

A STUDY OF NEW ENGLAND SEISMICITY

Quarterly Earthquake Report

April - June, 2011



**Weston Observatory
New England Seismic Network
381 Concord Road
Weston, MA 02493**

NESN Quarterly Earthquake Report

April - June, 2011

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Introduction

The New England Seismic Network (NESN) is operated by the Weston Observatory (WES) of Boston College. The mission of the NESN is to operate and maintain a regional seismic network with digital recording of seismic ground motions for the following purposes: 1) to determine the location and magnitude of earthquakes in and adjacent to New England and report felt events to public safety agencies, 2) to define the crust and upper mantle structure of the northeastern United States, 3) to derive the source parameters of New England earthquakes, and 4) to estimate the seismic hazard in the area.

This report summarizes the work of the NESN for the period April - June, 2011. It includes a brief summary of the network's equipment and operation, and a short discussion of data management procedures. A list of participating personnel is given in Table 1. There were 81 earthquakes that occurred within or near the network during this reporting period. Phase information for these earthquakes is included in this report.

Current Network Operation and Status

The New England Seismic Network of Weston Observatory of Boston College currently consists of 14 broadband three-component sensors as well as 14 strong motion three-component sensors. The coordinates of the broadband stations are given in Table 2, and maps of the weak- and strong-motion networks are shown in Figures 1. The 14 stations consist of Nanometrics 120PA three-component broadband sensors as well as Reftek RT-147 Accelerometers (Strong Motion Sensors). Ground motions recorded by these sensors are digitized at 40 sps. These stations are

operated in continuous mode with all waveform data transmitted via the internet to Weston Observatory for analysis and event archiving.

Seismicity

There were 81 earthquakes that occurred in or adjacent to the NESN during this reporting period.

Table 1: Personnel operating the NESN

Table 2: Seismic and Strong Motion Stations

1. Code = station name
2. Lat = station latitude, degrees north
3. Long = station longitude, degrees west
4. Elev = station elevation in meters
5. Location = geographic location
6. Operator = network operator

Table 3: Earthquake Hypocenters

1. Date = date event occurred, Yr (year)/Mo (month)/Dy (day)
2. Time = origin time of event, Hr (hour):Mn (minute):Sec (second)
in UCT (Universal Coordinated Time, same as Greenwich Mean Time)
3. Lat = event location, latitude north in degrees
4. Long = event location, longitude west in degrees
5. Depth = event depth in kilometers
6. Mn = Nuttli Magnitude
7. Mc = Coda Magnitude
8. Location = event geographic location

Table 4: Earthquake Phase Data

1. Geographic location
2. DATE = date event occurred, yr/mo/dy (year/month/day)
3. ORIGIN = event origin time (UCT) in hours, minutes, and seconds
4. LAT N = latitude north in degrees and minutes
5. LONG W = longitude west in degrees and minutes
6. DEPTH = event depth in kilometers
7. MN = Nuttli Lg phase magnitude with amplitude divided by period
8. MC = signal duration (coda) magnitude
WES: $2.23 \text{ Log(FMP)} + 0.12 \text{ Log(Dist)} - 2.36$ (Rosario, 1979)
9. ML = local magnitude
WES: calculated from Wood-Anderson seismograms (Ebel, 1982)
GSC (Geological Survey of Canada): Richter Lg magnitude
10. GAP = largest azimuthal separation, in degrees, between stations
11. RMS = root mean square error of travel time residual in seconds
12. ERH = standard error of epicenter in kilometers
13. ERZ = standard error of event depth in kilometers
14. Q = solution quality of hypocenter
A = excellent
B = good

TABLE 1

WESTON OBSERVATORY PERSONNEL

Name	Position	Phone #	Email Address
John E. Ebel	Director, Seismologist, Principal Investigator	617-552-8319	ebel@bc.edu
Alan Kafka	Research Seismologist	617-552-8300	kafka@bc.edu
Anastasia M. Moulis	Seismologist, Analyst	617-552-8325	macherid@bc.edu
Michael Hagerty	NESN Manager, Seismologist	617-552-8337	hagertmb@bc.edu

EARTHQUAKE HYPOCENTERS

DATE	TIME	LAT	LONG	DEPTH	MN	MC	LOCATION
2011/06/29	14:10:50.40	43.44	-71.35	12.04	1.8	2.4	NH, 14KM SE OF LACONIA
2011/06/29	13:53:40.03	43.44	-71.35	10.91	2.3	2.5	NH, 14KM SE OF LACONIA
2011/06/28	02:21:02.68	45.45	-63.39	19.07	2.2	2.9	NS, 13KM NW OF TRURO
2011/06/22	10:07:30.30	45.29	-73.08				

