NESN

A STUDY OF NEW ENGLAND SEISMICITY

Quarterly Earthquake Report

January - March 1999

New England
Seismic Network

Weston Observatory

381 Concord Road

Weston, MA 02493

Earth Resources Lab

Massachusetts Institute of Technology

42 Carleton Street

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NEW ENGLAND SEISMIC NETWORK

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Notice

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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 1999. 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 11 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 11 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 4 more broadband instruments scheduled for installation in 1999. 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. Personnel at ERL are in the process of installing a new three-component, high dynamic range instrument at Station WFM. 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. 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 earthquake activity to 1991. This will be updated as new Northeastern U.S. Seismic Network Bulletins are produced.

The entire MIT/ERL earthquake database can be accessed through the World Wide Web using the address "http://www-erl.mit.edu/NESN/homepage.html". For extraction of waveforms (recorded by the MIT stations of the NESN through March 1995) and hypocenter data, use our database search engine. Link to "Seismic Event Server at MIT ERL (SESAME)" and then click on "Interactive query form" under the heading "Custom Materials". Alternatively, the more recent local earthquake data, recorded by the MIT stations, may be accessed by logging in to our anonymous FTP directory ("ftp sunda.mit.edu"). To be added to the list of users permitted to access this FTP directory, contact Charles Doll. The waveform files are in SAC format at both sites. Waveforms are downloaded as a Unix-compressed tar volume from our web-site and as individual, Unix-compressed, station files from our FTP site.

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 www.bc.edu:80/bc_org/avp/cas/wesobs/ 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@bc.edu
Susan O'Connor	Seismic Analyst	617-552-8337	dannolfo@bc.edu
Edward Johnson	Project Engineer	617-552-8332	johnson@bc.edu
Patricia Tassia	Administrative Secretary	617-552-8311	tassia@bc.edu
W. Richard Ott, S.J.	Assistant to the Director	617-552-8335	ottwi@mail1.bc.edu
		617-552-8300	
Weston Observatory		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
Charles Doll	Research Seismologist	617-253-7863	doll@erl.mit.edu
Charles Doll	Seismic Analyst	617-253-6290	doll@erl.mit.edu
Sara Brydges	Administrator	617-253-7797	sara@erl.mit.edu
		617-253-8027	
Earth Resources Lab		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

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 1999

Date	Time	Lat	Long	Depth	Mag	Int	Location
Yr/Mo/Dy	Hr:Mn:Sec			(km)			
1999/01/10	10:52:16.13	42.8416	-70.9788	2.0	3.0		MA, ~1 Mile S of Amesbury
1999/01/10	15:20:44.32	42.8438	-70.9733	2.12	2.9		MA, ~1 Mile S of Amesbury
1999/01/10	15:22:16.86	42.8450	-70.9782	.94	1.9		MA, S of Amesbury
1999/01/14	06:11:24.62	42.8425	-70.9772	4.2	2.3		MA, NE of Merrimac
1999/02/26	03:38:42.91	44.4885	-69.5390	1.03	3.6		ME, 11 km SE of Waterville
1999/03/09	12:07:09.18	44.6716	-73.6050	5.0	2.6		NY, 7 Miles W of Plattsburgh
1999/03/12	09:58:09.42	42.0688	-72.1696	5.05	1.9		MA, 2 km WNW of Holland
1999/03/16	12:50:56.23	49.0400	-66.9445	5.0	4.5		PQ, Lower St. Lawrence

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TABLE 4

EARTHQUAKE PHASE DATA LIST
NEW ENGLAND AND ADJACENT REGIONS
January - March 1999

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SOUTH & COASTAL NEW ENGLAND, CHIBURIS, 1979
99JAN10 MA,APPROX 1 MILE S OF AMESBURY

 DATE     ORIGIN    LAT N    LONG W   DEPTH   MN  MC  ML GAP   RMS  ERH  ERZ Q
990110 1052 16.13 42-50.50  70-58.73   2.00  3.0 3.0     108  0.45  1.0  2.0 C

