			EP		057	0.31								
RCY	SZ			EP		057	0.77								
BEIL	SZ			EP		057	1.35								

**December 10 2019 Hour: 4:24 50.4 Lat: 32.56N Lon: 35.36E Depth: 0**

**Agency: REL Regional**

**Magnitudes: 3.0MC REL**

**Rms: 0.1 secs**

**DEAD SEA REGION**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
SHBL	SZ	95	22	EP		425	5.65	-0.03	54						1.0
SHBL	SN	95	22	ES		425	16.96	-0.01							1.0
RCY	SZ	113	23	EP		425	8.51	-0.15							1.0
RCY	SN	113	23	ES		425	22.22	0.07							1.0
QRWL	SZ	114	15	EP		425	8.59	-0.17							1.0
DQRL	SZ	129	9	EP		425	11.07	-0.10							1.0
BHL	BZ	152	10	EP		425	14.79	0.15							1.0
ZAHL	SZ	152	19	EP		425	14.89	0.16							1.0
HWQ	BZ	198	16	EP		425	21.27	0.07							1.0

**December 10 2019 Hour: 17:5 3.5**

**Agency: REL Distant**

**EMSC OT=17:05:03.5 30.71N 141.73E 15Km M=5.9 IZU ISLANDS, JAPAN REGION**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BEIL	SZ			EP		1717	35.94								
FKH	SZ			EP		1717	36.36								
HWQ	BZ			EP		1717	37.20								
ZAHL	SZ			EP		1717	38.63								
BHL	BZ			EP		1717	39.30								
RCY	SZ			EP		1717	39.73								
DQRL	SZ			EP		1717	40.23								
QRWL	SZ			EP		1717	40.48								
SHBL	SZ			EP		1717	40.74								

**December 10 2019 Hour: 21:58 29.0**

**Agency: REL Regional**

**EMSC OT=21:58:29.0 35.38N 26.50E 54Km M=5.4 CRETE, GREECE**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
DQRL	SZ			EP		22	0	13.43							
BHL	BZ			EP		22	0	13.24							
QRWL	SZ			EP		22	0	15.78							
HWQ	BZ			EP		22	0	16.53							
SHBL	SZ			EP		22	0	16.94							
ZAHL	SZ			EP		22	0	17.07							
RCY	SZ			EP		22	0	17.69							
BEIL	SZ			EP		22	0	18.53							
FKH	SZ			EP		22	0	22.13							

**December 12 2019 Hour: 3:5 44.8**

**Agency: REL Regional**

**EMSC OT=03:05:44.8 35.17N 26.19E 3Km M=4.9 CRETE, GREECE**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
DQRL	SZ			EP		3	7	30.97							
BHL	BZ			EP		3	7	31.57							
QRWL	SZ			EP		3	7	32.43							
SHBL	SZ			EP		3	7	33.63							
ZAHL	SZ			EP		3	7	33.81							
RCY	SZ			EP		3	7	34.49							
HWQ	BZ			EP		3	7	35.09							



BEIL SZ EP 3 7 36.64  
FKH SZ EP 3 7 40.17

**December 14 2019 Hour: 18:20 16.0 Lat: 35.49N Lon: 35.80E Depth: 0 Agency: REL Regional**  
**Magnitudes: 3.1MC REL Rms: 0.2 secs**

**SYRIA REGION**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BEIL	SZ	111	161	EP		1820	33.82	-0.06	61						1.0
BEIL	SN	111	161	ES		1820	47.25	0.14							1.0
HWQ	BZ	135	174	EP		1820	37.44	-0.34							1.0
HWQ	BN	135	174	ES		1820	53.95	0.06							1.0
FKH	SZ	149	158	EP		1820	39.87	0.04							1.0
FKH	SN	149	158	ES		1820	57.38	-0.09							1.0
BHL	BZ	176	184	EP		1820	43.56	-0.29							1.0
ZAHL	SZ	181	177	EP		1820	44.59	0.02							1.0
DQRL	SZ	199	186	EP		1820	46.97	0.13							1.0
QRWL	SZ	216	183	EP		1820	49.05	0.15							1.0
RCY	SZ	221	179	EP		1820	49.74	0.11							1.0
SHBL	SZ	237	181	EP		1820	51.81	0.13							1.0