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0 450 56.56 102.07 91.94 10.12 0.00

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	N	DI	A	M	MK	H	MN	EC	OB	CAL	E	AM	P	MAG	FMP	FMAG	ANG
BA G	37.7	62	EPC0	643	21.37	7.13	7.09	-0.02	1.96								115
				0	643	26.97	12.73	12.62	0.00	1.96							
P O I	125.7	248	EPC2	643	32.34	18.10	20.02	-1.95	0.00	1.8	.08	2.4	143	2.8			92
				3	643	46.24	32.00	35.64	-3.69	0.00							
LMN	191.9	136	EPC0	643	42.65	28.41	28.33	0.02	1.45								55
				2	644	3.15	48.91	50.43	-1.62	0.00							
G	204.5	348	0	644	7.44	53.20	53.20	-0.02	1.38								55
GGN	224.1	187	EPC3	643	48.50	34.26	32.31	1.94	0.00								55
				3	644	12.72	58.48	57.51	0.95	0.04							
A21	249.3	287	EPC0	643	49.72	35.48	35.41	0.06	1.14								55
				0	644	17.75	63.51	63.03	0.46	1.14							
A64	267.4	289	EPC0	643	51.99	37.75	37.66	0.07	1.04								55
				4	644	27.17	72.93	67.03	5.86	0.00							
A 6	268.0	280	EPC0	643	52.15	37.91	37.73	0.18	1.03								55
				4	644	27.08	72.84	67.16	5.68	0.00							
EMM	278.0	196	EPC2	643	54.87	40.63	38.96	1.66	0.00								55
				3	644	26.40	72.16	69.35	2.79	0.00							
A6	278.3	285	EPC0	643	52.92	38.68	39.00	-0.38	0.98								55
				0	644	23.10	68.86	69.42	-0.67	0.86							
LM	293.1	281	EPC4	643	59.38	45.14	40.82	4.25	0.00								55
				0	644	27.03	72.79	72.66	0.01	0.89							
A54	298.3	279	EPC0	643	55.74	41.50	41.47	-0.03	0.86								55
				0	644	27.06	72.82	73.82	-1.10	0.00							
PKME	298.3	228	EPC1	643	54.60	40.36	41.47	-1.13	0.00	0.3	.10	2.6	170	3.1			55
				4	644	33.18	78.94	73.82	5.09	0.00							
M	345.3	358	EPC2	644	3.57	49.33	47.26	2.01	0.00								55
				4	644	42.73	88.49	84.12	4.26	0.00							
HAL	356.6	139	0	644	40.79	86.55	86.63	-0.10	0.55								55
DA	369.2	287	EPC1	644	3.48	49.24	50.22	-1.14	0.00								55
				0	644	43.78	89.54	89.39	-0.14	0.49							
GB	429.3	114	EPC2	644	13.27	59.03	57.64	1.38	0.00								55
				0	644	57.09	102.85	102.60	0.23	0.23							
DP	481.1	267	EPC3	644	15.34	61.10	64.03	-2.96	0.00								55
				2	645	6.01	111.77	113.97	-2.26	0.00							

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TABLE 5:**MICROEARTHQUAKES AND OTHER NON-LOCATABLE EVENTS**

Date yr/mo/day	Arrival Time (UTC)	Station	Possible Location
2011/06/19	06:06	PKME	Maine
2011/06/01	07:08:32	PKME	Maine
2011/05/10	17:51	PKME	Bucksport, ME
2011/05/04	12:59	PKME	Bucksport, ME
2011/05/04	11:29	PKME	Bucksport, ME
2011/05/04	05:40	PKME	Bucksport, ME
2011/05/03	23:34	PKME	Bucksport, ME
2011/05/03	21:21	PKME	Bucksport, ME
2011/05/03	07:56	EMMW, PKME	Bucksport, ME
2011/05/03	04:06	EMMW, PKME	Bucksport, ME
2011/05/03	02:27	PKME	Bucksport, ME
2011/05/03	01:18	PKME	Bucksport, ME
2011/05/01	17:21	PKME	Bucksport, ME
2011/05/01	15:58	PKME	Bucksport, ME
2011/05/01	07:48	PKME	Bucksport, ME
2011/05/01	06:53	PKME	Bucksport, ME
2011/05/01	06:24	PKME	Bucksport, ME
2011/05/01	02:42	PKME	Bucksport, ME
2011/05/01	01:13	PKME	Bucksport, ME
2011/05/01	00:48	PKME	Bucksport, ME
2011/05/01	00:16	PKME	Bucksport, ME
2011/05/01	00:07	PKME	Bucksport, ME
2011/04/30	23:59	PKME	Bucksport, ME
2011/04/30			

