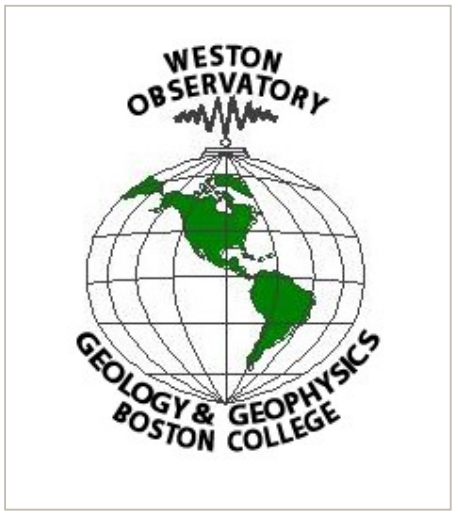
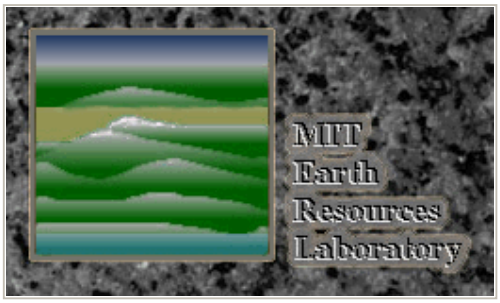
A STUDY OF NEW ENGLAND SEISMICITY

Quarterly Earthquake Report

January - March, 2000

NEW ENGLAND
SEISMIC NETWORK





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NEW ENGLAND SEISMIC NETWORK

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Notice

Network operation supported by the U.S. Geological Survey (USGS), Department of the Interior, under USGS award number 1434-HQ-98-AG-01943 and award number 1434-HQ-98-AG-01926. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

Quarterly Earthquake Report
January - March, 2000

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Introduction

The New England Seismic Network (NESN) is operated collaboratively by the Weston Observatory (WES) of Boston College and the Earth Resources Lab (ERL) of the Massachusetts Institute of Technology. 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 January - March, 2000. 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 8 earthquakes that occurred within or near the network during this reporting period. Phase information for these earthquakes is included in this report.

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Current Network Operation and Status

The New England Seismic Network currently consists of 13 broadband three-component, 4 short-period vertical, and 8 strong-motion stations. The coordinates of the stations are given in Table 2, and maps of the weak- and strong-motion

networks are shown in Figures 1 and 2, respectively.

WES operates 12 stations with broadband instruments consisting of Guralp CMG-40T three-component sensors. Ground motions recorded by these sensors are digitized at 100 sps with 16-bit resolution. Additional gain-ranging provides 126 dB dynamic range. These stations are operated in dialup mode with waveform segments of suspected events transmitted in digital mode to Weston Observatory for analysis and archiving. WES is continuing to upgrade its recording stations with 2 more broadband instruments scheduled for installation in 2000. WES also maintains 8 SMA-1 strong-motion instruments in New England.

ERL at MIT currently operates 4 short-period stations, all located within 100 km of Boston. The short- period instruments have 1.0 Hz L4C vertical seismometers. Data recorded by these seismometers is transmitted continuously in analog mode to ERL and digitized (12-bit) into a PC at 50 sps. A data acquisition program on the PC triggers on events detected in the short-period data streams and saves them to a disk for manual analysis. Station WFM also has a new three-component, high dynamic range instrument. The instrument has a CMG-40T sensor and transmits 3-channel, 24-bit data at 100 sps continuously to a central processor (Pentium PC) at ERL. Waveform windows of suspected events are extracted from the data stream, analyzed and archived with the short-period data. WES and ERL record some stations in analog format on helicorders to provide additional data for analysis.

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Seismicity

There were 8 earthquakes that occurred in or adjacent to the NESN during this reporting period. A summary of the location data is given in Table 3. Figure 3 shows the locations of these events. Figure 4 shows the locations of all events since the beginning of network operation in October, 1975.

Table 4 gives the station phase data and detailed hypocenter data for each event listed in Table 3. In addition to NESN data, arrival time and magnitude data sometimes are contributed for seismic stations operated by the Geological Survey of Canada (GSC), the Lamont-Doherty Cooperative Seismographic Network., and the US National Seismic Network. Final locations for this section were computed using the program HYPO78. For regional events (those too far from the NESN to obtain accurate locations and magnitudes) phase data are given for NESN stations, but the entry in Table 3 lists the hypocenter and geographic location information adopted from the authoritative network. Accordingly, the epicenter is plotted on the maps using the entry from Table 3.

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Data Management

Recent event locations are available via FTP at: SEISMOEAGLE.BC.EDU. Waveform data are saved in Nanometrics, ASCII, and SEED formats and are available via SEISMOEAGLE.BC.EDU or through personal contact. Earthquake lists can be fingered at QUAKE@SEISMOEAGLE.BC.EDU. Weston Observatory maintains two web pages with information about local earthquakes: "http://www.bc.edu:80/bc_org/avp/cas/wesobs/" and "http://seismoeagle.bc.edu/". The latter page is still under contruction. Currently available on the seismoeagle web page is the full catalog of northeastern U.S. earthquake activity to 1992. This will be updated as new Northeastern U.S. Seismic Network Bulletins are produced.

MIT/ERL provides two internet utilities, the MIT/ERL web-site ("www-erl.mit.edu/NESN/homepage.html") and an anonymous FTP directory, to distribute seismic data. SESAME (Seismic Event Server at MIT/ERL) is the web data server that distributes catalogs, reports, earthquake bulletins, and epicenter and station maps (including an archive of recent seismic events). The FTP site, named "sunda.mit.edu", is the current facility available to download waveform data recorded by the MIT NESN. The client machine IP number must be forwarded to us for the client to gain access to the anonymous FTP directory. After logging on, the user changes directories to "pub/seismic". Waveforms of individual events for the period April 1995 through the present are accessed as Unix-compressed SAC files, through the anonymous FTP directory. A "readme" file offers further explanation about the data. Older waveform data in SAC format (1981 - March 1995) will be made available on the FTP site upon request.