 STN  DIST AZM  RMK HRMN   SEC    TOBS    TCAL    RES    WT AMX PRX XMAG FMP FMAG
 GLO  30.4 137 IPU0 1052 21.52    5.39    5.11   0.28 1.51
               S 0 1052 25.28    9.15    9.09   0.06 1.51
 DNH  31.9  12 EPD0 1052 21.34    5.21    5.35 -0.15 1.50
               S 0 1052 25.16    9.03    9.53 -0.51 1.46
 WFM  49.2 239 EPD0 1052 24.74    8.61    8.20   0.39 1.44
               S 0 1052 30.86   14.73   14.60   0.11 1.45
 WES  58.1 209 IP 0 1052 26.18   10.05    9.66   0.37 1.41 284 .08  2.5 201  3.0
               ES 0 1052 33.12   16.99   17.20 -0.23 1.43
 BCX  58.5 196 IP 1 1052 25.22    9.09    9.73 -0.64 1.01               187  3.0
               ES 0 1052 33.06   16.93   17.31 -0.38 1.41
 DXB  89.7 165 EPU0 1052 31.30   15.17   14.88   0.28 1.34
               S 1 1052 41.94   25.81   26.49 -0.69 0.93
 NH1  92.1 328 EP 0 1052 31.71   15.58   15.28   0.29 1.32 318 .14  2.8 180  3.0
               ES 1 1052 42.52   26.39   27.20 -0.82 0.87
 BRY 112.5 204 EP 0 1052 35.29   19.16   18.64   0.51 1.23 256 .08  2.9 165  2.9
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                ES 0 1052 48.85  32.72  33.19 -0.47 1.23
 HNH 143.0 312  EP 1 1052 40.30  24.17  23.31  0.83 0.79 560 .22  3.2 172  3.0
                ES 2 1052 56.90  40.77  41.49 -0.77 0.53
 WVL 215.4  29  EP 0 1052 49.69  33.56  33.06  0.49 0.95
                ES 0 1052 74.73  58.60  58.85 -0.27 0.96
 VT1 219.0 319  ES 3 1052 77.91  61.78  59.64  2.10 0.00
 YLE 234.3 223  EP 1 1052 52.31  36.18  35.40  0.77 0.63 597 .42  3.4
                ES 4 1052 82.36  66.23  63.02  3.21 0.00
 MOQ 292.9 340   P 0 1052 59.44  43.31  42.63  0.54 0.72
 DPQ 449.7 342   P 1 1052 77.60  61.47  61.99 -0.52 0.21
 A11 492.9   7   P 3 1052 85.03  68.90  67.33  1.56 0.01
 A54 514.8   5   P 0 1052 86.80  70.67  70.03  0.57 0.10
 LMQ 525.6   6   P 1 1052 86.98  70.85  71.36 -0.58 0.05
 A21 549.7  11   P 1 1053 31.22  75.09  74.34  0.75 0.00
                 S 0 1053 87.57 131.44 132.32 -0.88 0.00
 LMN 595.4  56   P 0 1053 35.85  79.72  79.98 -0.27 0.00
 GSQ 738.7  24   P 3 1053 55.27  99.14  97.67  1.46 0.00
 ICQ 795.7  21   P 0 1053 60.62 104.49 104.71 -0.23 0.00
 MNQ 871.3  11   P 0 1053 69.80 113.67 114.03 -0.37 0.00
 SMQ 883.8  22   P 0 1053 71.40 115.27 115.58 -0.37 0.00

SOUTH & COASTAL NEW ENGLAND, CHIBURIS, 1979
99JAN10 MA,APPROX 1 MILE S OF AMESBURY

 DATE     ORIGIN    LAT N    LONG W   DEPTH   MN  MC  ML GAP   RMS  ERH  ERZ Q
990110 1520 44.32 42-50.63  70-58.40   2.12  2.9 2.6     127  0.43  1.1  3.0 C

 STN  DIST AZM  RMK HRMN   SEC   TOBS   TCAL   RES   WT AMX PRX XMAG FMP FMAG
 GLO  30.3 138 IPU0 1520 49.76   5.44   5.09  0.36 1.47
                 S 0 1520 53.45   9.13   9.05  0.08 1.49
 DNH  31.6  12 EPD0 1520 49.64   5.32   5.30  0.02 1.48
                 S 0 1520 53.34   9.02   9.44 -0.41 1.45
 WFM  49.7 239 EPD0 1520 52.98   8.66   8.29  0.37 1.42               127  2.6
                 S 0 1520 59.04  14.72  14.75 -0.05 1.43
 WES  58.5 209 IP 0 1520 54.47  10.15   9.74  0.40 1.38 341 .12  2.6
                 S 0 1520 61.39  17.07  17.34 -0.29 1.39
 BCX  58.8 196 IP 0 1520 53.43   9.11   9.79 -0.68 1.30 478 .13  2.7
                 S 3 1520 60.43  16.11  17.43 -1.32 0.10
 DXB  89.8 165 EP 0 1520 59.50  15.18  14.90  0.28 1.30
                 S 0 1520 70.22  25.90  26.53 -0.62 1.25
 NH1  92.2 328 EP 0 1520 59.93  15.61  15.29  0.32 1.30 450 .12  2.9
                 S 2 1520 70.88  26.56  27.21 -0.65 0.61
 BRY 112.9 204 EP 0 1520 63.57  19.25  18.71  0.54 1.20 366 .12  3.0
                 S 0 1520 77.48  33.16  33.30 -0.14 1.25
 HNH 143.2 312 EP 1 1520 68.56  24.24  23.33  0.89 0.67 433 .15  3.1
                 S 0 1520 85.19  40.87  41.52 -0.70 1.07
 YLE 234.8 223 EP 4 1520 82.88  38.56  35.45  3.11 0.00 252 .30  3.1
 MOQ 292.8 339   P 0 1521 27.26  42.94  42.61  0.19 0.74
 WBO 420.6 305   P 0 1521 43.23  58.91  58.38  0.53 0.35
 DPQ 449.6 341   P 0 1521 46.56  62.24  61.97  0.28 0.28
 LMQ 525.3   6   P 0 1521 55.65  71.33  71.31 -0.05 0.07
 A61 543.4   7   P 2 1521 58.87  74.55  73.55  1.00 0.01
 A21 549.4  11   P 1 1521 59.51  75.19  74.28  0.91 0.00
 GRQ 570.0 317   P 4 1521  4.10  19.78  76.83-57.05 0.00
 LMN 594.9  56   P 0 1521 63.75  79.43  79.91 -0.48 0.00
 ICQ 795.3  21   P 0 1521 88.62 104.30 104.65 -0.36 0.00
 MNQ 870.9  11   P 4 1521 96.11 111.79 113.98 -2.19 0.00