**December 15 2019 Hour: 6:11 52.0 Agency: REL Distant**  
**EMSC OT=06:11:52.0 6.73N 125.15E 20Km M=6.8 MINDANAO, PHILIPPINES**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
FKH	SZ			EP		624	26.51								
BEIL	SZ			EP		624	26.93								
HWQ	BZ			EP		624	27.76								
ZAHL	SZ			EP		624	28.93								
BHL	BZ			EP		624	28.76								
RCY	SZ			EP		624	29.60								
QRWL	SZ			EP		624	30.10								
SHBL	SZ			EP		624	30.27								

**December 15 2019 Hour: 9:52 22.3 Agency: REL Distant**  
**EMSC OT=09:52:22.3 37.51S 177.22E 153Km M=5.1 OFF E. COAST OF N. ISLAND, N.Z**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
ZAHL	SZ			EP		1011	50.82								
RCY	SZ			EP		1011	50.82								
BEIL	SZ			EP		1011	50.82								
SHBL	SZ			EP		1011	50.91								
QRWL	SZ			EP		1011	51.10								
BHL	BZ			EP		1011	51.00								
DQRL	SZ			EP		1011	51.65								

**December 16 2019 Hour: 11:29 23.2 Lat: 34.27N Lon: 34.81E Depth:130 Agency: REL Local**  
**Magnitudes: 3.0MC REL Rms: 0.1 secs**

**OFFSHORE NORTH LEBANON**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
HWQ	BZ	105	89	EP		1129	44.97	0.17	53						1.0
HWQ	BN	105	89	ES		1130	0.64	-0.11							1.0
QRWL	SZ	114	134	EP		1129	45.41	-0.05							1.0
RCY	SZ	128	132	EP		1129	46.71	-0.03							1.0
RCY	SN	128	132	ES		1130	4.18	0.05							1.0
BEIL	SZ	130	76	EP		1129	46.79	-0.06							1.0
BEIL	SN	130	76	ES		1130	4.38	0.07							1.0
SHBL	SZ	134	139	EP		1129	47.29	0.02							1.0
FKH	SZ	148	90	EP		1129	48.46	-0.05							1.0

**December 16 2019 Hour: 14:49 15.2 Agency: REL Distant**  
**EMSC OT=14:49:15.2 2.95S 101.03E 30Km M=5.6 SOUTHERN SUMATRA, INDONESIA**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BEIL	SZ			EP		15 0	32.11								
SHBL	SZ			EP		15 0	32.44								
HWQ	BZ			EP		15 0	33.20								
BHL	BZ			EP		15 0	33.85								

DQRL SZ EP 15 0 34.34

**December 17 2019 Hour: 22:29 23.1**

**Agency: REL Regional**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BEIL	SZ			EP		2229	29.47								
HWQ	BZ			EP		2229	31.14								
RCY	SZ			EP		2229	40.32								
SHBL	SZ			EP		2229	42.46								

**December 18 2019 Hour: 11:16 46.3 Lat: 33.82N Lon: 36.76E Depth: 0**

**Agency: REL Regional**

**Magnitudes: 3.3MC REL**

**Rms: 0.1 secs**

**SYRIA REGION**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
FKH	SZ	57	326	EP		1116	55.40	-0.06							1.0
FKH	SN	57	326	ES		1117	2.32	0.05							1.0
HWQ	BZ	90	305	EP		1117	0.88	0.03							1.0
RCY	SZ	92	248	EP		1117	1.14	-0.03							1.0
BEIL	SZ	96	327	EP		1117	1.80	0.07	81						1.0
BEIL	SN	96	327	ES		1117	13.10	-0.08							1.0
QRWL	SZ	104	253	EP		1117	3.11	0.09							1.0
SHBL	SZ	107	241	EP		1117	3.52	-0.06							1.0

**December 18 2019 Hour: 12:19 56.4**

**Agency: REL Distant**

**EMSC OT=12:19:56.4 23.61S 177.06W 161Km M=5.3 SOUTH OF FIJI ISLANDS**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BEIL	SZ			EP		1239	26.45								
FKH	SZ			EP		1239	26.32								
HWQ	BZ			EP		1239	26.64								
BHL	BZ			EP		1239	27.48								
DQRL	SZ			EP		1239	28.39								
QRWL	SZ			EP		1239	27.87								
SHBL	SZ			EP		1239	28.26								

**December 20 2019 Hour: 11:39 52.9**

**Agency: REL Distant**

**EMSC OT=11:39:52.9 36.57N 70.60E 215Km M=6.1 HINDU KUSH REGION, AFGHANISTAN**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
FKH	SZ			EP		1145	24.25								
BEIL	SZ			EP		1145	24.79								
HWQ	BZ			EP		1145	27.28								
ZAHL	SZ			EP		1145	28.99								
RCY	SZ			EP		1145	29.82								
BHL	BZ			EP		1145	30.11								
QRWL	SZ			EP		1145	31.04								
SHBL	SZ			EP		1145	30.94								
DQRL	SZ			EP		1145	30.99								