For more information on matters discussed in this report or general earthquake information (reports, maps, catalogs, etc.) consult our web-sites www-erl.mit.edu/NESN and /westonobservatory or contact:

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Explanation of Tables

Table 1: List of personnel operating the NESN

Table 2: List of 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 Hypocenter List

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. Mag = event magnitude
7. Int = event epicentral intensity
8. Location = event geographic location

Table 4: Earthquake detailed hypocenter and phase data list

Table Header: detailed hypocenter 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 Log(FMP) + 0.12Log(Dist) - 2.36 (Rosario, 1979)
   MIT: 2.21 Log(FMP) - 1.7 (Chaplin *et al.*, 1980)

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
    C = fair
    D = poor

Table Body: earthquake phase data

1. STN = station name
2. DIST = epicentral distance in kilometers
3. AZM = azimuthal angle in degrees measured clockwise between true north and vector pointing from epicenter to station
4. Description of onset of phase arrival

   I = impulsive
   E = emergent

5. R = phase

   P = first P arrival
   S = first S arrival

6. M = first motion direction of phase arrival

   U = up or compression
   D = down or dilatation

7. K = weight of arrival

   0 = full weight (1.0)
   1 = 0.75 weight
   2 = 0.50 weight
   3 = 0.25 weight
   4 = no weight (0.0)

8. HRMN = hour and minute of phase arrival
9. SEC = second of phase arrival
10. TCAL = calculated travel time of phase in seconds
11. RES = travel time residual (error) of phase arrival
12. WT = weight of phase used in hypocentral solution
13. AMX = peak-to-peak ground motion, in millimicrons, of the maximum envelope amplitude of vertical-component signal, corrected for system response
14. PRX = period in seconds of the signal from which amplitude was measured
15. XMAG = Nuttli magnitude recorded at station
16. FMP = signal duration (coda), in seconds, measured from first P arrival
17. FMAG = coda magnitude recorded at station

Table 5: Microearthquakes and other non-locatable events

1. Date = date event occurred, Yr (year)/Mo (month)/Dy (day)
2. Sta = nearest station recording event
3. Arrival Time = phase arrival time, Hr (hour):Mn (minute):Sec (second)

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TABLE 1

WESTON OBSERVATORY PERSONNEL

Name	Network Position	voice phone	email address
John E. Ebel	Principal Investigator	617-552-8319	ebel@bc.edu
Alan Kafka	Research Seismologist	617-552-8300	kafka@bcvms.bc.edu
Susan O'Connor	Seismic Analyst	617-552-8337	dannolfo@bc.edu
Edward Johnson	Project Engineer	617-552-8332	johnson@bcvms.bc.edu
Patricia Tassia	Administrative Secretary	617-552-8311	tassia@bcvms.bc.edu
W. Richard Ott, S.J.	Assistant to the Director	617-552-8335	ottwi@mail1.bc.edu
Weston Observatory		617-552-8300 617-552-8388 (FAX)	

MIT/ERL PERSONNEL

Name	Network Position	voice phone	email address
M. Nafi Toksöz	Principal Investigator	617-253-7852	toksoz@mit.edu
Robert Cicerone	Research Seismologist	617-253-7863	cicerone@erl.mit.edu
Heather Hooper	Seismic Analyst	617-253-6290	
Sara Brydges	Administrator	617-253-7797	sara@erl.mit.edu
Earth Resources Lab		617-253-8027 617-253-6385 (FAX)	

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TABLE 2

SEISMIC STATIONS OF THE NEW ENGLAND SEISMIC NETWORK

Code	Lat	Long	Elev (m)	Location	Operator
BCX	42.3350	-71.1705	61.0	Chestnut Hill, MA	WES
BRY	41.9178	-71.5388	380.0	Smithfield, RI	WES
DNH	43.1225	-70.8948	24.0	Durham, NH	MIT
DXB	42.0610	-70.6992	8.0	Duxbury, MA	MIT
GLO	42.6403	-70.7272	15.2	Gloucester, MA	MIT
HNH	43.7050	-72.2860	180.0	Hanover, NH	WES
MIM	45.2436	-69.0403	140.0	Milo, ME	WES
NH1	43.5473	-71.5743	402.0	Sanbornton, NH	WES
QUA2	42.2789	-72.3525	168.0	Belchertown, MA	WES
TRY	42.7311	-73.6669	131.0	Troy, NY	WES
VT1	44.3317	-72.7536	410.0	Waterbury, VT	WES
WES	42.3850	-71.3220	60.0	Weston, MA	WES
WFM	42.6106	-71.4906	87.5	Westford, MA	MIT
WVL	44.5648	-69.6575	85.0	Waterville, ME	WES
YLE	41.3100	-72.9269	914.0	New Haven, CT	WES
PQI	46.6710	-68.0168	175.0	Presque Isle, ME	WES

STRONG MOTION STATIONS OF THE NEW ENGLAND SEISMIC NETWORK

Code	Lat	Long	Location	Operator
SM1	44.90	-67.25	Dennysville, ME	WES
SM2	44.49	-73.10	Essex Junction, VT	WES
SM3	41.45	-71.33	Newport, RI	WES
SM4	42.38	-71.32	Weston, MA	WES
SM5	42.66	-71.30	Lowell, MA	WES
SM6	42.30	-71.34	Natick, MA	WES
SM7	42.39	-71.54	Hudson, MA	WES
SM8	44.48	-69.61	North Vassalboro, ME	WES

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TABLE 3

EARTHQUAKE HYPOCENTER LIST
NEW ENGLAND AND ADJACENT REGIONS
January - March, 2000

Date Yr/Mo/Dy	Time Hr:Mn:Sec	Lat	Long	Depth (km)	Mag	Int	Location
2000/01/01	11:23:03.00	47.0270	-78.1698	5.00	4.8		PQ, TEMISCAMINGUE
2000/01/03	21:05:50.01	44.3145	-70.1722	9.69	3.4		ME, 18 KM S OF LIVERMORE FALLS
2000/01/17	08:16:20.40	44.5692	-70.4422	16.28	3.4		ME, 3.5 KM NNE OF DIXFIELD
2000/01/21	05:59:49.69	42.9908	-71.1773	1.65	2.4		NH, 4.5 KM S OF RAYMOND
2000/01/27	14:49:40.50	43.0000	-71.1815	1.40	3.0		NH, 3.5 KM S OF RAYMOND
2000/01/27	15:07:43.15	43.0195	-71.2615	8.18	2.2		NH, 3 KM SSW OF RAYMOND
2000/01/27	15:30:06.39	43.0213	-71.2673	6.19	2.2		NH, 7.5 KM ESE OF RAYMOND
2000/01/27	16:43:47.22	43.0193	-71.0692	7.70	1.8		NH, 5 KM WSW OF RAYMOND

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TABLE 4

EARTHQUAKE PHASE DATA LIST
NEW ENGLAND AND ADJACENT REGIONS
January - March, 2000

NORTHWEST MAINE CRUSTAL STRUCTURE
00JAN01 PQ, TEMISCAMINGUE REGION

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
000101	1123 3.00	47- 1.62	78-10.19	5.00	4.8			304	0.18	50.8	41.1	D