SOUTH & COASTAL NEW ENGLAND, CHIBURIS, 1979
99JAN10 MA, S OF AMESBURY

 DATE     ORIGIN    LAT N    LONG W   DEPTH   MN  MC  ML GAP   RMS  ERH  ERZ Q
990110 1522 16.86 42-50.70  70-58.69   0.94  1.9         125  0.39  1.1  4.2 C

 STN  DIST AZM  RMK HRMN   SEC   TOBS   TCAL   RES   WT AMX PRX XMAG FMP FMAG
 GLO  30.7 138  EP 1 1522 22.28   5.42   5.14  0.28 1.27
                 S 0 1522 25.96   9.10   9.15 -0.05 1.69
 DNH  31.6  12  EP 0 1522 22.28   5.42   5.29  0.13 1.69
                 S 1 1522 25.82   8.96   9.41 -0.45 1.23
 WFM  49.4 238  EP 1 1522 25.56   8.70   8.23  0.46 1.21
                 S 1 1522 31.40  14.54  14.65 -0.13 1.22
 WES  58.4 209  EP 3 1522 27.73  10.87   9.72  1.14 0.29  65 .15  1.8
                 S 0 1522 33.97  17.11  17.30 -0.21 1.60
 BCX  58.8 196  EP 0 1522 26.88  10.02   9.79  0.23 1.60  49 .13  1.7
                 S 3 1522 33.06  16.20  17.42 -1.22 0.22
 DXB  90.1 165  EP 3 1522 33.76  16.90  14.94  1.96 0.01
                 S 2 1522 42.72  25.86  26.59 -0.74 0.69
 NH1  91.8 328  EP 4 1522 34.65  17.79  15.23  2.55 0.00  36 .07  1.9
                 S 3 1522 43.22  26.36  27.12 -0.76 0.34
 BRY 112.9 204  EP 3 1522 36.83  19.97  18.70  1.27 0.20  49 .16  2.0
                 S 0 1522 50.11  33.25  33.29 -0.04 1.42
 HNH 142.8 312   S 0 1522 58.57  41.71  41.55  0.10 1.33  27 .19  1.9

SOUTH & COASTAL NEW ENGLAND, CHIBURIS, 1979
99JAN14 MA, NE OF MERRIMAC

 DATE     ORIGIN    LAT N    LONG W   DEPTH   MN  MC  ML GAP   RMS  ERH  ERZ Q
990114  611 24.62 42-50.55  70-58.63   4.20  2.3 2.3     125  0.42  1.2  2.4 C

 STN  DIST AZM  RMK HRMN   SEC   TOBS   TCAL   RES   WT AMX PRX XMAG FMP FMAG
 GLO  30.4 138 IPU0  611 30.00   5.38   5.13  0.25 1.36               110  2.4
                 S 0  611 33.66   9.04   9.13 -0.09 1.36
 DNH  31.8  12 EPU0  611 29.98   5.36   5.36  0.00 1.36               102  2.3
                 S 0  611 33.70   9.08   9.55 -0.46 1.31
 WFM  49.3 239 IPD1  611 33.28   8.66   8.24  0.41 0.96                94  2.3
                 S 0  611 39.42  14.80  14.67  0.12 1.31
 WES  58.2 209  EP 1  611 34.71  10.09   9.70  0.38 0.96 139 .10  2.2
                 S 0  611 41.52  16.90  17.27 -0.38 1.27
 BCX  58.6 196  EP 3  611 33.19   8.57   9.76 -1.19 0.16  92 .09  2.0
                 S 4  611 40.09  15.47  17.37 -1.90 0.00
 DXB  89.8 165  EP 0  611 39.76  15.14  14.91  0.24 1.21                79  2.3
                 S 2  611 50.28  25.66  26.53 -0.87 0.51
 NH1  92.1 328  EP 1  611 40.35  15.73  15.30  0.43 0.88 119 .15  2.3
                 S 2  611 50.83  26.21  27.23 -1.02 0.44
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 BRY 112.6 204 EP 1  611 43.86  19.24  18.56  0.69 0.80 102 .13  2.4
               S 0  611 57.23  32.61  33.03 -0.42 1.12
QUA2 129.1 241 EP 0  611 46.18  21.56  21.05  0.48 1.07  62 .08  2.4
               S 0  611 62.11  37.49  37.47 -0.04 1.10
 HNH 143.0 312 EP 0  611 48.05  23.43  23.17  0.23 1.07  96 .21  2.4
               S 1  611 65.35  40.73  41.25 -0.57 0.77
 WVL 215.2  29  S 3  611 84.92  60.30  58.39  1.90 0.00