**December 20 2019 Hour: 19:40 51.8**

**Agency: REL Distant**

**EMSC OT=19:40:51.8 32.85N 142.71E 2Km M=5.3 IZU ISLANDS, JAPAN REGION**

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BEIL	SZ			EP		1953	23.15								
FKH	SZ			EP		1953	23.74								
HWQ	BZ			EP		1953	24.44								
ZAHL	SZ			EP		1953	26.43								
BHL	BZ			EP		1953	26.55								
DQRL	SZ			EP		1953	27.72								
RCY	SZ			EP		1953	27.96								
QRWL	SZ			EP		1953	27.96								
SHBL	SZ			EP		1953	28.43								

December 21 2019 Hour: 23:51 37.0

Agency: REL Regional

EMSC OT=23:51:37.0 34.64N 27.54E 33Km M=4.3 EASTERN MEDITERRANEAN SEA

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
QRWL	SZ			EP		2353	14.50								
SHBL	SZ			EP		2353	15.67								
RCY	SZ			EP		2353	15.83								
ZAHL	SZ			EP		2353	16.29								
HWQ	BZ			EP		2353	16.99								
BEIL	SZ			EP		2353	17.45								

December 22 2019 Hour: 10:24 21.8

Agency: REL Regional

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
SHBL	SZ			EP		1024	25.12								
RCY	SZ			EP		1024	26.81								
QRWL	SZ			EP		1024	27.54								
DQRL	SZ			EP		1024	31.55								
ZAHL	SZ			EP		1024	32.46								

December 22 2019 Hour: 16:15 24.9 Lat: 34.05N Lon: 35.95E Depth: 5 Agency: REL Local  
Magnitudes: 3.0MC REL Rms: 0.1 secs

KESROUAN REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
ZAHL	SZ	22	196	EP		1615	28.43	-0.20							1.0
ZAHL	SN	22	196	ES		1615	31.48	0.11							1.0
HWQ	BZ	26	359	EP		1615	29.07	-0.09							1.0
HWQ	BN	26	359	ES		1615	32.33	0.03							1.0
BHL	BZ	32	240	EP		1615	30.10	-0.07	61						1.0
FKH	SZ	48	63	EP		1615	32.61	-0.04							1.0
DQRL	SZ	52	223	EP		1615	33.36	0.00							1.0
DQRL	SN	52	223	ES		1615	39.65	0.04							1.0
BEIL	SZ	59	21	EP		1615	34.58	0.14							1.0
QRWL	SZ	61	204	EP		1615	34.84	0.04							1.0
RCY	SZ	62	190	EP		1615	34.98	-0.02							1.0
SHBL	SZ	80	194	EP		1615	37.92	0.05							1.0

December 22 2019 Hour: 16:49 26.4

Agency: REL Distant

EMSC OT=16:49:26.4 20.10S 173.67W 10Km M=5.2 TONGA

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BEIL	SZ			EP		17 9	19.08								
FKH	SZ			EP		17 9	19.12								
HWQ	BZ			EP		17 9	19.66								
ZAHL	SZ			EP		17 9	20.60								
BHL	BZ			EP		17 9	20.69								
DQRL	SZ			EP		17 9	21.18								
RCY	SZ			EP		17 9	21.05								
QRWL	SZ			EP		17 9	21.18								
SHBL	SZ			EP		17 9	21.49								

December 22 2019 Hour: 20: 4 44.6 Lat: 33.65N Lon: 35.32E Depth: 0 Agency: REL Local  
Magnitudes: 2.7MC REL Rms: 0.1 secs

OFFSHORE CENTRAL LEBANON

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
DQRL	SZ	24	74	EP		20 4	48.33	-0.09	42						1.0
DQRL	SN	24	74	ES		20 4	51.24	-0.02							1.0
QRWL	SZ	35	108	EP		20 4	50.20	-0.03							1.0
QRWL	SN	35	108	ES		20 4	54.47	0.06							1.0
BHL	BZ	42	47	EP		20 4	51.17	-0.16							1.0
RCY	SZ	50	109	EP		20 4	52.67	-0.04							1.0
SHBL	SZ	51	130	EP		20 4	52.86	0.02							1.0
ZAHL	SZ	57	66	EP		20 4	53.87	0.08							1.0
HWQ	BZ	91	39	EP		20 4	59.27	0.07							1.0
BEIL	SZ	127	38	EP		20 5	5.19	0.10							1.0