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
GRQ	182.4	105	P	4 1123	33.30	30.30	28.98	1.31	0.00					
OTT	262.4	134	P	4 1123	40.87	37.87	38.85	-0.99	0.00					
			S	0 1123	72.22	69.22	69.15	0.06	2.18					
TRQ	291.0	108	P	4 1123	45.86	42.86	42.39	0.46	0.00					
WBO	317.9	135	P	4 1123	47.12	44.12	45.70	-1.59	0.00					
			S	0 1123	84.22	81.22	81.35	-0.14	1.76					
MNT	389.1	116	P	0 1123	57.37	54.37	54.50	-0.14	1.22					
DPQ	412.7	95	P	0 1123	60.56	57.56	57.41	0.14	1.04					
MOQ	494.8	113	P	0 1124	10.59	67.59	67.55	-0.10	0.42					
VT1	517.4	125	EP	0 1124	14.11	71.11	70.34	0.75	0.25					
			ES	0 1124	95.26	152.26	125.20	27.02	0.00					
DAQ	532.2	79	P	0 1124	15.26	72.26	72.17	-0.07	0.13					
A54	589.7	85	P	0 1124	21.42	78.42	79.27	-0.91	0.00					
HNH	590.4	129	EPC0	1124	21.83	78.83	79.35	-0.55	0.003218	.47		4.8		
A21	644.5	83	P	0 1124	28.39	85.39	86.03	-0.65	0.00					
QUA2	700.7	139	EPC0	1124	34.75	91.75	92.97	-1.26	0.002682	.42		5.0		
WVL	717.0	113	EP	0 1124	38.60	95.60	94.98	0.61	0.002381	.58		4.8		
WES	748.8	134	EP	0 1124	40.30	97.30	98.91	-1.63	0.001764	.58		4.7		
BCX	761.4	133	EPC0	1124	41.53	98.53	100.46	-1.93	0.001791	.63		4.7		
BRY	774.9	137	EPC0	1124	43.74	100.74	102.12	-1.39	0.001634	.54		4.8		
PQI	776.1	93	EP	0 1124	45.12	102.12	102.28	-0.19	0.002491	.62		4.9		
CNQ	792.0	71	P	4 1124	46.19	103.19	104.24	-1.08	0.00					
MNQ	792.9	61	P	4 1124	46.77	103.77	104.35	-0.58	0.00					
GSQ	851.6	76	P	0 1124	53.82	110.82	111.60	-0.79	0.00					
ICQ	854.8	71	P	0 1124	53.51	110.51	112.00	-1.50	0.00					
SMQ	917.5	67	P	4 1124	61.16	118.16	119.73	-1.63	0.00					

NORTHWEST MAINE CRUSTAL STRUCTURE
00JAN03 ME, 18 KM S OF LIVERMORE FALLS

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
103	21 5 50.01	44-18.87	70-10.33	9.69	3.4	3.4		126	0.38	1.1	1.2	C