SOUTHEAST MAINE CRUSTAL MODEL
99FEB26 ME, 11 KM SE OF WATERVILLE

 DATE     ORIGIN    LAT N    LONG W   DEPTH    MN  MC  ML GAP   RMS  ERH  ERZ Q
990226  338 42.91 44-29.31  69-32.34   1.03  3.6 3.3     265  0.33 10.7  9.5 D

 STN  DIST AZM  RMK HRMN   SEC   TOBS   TCAL   RES   WT AMX PRX XMAG FMP FMAG
 WVL  11.1 294 IPD0  338 44.87   1.96   1.91  0.04 1.67
               IS 0  338 46.09   3.18   3.41 -0.24 1.65
 MIM  92.7  25 IPC4  338 47.23   4.32  15.15-10.85 0.00
               ES 4  338 60.03  17.12  26.96 -9.88 0.00
 DNH 186.9 216 EP 0  339 12.06  29.15  29.28 -0.13 1.12
               S 4  339 33.67  50.76  52.11 -1.36 0.00
 NH1 193.9 237 IPC0  339 13.64  30.73  30.14  0.59 0.96 956 .15  3.7
               ES 4  339 37.47  54.56  53.64  0.92 0.00
 GLO 226.7 205 EP 0  339 16.90  33.99  34.18 -0.19 0.99
               S 4  339 42.64  59.73  60.85 -1.12 0.00
 HNH 236.5 248 EPD0  339 18.94  36.03  35.40  0.60 0.85 822 .30  3.6
               IS 4  339 49.82  66.91  63.01  3.84 0.00
 VT1 256.7 266 EP 4  339 24.28  41.37  37.89  3.46 0.00
               ES 4  339 53.80  70.89  67.45  3.41 0.00
 WFM 261.6 217 EP 0  339 21.68  38.77  38.50  0.26 0.88              216  3.3
               S 4  339 50.02  67.11  68.53 -1.44 0.00
 BCX 273.3 209 EP 4  339 16.66  33.75  39.94 -6.19 0.00 517 .30  3.5
               S 4  339 52.97  70.06  71.10 -1.04 0.00
 WES 274.7 212 IPD0  339 23.18  40.27  40.12  0.14 0.85 377 .22  3.5
               ES 4  339 52.78  69.87  71.41 -1.56 0.00
 DXB 285.6 199 EP 0  339 24.00  41.09  41.46 -0.38 0.79
               S 4  339 53.90  70.99  73.81 -2.82 0.00
 BRY 328.6 210 EP 0  339 29.55  46.64  46.77 -0.13 0.69 321 .17  3.7
               S 4  339 75.77  92.86  83.25  9.61 0.00
QUA2 335.0 223 EPD0  339 29.84  46.93  47.56 -0.66 0.54
               S 4  339 74.84  91.93  84.65  7.23 0.00

SOUTH & COASTAL NEW ENGLAND, CHIBURIS, 1979
99MAR09 NY, 7 MILES WEST OF PLATTSBURGH

 DATE     ORIGIN    LAT N    LONG W   DEPTH    MN  MC  ML GAP   RMS  ERH  ERZ Q
990309 12 7  9.18 44-40.30  73-36.30   5.00  2.6 2.7     334  0.33  7.3 12.0 D

 STN  DIST AZM  RMK HRMN   SEC   TOBS   TCAL   RES   WT AMX PRX XMAG FMP FMAG
LBNH 141.9 110  P 0 12 7 32.50  23.32  22.94  0.31 1.29
               S 0 12 7 50.00  40.82  40.84 -0.13 1.29
 HNH 150.5 136 IPD0 12 7 33.38  24.20  24.25 -0.09 1.27  63 .15  2.3 118  2.7
               S 0 12 7 52.38  43.20  43.17 -0.03 1.27
 NH1 205.1 128 IPU1 12 7 40.34  31.16  31.46 -0.30 0.81 124 .15  2.9
               S 2 12 7 67.76  58.58  56.00  2.58 0.06

SOUTH & COASTAL NEW ENGLAND, CHIBURIS, 1979
99MAR12 MA, 2 KM WNW OF HOLLAND

 DATE     ORIGIN    LAT N    LONG W   DEPTH    MN  MC  ML GAP   RMS  ERH  ERZ Q
990312  958  9.42 42- 4.13  72-10.18   5.05  1.9 2.2     219  0.27  1.2  1.2 B