December 22 2019 Hour: 23:58 5.0

Agency: REL Regional

EMSC OT=23:58:05.0 39.51N 40.10E 10Km M=4.3 EASTERN TURKEY

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BEIL	SZ			EP		2359	33.02								
FKH	SZ			EP		2359	34.88								
HWQ	BZ			EP		2359	37.44								
ZAHL	SZ			EP		2359	43.67								
BHL	BZ			EP		2359	43.67								
DQRL	SZ			EP		2359	46.17								
RCY	SZ			EP		2359	49.19								
QRWL	SZ			EP		2359	48.80								
SHBL	SZ			EP		2359	51.05								

December 27 2019 Hour: 7:32 21.8 Lat: 35.17N Lon: 36.37E Depth: 49 Agency: REL Regional  
Magnitudes: 4.2MC REL Rms: 0.0 secs

SYRIA REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BEIL	SZ	72	194	EP		7 3	34.28	0.02	297						1.0
HWQ	BZ	106	202	EP		7 3	38.32	-0.08							1.0
ZAHL	SZ	152	197	EP		7 3	44.04	0.04							1.0
BHL	BZ	155	205	EP		7 3	44.37	0.04							1.0
DQRL	SZ	178	205	EP		7 3	47.13	-0.02							1.0
QRWL	SZ	191	200	EP		7 3	48.70	0.06							1.0
RCY	SZ	192	195	EP		7 3	48.87	0.02							1.0
SHBL	SZ	210	196	EP		7 3	50.97	-0.08							1.0

December 27 2019 Hour: 7:19 36.4 Lat: 34.64N Lon: 33.74E Depth: 20 Agency: REL Regional  
Magnitudes: 3.6MC REL Rms: 0.2 secs

CYPRUS REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BHL	BZ	194	114	EP		720	4.66	-0.03							1.0
DQRL	SZ	198	121	EP		720	5.13	-0.03							1.0
HWQ	BZ	206	101	EP		720	6.23	-0.01							1.0
HWQ	BN	206	101	ES		720	28.56	0.23							1.0
ZAHL	SZ	216	113	EP		720	7.16	-0.23							1.0
QRWL	SZ	216	124	EP		720	7.49	0.06							1.0
BEIL	SZ	224	92	EP		720	8.62	0.22	109						1.0
BEIL	SN	224	92	ES		720	31.85	-0.23							1.0
RCY	SZ	231	123	EP		720	9.25	-0.09							1.0
SHBL	SZ	234	127	EP		720	9.80	0.11							1.0

December 28 2019 Hour: 1:48 38.6

Agency: REL Regional

EMSC OT=01:48:38.6 35.67N 32.09E 71Km M=4.3 CYPRUS REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
BHL	BZ			EP		149	28.68								
HWQ	BZ			EP		149	30.39								
DQRL	SZ			EP		149	29.26								
BEIL	SZ			EP		149	31.21								
ZAHL	SZ			EP		149	31.97								
QRWL	SZ			EP		149	32.34								
RCY	SZ			EP		149	34.36								
SHBL	SZ			EP		149	34.89								

December 31 2019 Hour: 12:56 30.9 Lat: 32.26N Lon: 34.08E Depth: 33 Agency: REL Regional  
Magnitudes: 3.1MC REL Rms: 0.1 secs

OFFSHORE DEAD SEA REGION

STAT	CO	DIST	AZI	PHASE	P	HRMN	SECON	TRES	CODA	AMPL	PERI	BAZ	ARES	VELO	WT
SHBL	SZ	197	52	EP		1256	58.52	-0.00	52						1.0
SHBL	SN	197	52	ES		1257	18.90	-0.08							1.0
QRWL	SZ	206	46	EP		1256	59.67	-0.03							1.0
DQRL	SZ	212	41	EP		1257	0.21	-0.16							1.0
DQRL	SN	212	41	ES		1257	22.24	0.04							1.0
RCY	SZ	213	50	EP		1257	0.63	0.02							1.0

RCY	SN	213	50	ES	1257	22.66	0.04	1.0
BHL	BZ	234	38	EP	1257	3.00	-0.09	1.0
HWQ	BZ	283	37	EP	1257	9.25	0.03	1.0
FKH	SZ	309	44	EP	1257	12.66	0.24	1.0



# Epicentral Map of Lebanon

## DECEMBER 2019