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
WVL	46.9	59	IPD0	21 5	57.89	7.88	7.79	0.09	2.22					
			ES	0 21 5	63.74	13.73	13.86	-0.14	2.22					
LBNH	140.2	267	EP	0 21 6	12.30	22.29	22.58	-0.34	1.79					
DNH	144.7	204	EP	0 21 6	13.94	23.93	23.29	0.64	1.73				279	3.4
			ES	0 21 6	31.10	41.09	41.46	-0.37	1.77					
HNH	182.5	248	EP	0 21 6	19.10	29.09	28.52	0.54	1.60	637	.13	3.5		
			ES	3 21 6	40.22	50.21	50.77	-0.61	0.39					
GLO	191.3	194	EP	1 21 6	19.70	29.69	29.61	0.09	1.19				225	3.3
			ES	4 21 6	41.94	51.93	52.70	-0.77	0.00					
MOQ	198.6	304	EP	0 21 6	20.90	30.89	30.50	0.25	1.55					
VT1	206.0	271	EP	4 21 6	23.60	33.59	31.42	2.15	0.00					
			ES	0 21 6	46.09	56.08	55.93	0.12	1.52					
WFM	217.3	209	EP	0 21 6	23.14	33.13	32.81	0.31	1.47				238	3.3
			ES	0 21 6	48.16	58.15	58.40	-0.27	1.47					
WES	233.8	204	EP	0 21 6	24.90	34.89	34.85	0.03	1.39	130	.10	3.2		
			ES	2 21 6	55.35	65.34	62.04	3.29	0.00					
BCX	234.4	200	EP	0 21 6	24.56	34.55	34.92	-0.37	1.38	386	.28	3.3		
			ES	4 21 6	56.75	66.74	62.16	4.59	0.00					
BRY	288.6	203	EP	4 21 6	38.03	48.02	41.61	6.41	0.00	210	.23	3.3		
			ES	4 21 6	71.04	81.03	74.07	6.96	0.00					
MNT	302.9	296	EP	4 21 6	35.91	45.90	43.38	2.53	0.00					
PQI	311.4	33	EP	0 21 6	34.55	44.54	44.43	0.08	1.05	305	.22	3.5		
			ES	4 21 6	75.76	85.75	79.09	6.61	0.00					
A11	325.5	360	EP	0 21 6	36.69	46.68	46.17	0.51	0.98					
			ES	0 21 6	72.79	82.78	82.18	0.59	0.97					
DPQ	332.5	322	EP	0 21 6	36.97	46.96	47.04	-0.08	0.96					
			S	4 21 6	70.87	80.86	83.74	-2.87	0.00					
A54	349.8	357	P	0 21 6	39.02	49.01	49.17	-0.22	0.88					
			S	0 21 6	77.41	87.40	87.53	-0.23	0.88					
A16	350.7	2	P	0 21 6	39.37	49.36	49.29	0.07	0.88					
			S	0 21 6	76.97	86.96	87.73	-0.77	0.81					
LMQ	359.6	358	P	0 21 6	40.23	50.22	50.39	-0.23	0.84					
			S	0 21 6	80.23	90.22	89.69	0.41	0.83					
A61	375.7	1	P	0 21 6	42.03	52.02	52.36	-0.35	0.76					
			S	0 21 6	83.57	93.56	93.21	0.34	0.77					
A21	378.6	6	P	0 21 6	42.68	52.67	52.72	-0.05	0.76					
			S	0 21 6	83.35	93.34	93.85	-0.50	0.74					
A64	391.0	3	P	0 21 6	43.80	53.79	54.26	-0.49	0.69					
			S	3 21 6	85.30	95.29	96.59	-1.33	0.11					
TRQ	403.9	302	P	0 21 6	44.99	54.98	55.85	-0.87	0.58					
			S	3 21 6	87.65	97.64	99.42	-1.78	0.02					
WBO	411.6	281	P	0 21 6	47.30	57.29	56.80	0.49	0.60					
DAQ	414.0	348	P	0 21 6	47.52	57.51	57.10	0.25	0.60					
GAC	446.0	290	P	0 21 6	51.29	61.28	61.04	0.24	0.46					
			S	4 21 6	95.77	105.76	108.66	-2.89	0.00					
OTT	454.0	285	P	4 21 6	59.09	69.08	62.04	7.04	0.00					
LMN	455.6	68	P	3 21 6	51.80	61.79	62.24	-0.45	0.10					
GRQ	512.4	300	P	3 21 6	60.11	70.10	69.24	0.86	0.04					
GSQ	562.6	25	P	0 21 6	65.92	75.91	75.44	0.46	0.00					

```
 CNQ 577.2  16  P 0 21 6 67.06  77.05  77.24 -0.22 0.00
 ICQ 619.6  21  P 0 21 6 72.10  82.09  82.49 -0.40 0.00
 MNQ 699.0   9  P 0 21 6 81.56  91.55  92.29 -0.74 0.00
 SMQ 707.3  22  P 0 21 6 83.06  93.05  93.31 -0.31 0.00
 EEO 742.2 290  P 0 21 6 87.70  97.69  97.62  0.08 0.00

NORTHWEST MAINE CRUSTAL STRUCTURE
 00JAN17 ME, 3.5 KM NNE OF DIXFIELD

  DATE     ORIGIN    LAT N    LONG W   DEPTH   MN  MC  ML GAP   RMS  ERH  ERZ Q
 000117  816 20.40 44-34.15  70-26.53  16.28  3.4 3.3      90  0.50  1.3  1.8 C

  STN  DIST AZM  RMK HRMN   SEC   TOBS   TCAL   RES   WT AMX PRX XMAG FMP FMAG
  WVL  61.8  94 IPC0  816 30.59  10.19  10.31 -0.13 2.40 846 .13  3.0 223  3.1
               ES 1   816 38.22  17.82  18.35 -0.55 1.74
 LBNH 123.7 253 EPD3  816 39.13  18.73  19.99 -1.32 0.29
               ES 4   816 51.86  31.46  35.58 -4.23 0.00
  DNH 164.8 193 EP 0   816 46.68  26.28  25.68  0.60 1.81              252  3.4
                S 0   816 65.30  44.90  45.71 -0.81 1.76
  HNH 176.1 237 EPD0  816 47.73  27.33  27.07  0.23 1.84 760 .24  3.4 264  3.4
               ES 2   816 67.86  47.46  48.18 -0.78 0.85
  VT1 185.7 262 EP 1   816 49.43  29.03  28.26  0.75 1.24
               ES 1   816 70.90  50.50  50.30  0.16 1.34
  GLO 215.6 186 EP 0   816 53.00  32.60  31.94  0.66 1.56              161  3.0
                S 0   816 77.30  56.90  56.85  0.04 1.65
  WFM 233.5 201 EP 0   816 55.04  34.64  34.16  0.47 1.52              237  3.4
                S 0   816 80.60  60.20  60.80 -0.62 1.51
  WES 252.9 196 EP 1   816 57.44  37.04  36.55  0.47 1.07 664 .37  3.5 227  3.3
               ES 4   816 83.50  63.10  65.06 -1.98 0.00
  BCX 255.1 193 EP 4   816 59.25  38.85  36.82  2.02 0.00 329 .19  3.4 190  3.2
               ES 1   816 86.43  66.03  65.54  0.48 1.07
  MNT 271.4 292  P 1   816 59.61  39.21  38.84  0.37 1.02
  DXB 279.4 184 EP 0   816 60.00  39.60  39.83 -0.23 1.33              184  3.2