 STN  DIST AZM  RMK HRMN   SEC   TOBS   TCAL   RES   WT AMX PRX XMAG FMP FMAG
QUA2  27.8 327 EPC0  958 13.98   4.56   4.72 -0.19 1.24 101 .17  1.7
               S 0  958 17.77   8.35   8.40 -0.10 1.25
 BRY  54.9 108 EPD0  958 18.74   9.32   9.17  0.16 1.17  45 .18  1.6
               S 0  958 25.27  15.85  16.31 -0.46 1.08
 WES  78.3  63 EPD0  958 22.62  13.20  13.02  0.17 1.12  88 .21  2.1
               S 0  958 32.45  23.03  23.18 -0.16 1.13
 WFM  82.2  43 EP 0  958 23.44  14.02  13.67  0.35 1.07               77  2.2
               S 0  958 33.46  24.04  24.32 -0.30 1.10
 BCX  87.7  70 EPD0  958 24.22  14.80  14.57  0.24 1.09  54 .13  2.0
               S 0  958 35.68  26.26  25.93  0.34 1.06
 DXB 121.6  90 EP 0  958 29.14  19.72  19.87 -0.15 1.02               51  2.0
               S 0  958 44.90  35.48  35.37  0.11 1.02
 GLO 134.7  62 EP 0  958 30.72  21.30  21.85 -0.54 0.87               69  2.3
               S 0  958 48.38  38.96  38.89  0.08 0.99
 DNH 157.0  42 EP 0  958 35.10  25.68  25.24  0.45 0.86               85  2.5
               S 3  958 53.28  43.86  44.92 -1.06 0.01
 NH1 171.3  17  S 0  958 58.04  48.62  48.58  0.05 0.91  22 .18  2.0
 WVL 340.6  37 ES 4  959 52.47 103.05  85.78 17.26 0.00

NORTHWEST MAINE CRUSTAL STRUCTURE
99MAR16 PQ, LOWER ST. LAWRENCE

 DATE     ORIGIN    LAT N    LONG W   DEPTH    MN  MC  ML GAP   RMS  ERH  ERZ Q
990316 1250 56.23 49- 2.40  66-56.67   5.00      4.5     324  0.31 81.0 **** D

 STN  DIST AZM  RMK HRMN   SEC   TOBS   TCAL   RES   WT AMX PRX XMAG FMP FMAG
 A21 251.8 234  P 3 1251 34.28  38.05  37.55  0.51 1.02
 A64 256.5 238  P 3 1251 34.36  38.14  38.13 -0.01 1.11
 A61 276.9 237  P 2 1251 36.66  40.43  40.65 -0.23 2.15
 LMN 389.4 156  P 4 1251 46.23  50.00  54.54 -4.54 0.00
 WVL 542.7 203 EPD1 1252 10.01  73.78  73.47  0.31 2.00              935  4.7
               S 4 1252 70.02 133.79 130.77  3.01 0.00
 VT1 686.6 220 EP 4 1252 29.54  93.31  91.22  2.07 0.00
 NH1 707.1 210 EPD3 1252 30.43  94.20  93.76  0.45 0.41
 HNH 721.3 215 EPD3 1252 32.14  95.91  95.51  0.37 0.40              912  4.7
 DNH 725.2 205 EP 0 1252 32.20  95.97  95.99 -0.02 1.63              549  4.2
 GLO 769.7 202 EP 2 1252 37.46 101.23 101.49 -0.25 0.68              529  4.2
 WFM 797.3 206 EP 0 1252 40.82 104.59 104.89 -0.30 1.19              656  4.4
 WES 814.5 205 EPD0 1252 42.99 106.76 107.02 -0.27 1.09              840  4.6
 BCX 814.7 204 EPD1 1252 43.09 106.86 107.04 -0.18 0.82              904  4.7
QUA2 861.5 209 EPD1 1252 47.98 111.75 112.82 -1.09 0.15
```