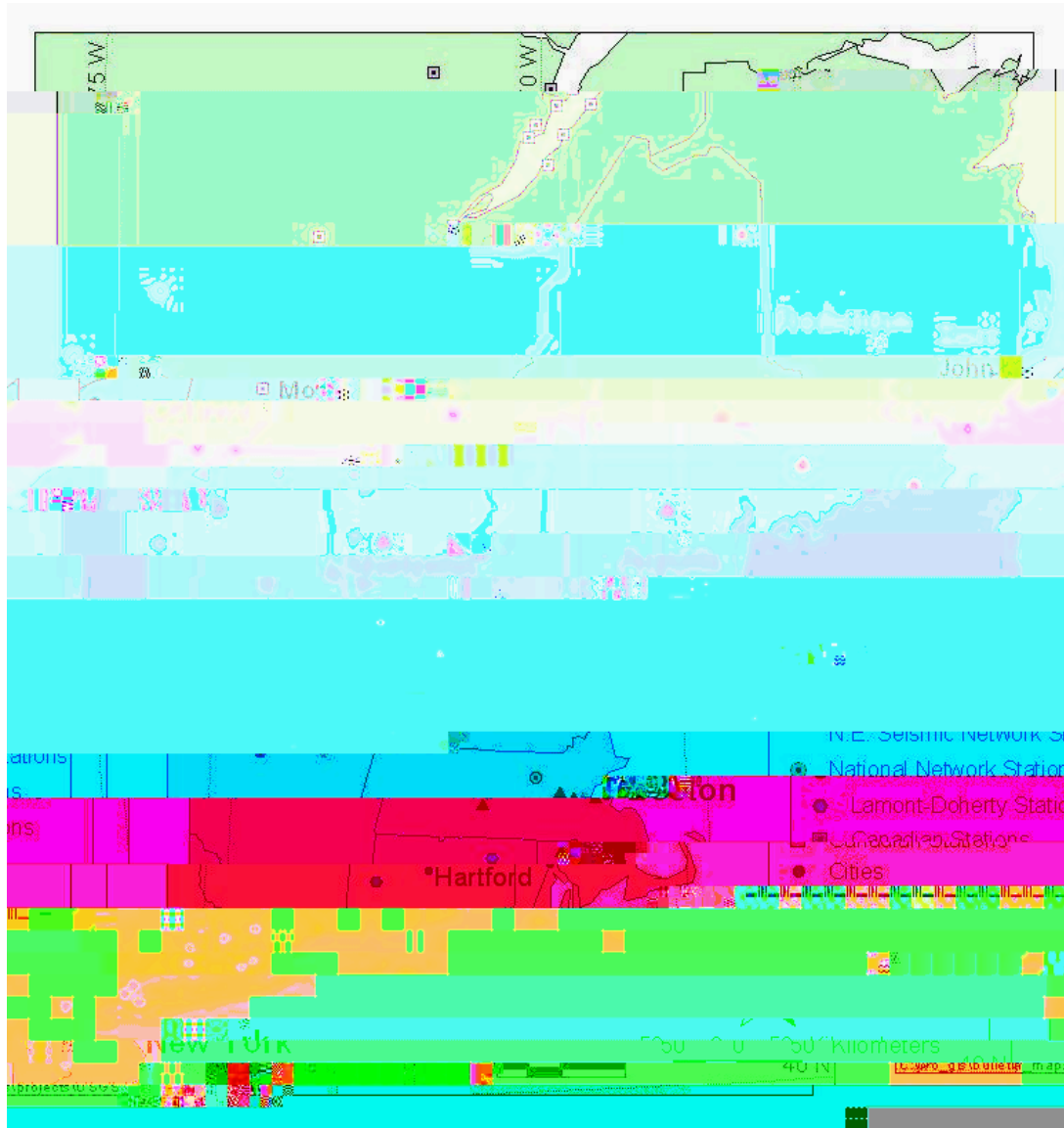


Figure 1: Map of stations of the New England Seismic Network (NESN) in operation during the period of this report. Also included are other Northeast U.S. and Canadian seismic stations in operation during this period. NESN stations include broadband and strong motion sensors.

NESN Quarterly Seismicity Map



Figure 2: Earthquake epicenters located by the NESN during the period of this report.

NESN Cumulative Seismicity Map



Figure 3: Seismicity for period January, 1975 – June, 2011.

Our map database has been developed in-house using ArcView and in part basemap data