                S 0   816 90.74  70.34  70.89 -0.55 1.29
  DPQ 297.1 322  P 1   817  1.64  41.24  42.01 -0.77 0.86
                S 3   817 33.79  73.39  74.77 -1.39 0.15
  A11 297.7   4  P 3   817  3.36  42.96  42.09  0.86 0.28
                S 4   817 32.17  71.77  74.92 -3.17 0.00
  BRY 307.7 197 EPC0  817  4.20  43.80  43.32  0.48 1.17 334 .17  3.6 224  3.4
                S 4   817 44.17  83.77  77.11  6.65 0.00
  A54 321.0   0  P 1   817  5.70  45.30  44.96  0.28 0.84
                S 0   817 40.67  80.27  80.03  0.13 1.13
  LMQ 331.3   2  P 0   817  6.88  46.48  46.23  0.18 1.08
                S 0   817 42.53  82.13  82.28 -0.28 1.08
  A61 348.4   4  P 1   817  8.99  48.59  48.34  0.24 0.74
  A21 353.2   9  P 1   817  9.71  49.31  48.94  0.37 0.72
  A64 364.6   7  P 0   817 10.37  49.97  50.34 -0.40 0.90
                S 4   817 52.28  91.88  89.61  2.23 0.00
  TRQ 370.8 300  P 4   817  8.62  48.22  51.10 -2.89 0.00
                S 0   817 51.17  90.77  90.97 -0.20 0.88
  DAQ 382.4 351  P 1   817 13.76  53.36  52.54  0.66 0.59
                S 3   817 52.58  92.18  93.52 -1.62 0.05
  WBO 385.4 277  P 0   817 12.79  52.39  52.91 -0.52 0.79
                S 4   817 47.65  87.25  94.18 -6.93 0.00
  GAC 416.0 288  P 0   817 16.78  56.38  56.68 -0.31 0.66
                S 3   817 59.32  98.92 100.90 -1.98 0.00
  OTT 425.8 282  P 0   817 18.09  57.69  57.90 -0.21 0.61
  LMN 465.2  72  P 0   817 23.28  62.88  62.77  0.11 0.42
                S 0   817 72.73 112.33 111.72  0.60 0.40
  GRQ 479.6 298  P 0   817 24.67  64.27  64.54 -0.27 0.35
                S 3   817 73.24 112.84 114.87 -2.04 0.00
  GSQ 546.1  28  P 3   817 34.14  73.74  72.75  0.97 0.00
                S 0   817 89.49 129.09 129.50 -0.43 0.02
  CNQ 556.2  19  P 0   817 34.29  73.89  74.00 -0.15 0.00
                S 4   817 89.29 128.89 131.72 -2.89 0.00
  ICQ 601.1  24  P 0   817 39.74  79.34  79.54 -0.21 0.00
                S 4   817 99.33 138.93 141.57 -2.66 0.00
  MNQ 674.7  11  P 0   817 48.95  88.55  88.62 -0.07 0.00
  SMQ 689.0  24  P 0   817 50.47  90.07  90.39 -0.38 0.00
  EEO 711.7 289  P 0   817 52.98  92.58  93.20 -0.62 0.00

SOUTHEAST MAINE CRUSTAL MODEL
 00JAN21 NH, 4.5 KM S OF RAYMOND

  DATE     ORIGIN    LAT N    LONG W   DEPTH   MN  MC  ML GAP   RMS  ERH  ERZ Q
 000121  559 49.69 42-59.45  71-10.64   1.65  2.4 2.5      81  0.50  1.4  4.7 D

  STN  DIST AZM  RMK HRMN   SEC   TOBS   TCAL   RES   WT AMX PRX XMAG FMP FMAG
  DNH  27.3  58 EP 0   559 54.12   4.43   4.60 -0.18 1.46              122  2.5
                S 1   559 57.28   7.59   8.19 -0.61 1.06
  WFM  49.4 211 EP 0   559 57.84   8.15   8.24 -0.10 1.40              109  2.5
                S 0   559 64.32  14.63  14.67 -0.06 1.40
  GLO  53.6 137 EP 0   559 58.84   9.15   8.91  0.24 1.39              128  2.6
                S 0   559 65.42  15.73  15.85 -0.13 1.39
  WES  68.4 190 IPD0  559 61.09  11.40  11.25  0.14 1.35 295 .24  2.5  85  2.3
               ES 1   559 69.08  19.39  20.03 -0.66 0.97
  BCX  72.9 180 EP 4   559 64.18  14.49  11.96  2.52 0.00 129 .16  2.2
               ES 3   559 72.89  23.20  21.29  1.90 0.03
  DXB 110.5 159 EP 1   559 68.86  19.17  17.94  1.22 0.67              106  2.6
                S 1   559 81.14  31.45  31.94 -0.49 0.90
  HNH 119.9 311 EP 0   559 69.52  19.83  19.44  0.36 1.19 113 .15  2.5  80  2.3
               ES 2   559 83.09  33.40  34.60 -1.25 0.40
  BRY 122.8 194 EPD0  559 70.08  20.39  19.89  0.49 1.18 170 .14  2.7
               ES 1   559 84.41  34.72  35.41 -0.70 0.85
 QUA2 124.7 231 EPC0  559 70.40  20.71  20.20  0.48 1.18 126 .19  2.5
               ES 1   559 85.11  35.42  35.95 -0.59 0.86
 LBNH 151.4 336 EP 0   559 74.30  24.61  24.43  0.12 1.11
  VT1 195.8 320 EPC4  559 82.01  32.32  30.31  1.99 0.00
  WVL 209.8  35 EP 1   559 82.60  32.91  32.04  0.86 0.66  40 .22  2.3   0  2.6
  MOQ 271.9 342  P 1   559 90.13  40.44  39.70  0.59 0.56

HUGHES AND LUETGERT NH
 00JAN27 NH, 3.5 KM S OF RAYMOND
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DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
000127	1449 40.50	43- 0.03	71-10.89	1.40	3.0	2.6		101	0.15	0.7	1.1	B

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
WFM	50.2	210	EP	0 1449	48.96	8.46	8.57	-0.12	1.84				121	2.6
			S	4 1449	54.46	13.96	15.25	-1.31	0.00					
GLO	54.6	137	EP	0 1449	49.92	9.42	9.32	0.10	1.84					
			S	4 1449	56.58	16.08	16.59	-0.51	0.00					
NH1	68.6	332	EPC	0 1449	51.98	11.48	11.69	-0.21	1.71	419	.14	2.7		
			S	4 1449	59.52	19.02	20.82	-1.80	0.00					