```
BRY 869.1 204 EPD2 1252 50.58 114.35 113.76  0.59 0.34              897  4.7
YLE 979.2 209 EPD4 1252 57.21 120.98 127.36 -6.37 0.00              891  4.7
```

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TABLE 5

MICROEARTHQUAKES AND OTHER NON-LOCATABLE EVENTS

Date	Arrival Time	Sta
Yr/Mo/Dy	Hr:Mn:Sec	

None recorded this quarter

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NESN Station Map

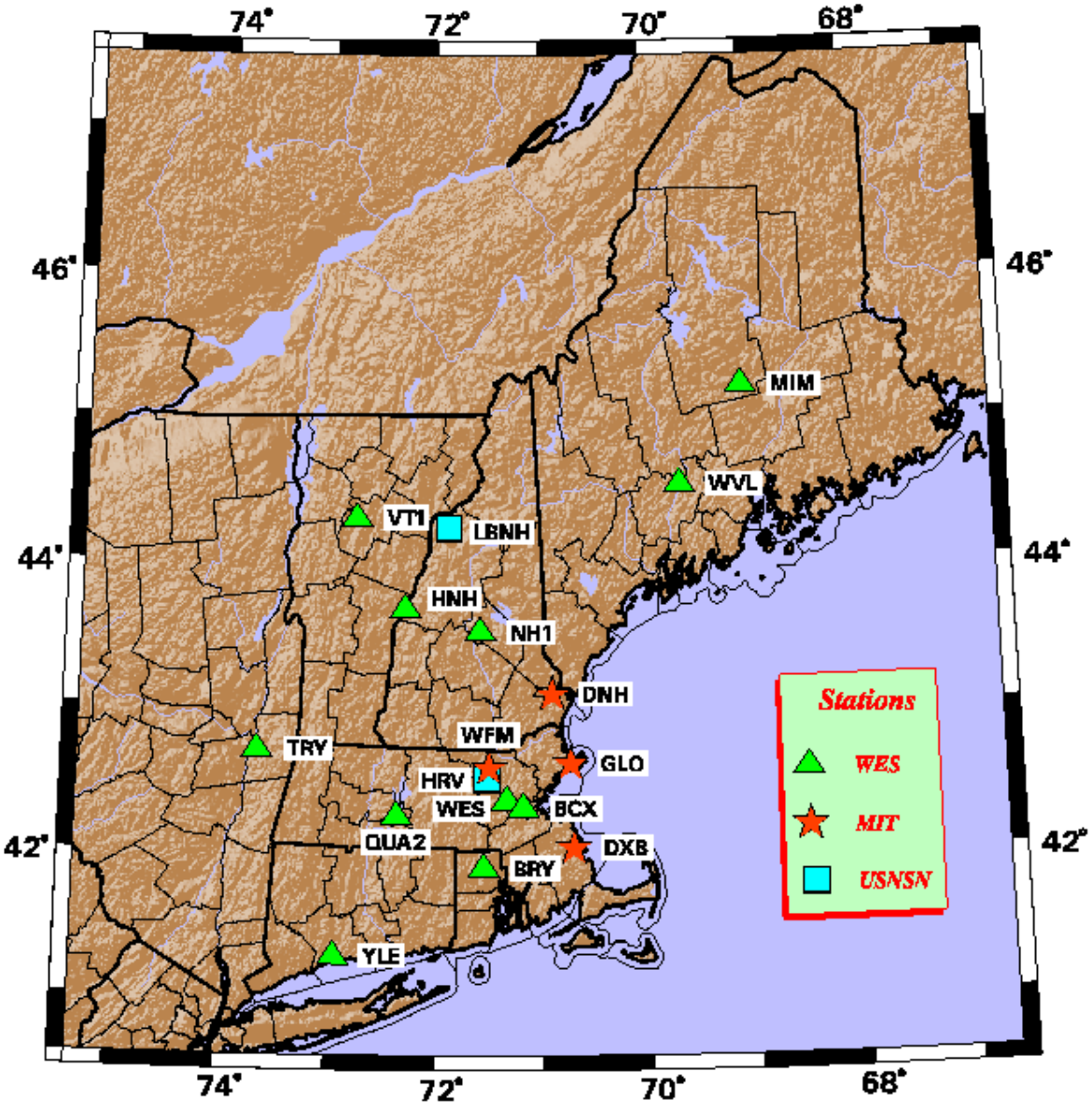