WES	69.4	190	IPD	0 1449	52.26	11.76	11.82	-0.07	1.78	648	.24	2.9		
			S	4 1449	60.31	19.81	21.04	-1.25	0.00					
BCX	73.9	179	EPC	4 1449	56.75	16.25	12.56	3.69	0.00	689	.28	2.9		
			S	4 1449	65.58	25.08	22.36	2.72	0.00					
DXB	111.6	159	EP	0 1449	59.22	18.72	18.69	0.03	1.63				107	2.6
			S	4 1449	71.76	31.26	33.28	-2.01	0.00					
HNH	118.9	311	EPC	0 1449	60.67	20.17	19.87	0.27	1.46	450	.26	3.0		
			S	4 1449	73.86	33.36	35.37	-2.06	0.00					
BRY	123.8	194	EPC	0 1449	61.13	20.63	20.67	-0.04	1.58	922	.19	3.3		
			S	4 1449	77.71	37.21	36.79	0.42	0.00					
QUA2	125.2	230	IPC	0 1449	61.53	21.03	20.89	0.11	1.56	1166	.33	3.4		
			S	4 1449	76.00	35.50	37.19	-1.74	0.00					
VT1	194.8	319	EPC	4 1449	73.49	32.99	31.21	1.76	0.00					
			S	4 1449	95.86	55.36	55.55	-0.22	0.00					
WVL	209.2	36	EPD	0 1449	73.44	32.94	32.98	-0.05	1.26	214	.22	3.0		
			S	4 1449	97.31	56.81	58.71	-1.91	0.00					
MOQ	270.8	342	P	0 1450	21.14	40.64	40.59	-0.09	1.04					
			S	4 1450	50.97	70.47	72.25	-2.03	0.00					
MNT	339.5	325	P	0 1450	29.95	49.45	49.07	0.38	0.57					
WBO	396.5	304	P	0 1450	36.51	56.01	56.11	-0.09	0.57					
			S	4 1450	78.81	98.31	99.87	-1.56	0.00					
DPQ	428.0	343	P	0 1450	40.44	59.94	60.00	-0.06	0.45					
TRQ	447.2	323	P	0 1450	42.75	62.25	62.36	-0.11	0.38					
A11	477.7	9	P	0 1450	47.04	66.54	66.14	0.39	0.19					
A54	498.9	7	P	0 1450	48.81	68.31	68.76	-0.50	0.06					
			S	4 1450	99.96	119.46	122.38	-3.03	0.00					
LMQ	509.8	8	P	0 1450	50.13	69.63	70.10	-0.54	0.03					
A21	535.6	13	P	0 1450	53.78	73.28	73.28	0.00	0.05					
GRQ	545.6	317	P	0 1450	57.21	76.71	74.51	2.20	0.00					
DAQ	551.7	360	P	0 1450	55.45	74.95	75.27	-0.48	0.00					
LMN	598.6	58	P	0 1450	60.53	80.03	81.07	-1.03	0.00					

SOUTH & COASTAL NEW ENGLAND, CHIBURIS, 1979
00JAN27 NH, 3 KM SSW OF RAYMOND

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
000127	15 7 43.15	43- 1.17	71-15.69	8.18	2.2	2.1		137	0.47	2.2	2.8	C

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
NH1	63.9	337	EP	3 15 7	55.48	12.33	10.69	1.64	0.12	62	.11	1.9		
			S	2 15 7	61.92	18.77	19.03	-0.26	0.94					
WES	70.7	184	EP	2 15 7	54.21	11.06	11.81	-0.76	0.86				70	2.1
			S	4 15 7	61.81	18.66	21.02	-2.38	0.00					
BCX	76.4	174	EP	4 15 7	58.47	15.32	12.75	2.57	0.00	108	.18	2.2		
			S	3 15 7	66.60	23.45	22.69	0.76	0.44					
HNH	112.6	313	EP	2 15 7	62.30	19.15	18.30	0.82	0.79	111	.18	2.4		
			S	2 15 7	75.33	32.18	32.57	-0.44	0.84					
QUA2	121.6	227	EPC	0 15 7	62.98	19.83	19.66	0.14	1.68	64	.17	2.2		
			S	0 15 7	78.51	35.36	35.00	0.31	1.68					
BRY	124.5	191	S	0 15 7	78.60	35.45	35.77	-0.32	1.65	138	.19	2.5		
VT1	189.0	320	EP	4 15 7	48.78	5.63	29.13	-23.52	0.00					
			S	4 15 7	61.46	18.31	51.85	-33.57	0.00					
WVL	211.3	37	EP	4 15 7	71.14	27.99	31.88	-3.90	0.00	12	.14	1.9		
			S	1 15 7	99.77	56.62	56.75	-0.14	1.00					

HUGHES AND LUETGERT NH
00JAN27 NH, 7.5 KM ESE OF RAYMOND

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
000127	1530 6.39	43- 1.28	71-16.04	6.19	2.2	2.4		137	0.48	2.3	4.2	C

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
WFM	49.2	202	EP	1 1530	14.60	8.21	8.31	-0.11	1.46					
			S	3 1530	20.75	14.36	14.80	-0.45	0.48					
NH1	63.5	337	EPC	4 1530	8.56	2.17	10.65	-8.48	0.00					
			S	0 1530	25.08	18.69	18.96	-0.27	1.89					
WES	70.9	184	EP	1 1530	18.00	11.61	11.84	-0.24	1.39	95	.18	2.1	96	2.4
			S	4 1530	26.03	19.64	21.08	-1.46	0.00					
BCX	76.7	174	EP	4 1530	22.56	16.17	12.78	3.39	0.00	68	.11	2.0		
			S	3 1530	31.50	25.11	22.76	2.35	0.07					
HNH	112.2	313	EP	4 1530	26.72	20.33	18.55	1.75	0.00	40	.12	2.0	89	2.4
			S	1 1530	39.63	33.24	33.02	0.16	1.27					
QUA2	121.3	227	EPC	1 1530	27.20	20.81	19.97	0.81	1.21	123	.33	2.4		
			S	1 1530	41.61	35.22	35.54	-0.38	1.25					
BRY	124.6	190	EP	0 1530	27.31	20.92	20.48	0.44	1.63	111	.18	2.4	94	2.5
			S	3 1530	41.55	35.16	36.45	-1.29	0.36					
WVL	211.4	38	EP	1 1530	39.24	32.85	32.70	0.13	0.98					
			S	3 1530	61.98	55.59	58.21	-2.64	0.01					

HUGHES AND LUETGERT NH
00JAN27 NH, 5 KM WSW OF RAYMOND

DATE	ORIGIN	LAT N	LONG W	DEPTH	MN	MC	ML	GAP	RMS	ERH	ERZ	Q
000127	1643 47.22	43- 1.16	71-14.15	7.70	1.8	2.0		211	0.41	3.2	4.1	C

STN	DIST	AZM	RMK	HRMN	SEC	TOBS	TCAL	RES	WT	AMX	PRX	XMAG	FMP	FMAG
WFM	50.0	205	EP	0 1643	56.03	8.81	8.45	0.35	1.43					
			S	0 1643	62.23	15.01	15.05	-0.06	1.45					
NH1	64.8	335	EP	4 1643	52.54	5.32	10.86	-5.54	0.00	28	.12	1.5		
			S	0 1643	66.16	18.94	19.34	-0.40	1.39					
WES	70.9	186	EP	0 1643	58.97	11.75	11.85	-0.11	1.39	34	.16	1.6	64	2.1
			S	3 1643	67.08	19.86	21.10	-1.25	0.15					
BCX	76.2	176	EP	4 1643	57.00	9.78	12.72	-2.94	0.00	22	.12	1.5		
			S	4 1643	72.79	25.57	22.65	2.92	0.00					

```
 HNH 114.2 312 EP 3 1643 67.52  20.30  18.79  1.48 0.06  24 .13  1.8  50  2.0
               S 0 1643 80.63  33.41  33.45 -0.10 1.26
QUA2 123.2 228 EPC1 1643 68.22  21.00  20.18  0.79 0.83  74 .26  2.2
               S 0 1643 83.08  35.86  35.92 -0.12 1.24
 BRY 124.9 192 EP 1 1643 68.21  20.99  20.45  0.54 0.90  49 .20  2.1
               S 1 1643 83.07  35.85  36.39 -0.54 0.90
```

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TABLE 5

MICROEARTHQUAKES AND OTHER NON-LOCATABLE EVENTS

Date Yr/Mo/Dy	Sta	Arrival Time Hr:Mn:Sec
None recorded this period.		

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NESN Station Map

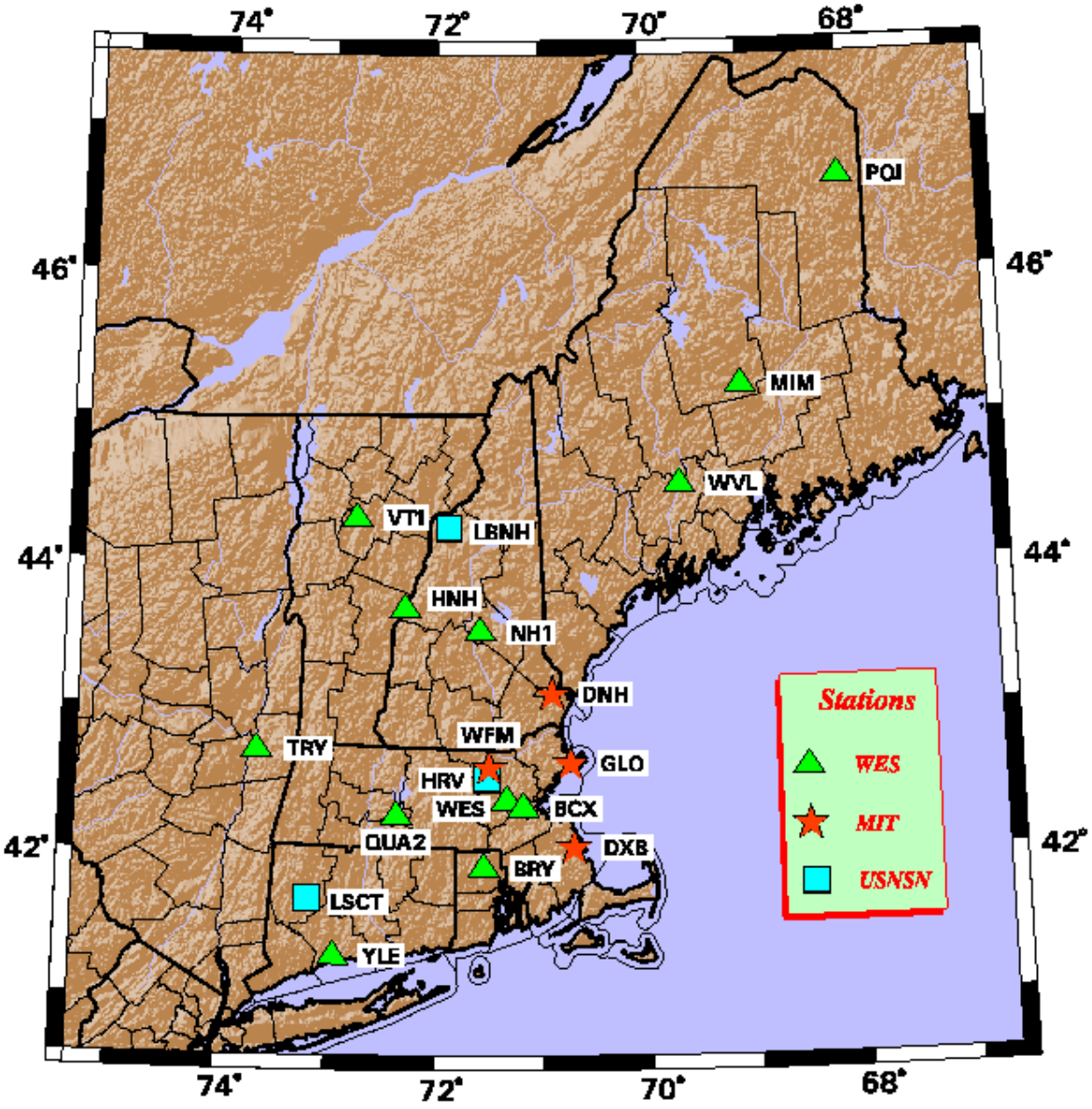

Figure 1: Map of stations of the New England Seismic Network (NESN) in operation during period January - March, 2000. Also included are the US National Seismic Network stations operating in New England during this period.

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NESN Strong-Motion Station Map

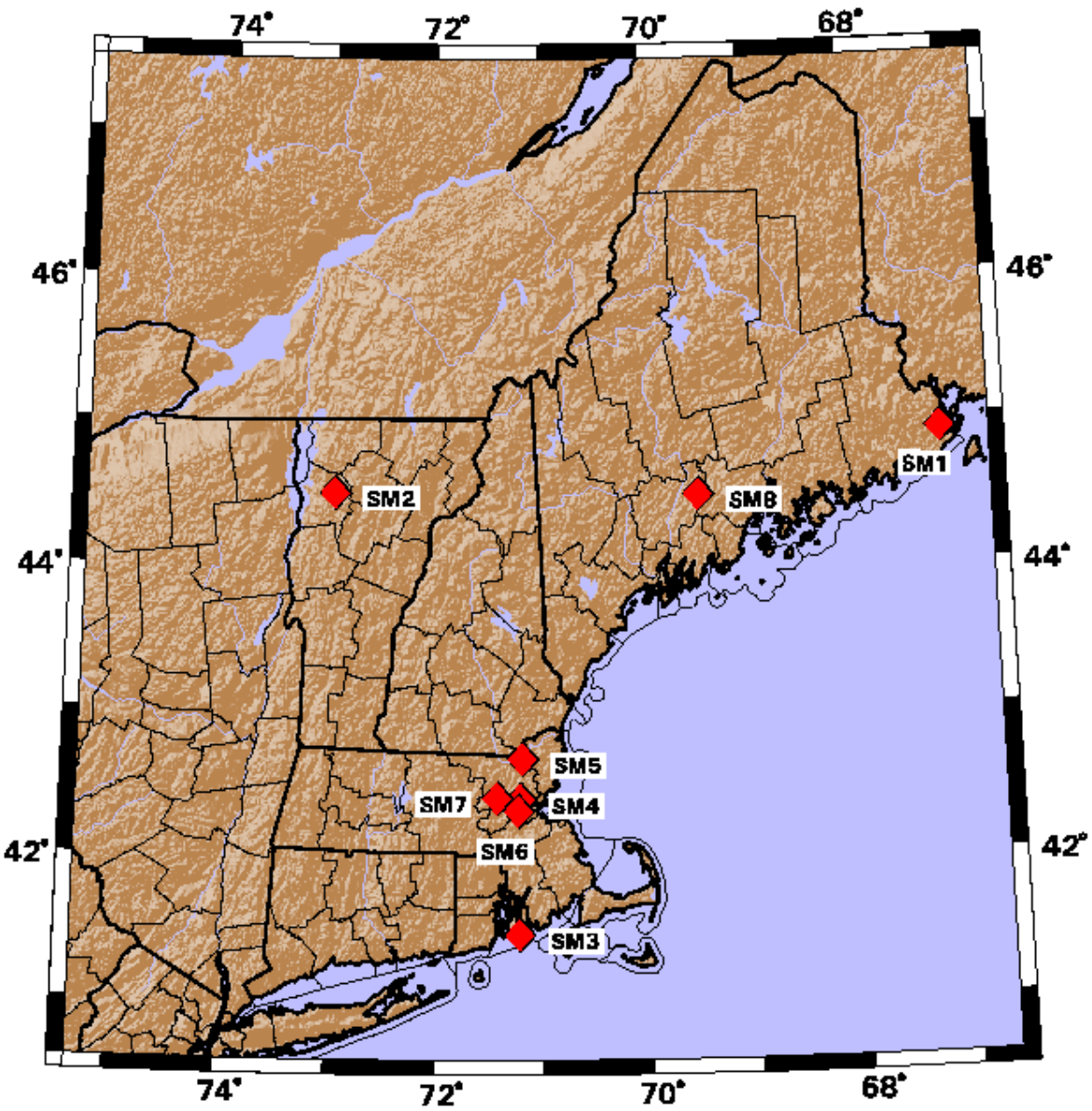

Figure 2: Map of strong-motion stations of the New England Seismic Network (NESN) in operation during period January - March, 2000.

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NESN Quarterly Seismicity Map