Figure 1: Map of stations of the New England Seismic Network (NESN) in operation during period January - March, 1999. Also included are the US National Seismic Network stations operating in New England during this period.

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NESN Strong-Motion Station Map

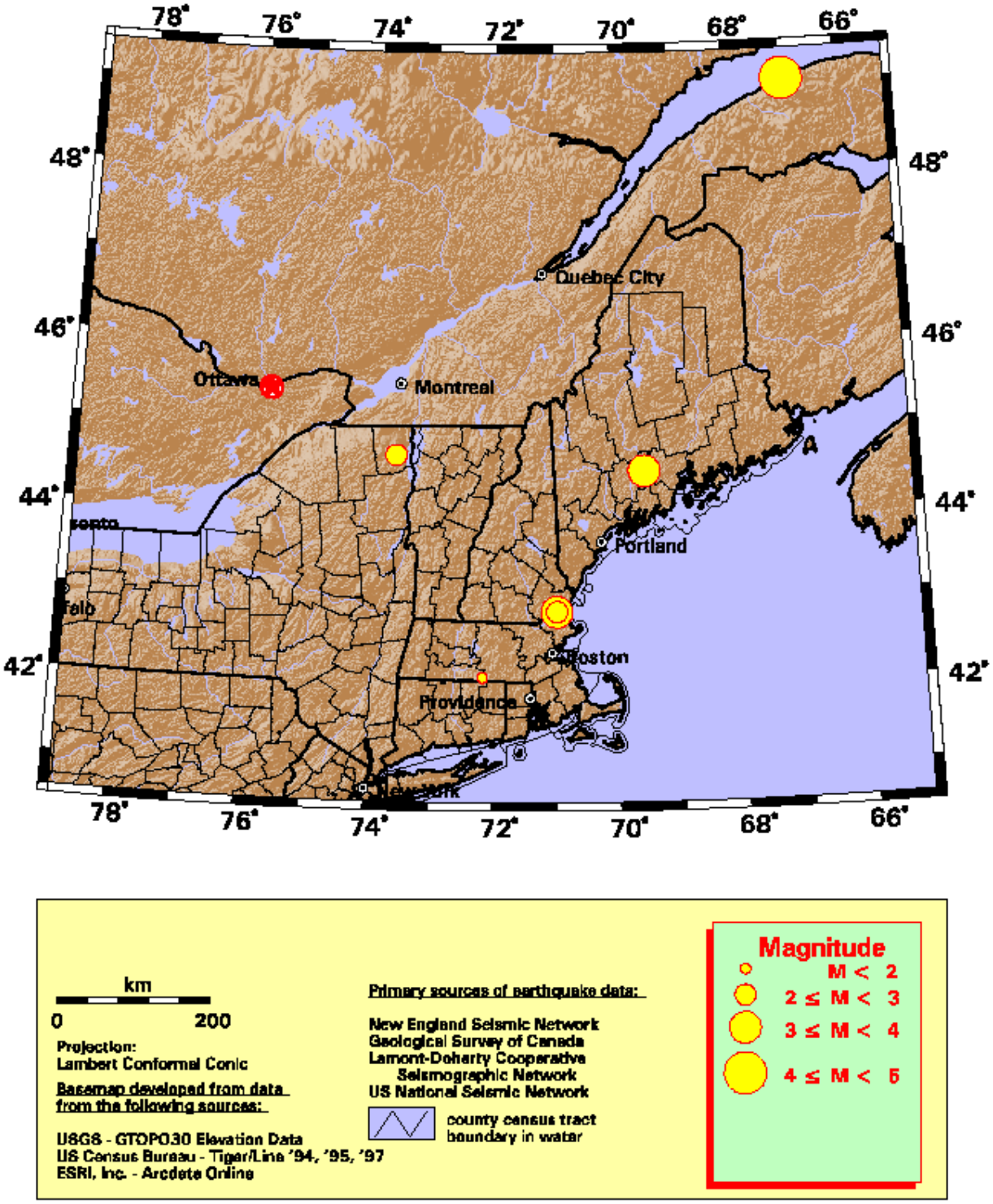

Figure 2: Map of strong-motion stations of the New England Seismic Network (NESN) in operation during period January - March, 1999.

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NESN Quarterly Seismicity Map

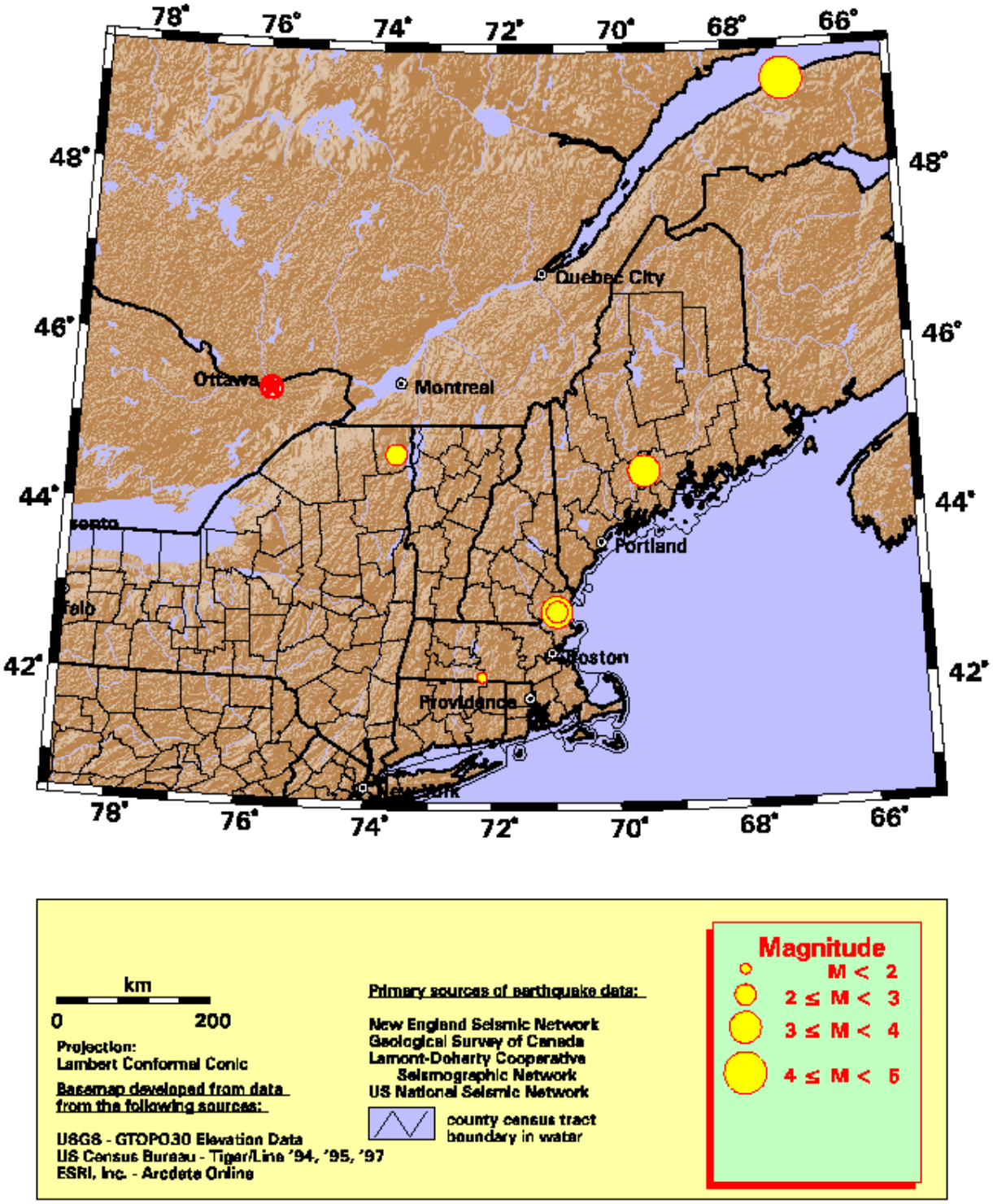

Figure 3: Earthquake epicenters located by the NESN during period January - March, 1999.

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NESN Cumulative Seismicity Map

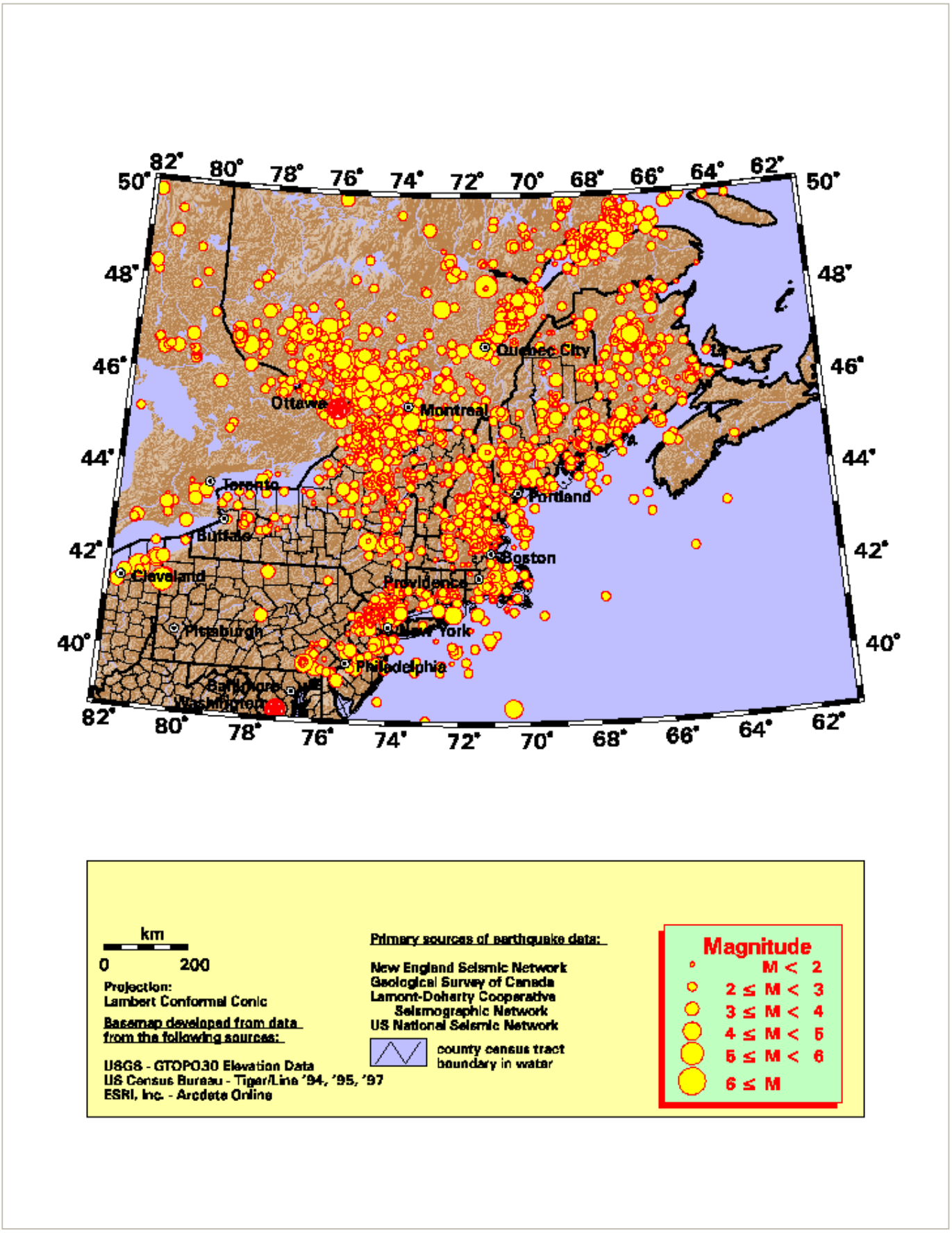

Figure 4: Seismicity for period October, 1975 - March, 1999.

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