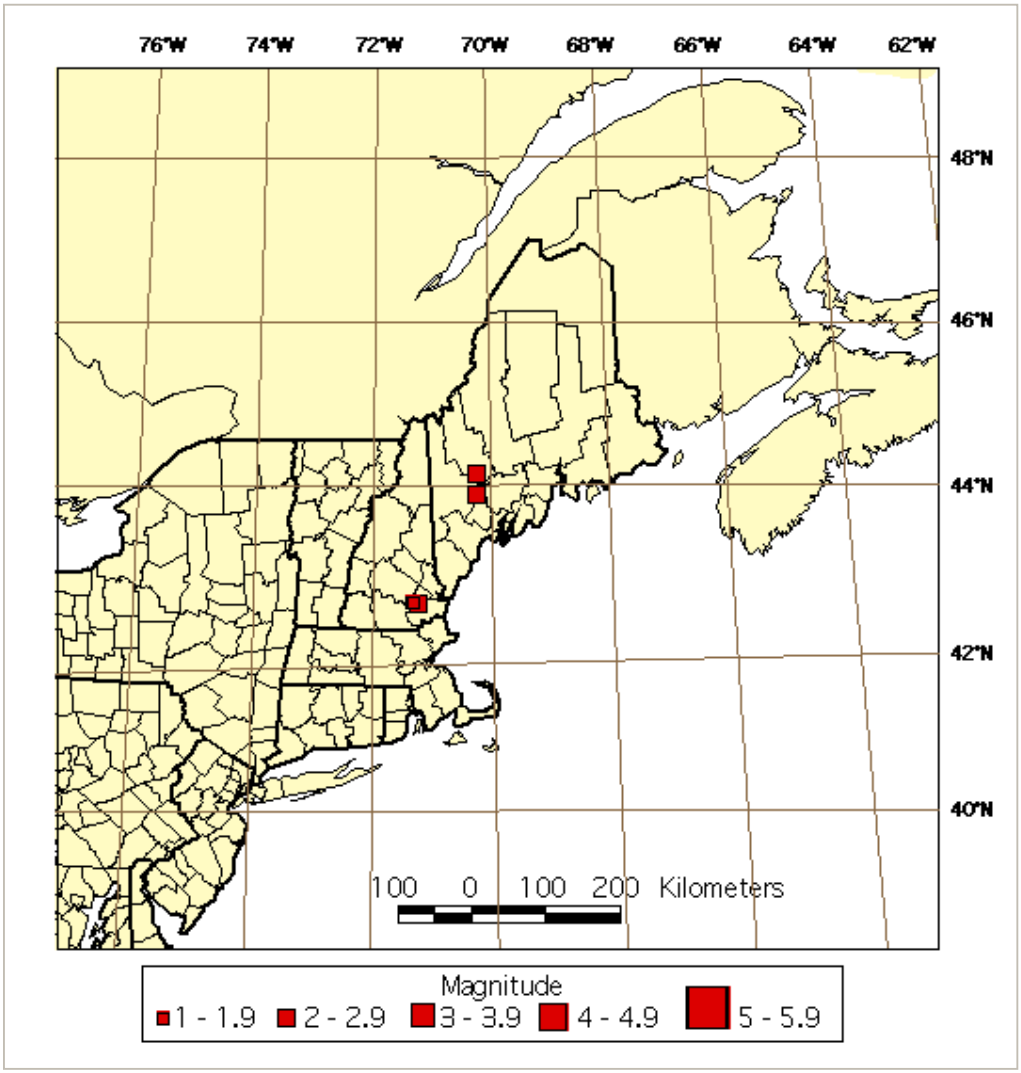

Figure 3: Earthquake epicenters located by the NESN during period January - March, 2000.

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NESN Cumulative Seismicity Map

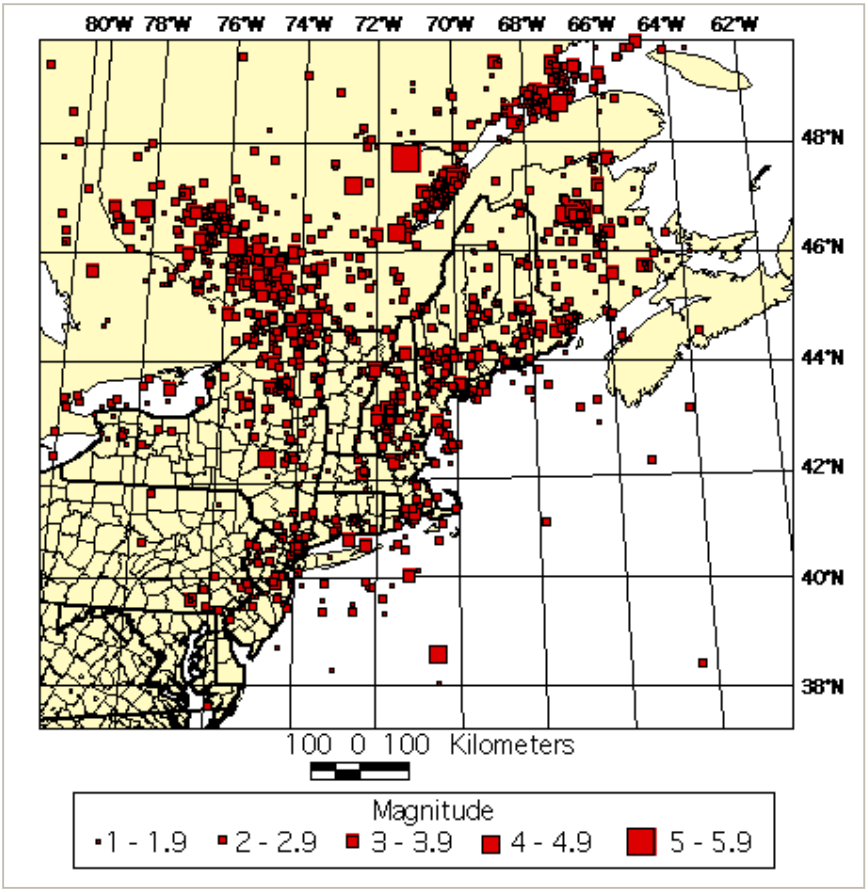

Figure 4: Seismicity for period October, 1975 - March, 2000.

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Acknowledgments

We would like to thank the Undergraduate Research Opportunities Program (UROP) of MIT for its support to the network. Our map database has been developed in-house using ARCINFO and in part basemap data provided by ESRI, Inc. (Arcdata Online), USGS GTOPO30 Elevation Data, and TIGER/Line '94, '95, and '97 (US Census Bureau) spatial data.

References

Chaplin, M.P., Taylor, S.R., and Toksöz, M.N. (1980), A coda length magnitude scale for New England, *Earthquake Notes, 51,* 15-22.

Ebel, J.E. (1982), M_L measurements for northeastern United States earthquakes, *Bull. Seism. Soc. Am., 72,* 1367-1378.

Rosario, M. (1979), A coda duration magnitude scale for the New England Seismic Network, *Master's Thesis,* Boston College, 82 pp.

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