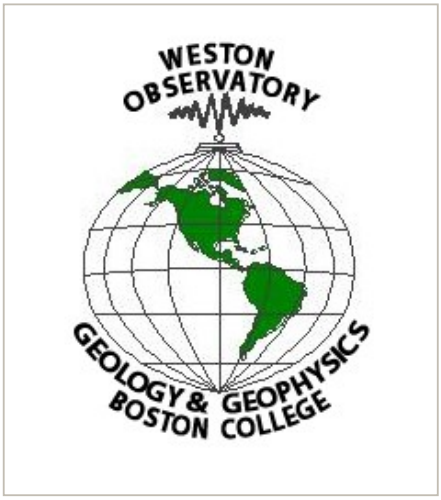
A STUDY OF NEW ENGLAND SEISMICITY

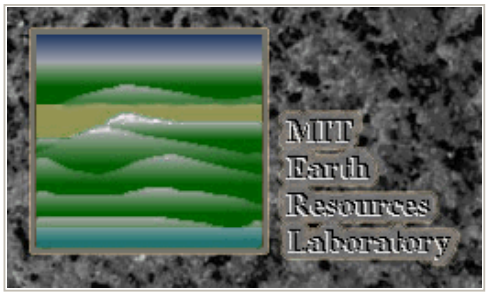
Quarterly Earthquake Report

April - June, 2003

New England

Seismic Network





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NEW ENGLAND SEISMIC NETWORK

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Notice

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April - June, 2003

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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 ofthe 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 ofthe NESN for the period April - June, 2003. 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 7 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 14 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 now operates 13 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. During the year 2001, two new seismic stations were added to the WES network. Station UMM was placed in northeastern Maine and station FFD was placed in central New Hampshire. Station MIM, in central Maine was dismantled. 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 sensorand 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 7 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 at www.bc.edu/westonobservatory. Waveform data are saved in Nanometrics, ASCII, and SEED formats and are available by contacting, Anastasia Macherides Moulis, via email at macherid@bc.edu. Earthquake lists can be found at www.bc.edu/westonobservatory. Currently available on the Weston Observatory web page is the full catalog of northeastern U.S. earthquake activity to 2003. This will be updated as new Northeastern U.S. Seismic Network Quarterly Earthquake Reports 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 www.bc.edu/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 = st ation 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. D ate = 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 se paration, 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 arr ival

   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 arriva l
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 = sign al 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 = neares t station recording event
3. Arrival Time = phase arrival time, Hr (hour):Mn (minute):Sec (second)

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TABLE 1

WESTON OBSERVATORY PERSONNEL

617-552-8319kafka@bc.edu617-552-8332johnson@bc.edu

Name	Network Position	voice phone	email address
John E. Ebel	Principal Investigator	ebel@bc.edu	
Alan Kafka	Research Seismologist	617-552-8300	
Anastasia Macherides Moulis	Seismic Analyst	617-552-8325	macherid@bc.edu
Edward Johnson	Project Engineer		
Patricia Tassia	Administrative Secretary	617-552-8311	tassia@bc.edu
Dina Smith	Assistant to the Director	617-552-8335	dina.smith.1@bc.edu
Weston Observatory		617-552-8300 617-552-8388 (FAX)	

MIT/ERL PERSONNEL

Principal Invest igator617-253-7863cicerone@erl.mit.eduAdministrator617-253-7797

Name	Network Position	voice phone	email address
M. Nafi Toksöz	617-253-7852	toksoz@mit.edu	
Robert Cicerone	Research Seismologist		
Heather Hooper	Seismic Analyst	617-253-6290	
Sara Brydges	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

WES

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
FFD	43.4702	-71.6533	131.0	Franklin Falls Dam, NH	
GLO	42.6403	-70.7272	15.2	Gloucester, MA	MIT
HNH	43.7050	-72.2860	180.0	Hanover, NH	WES
QUA2	42.2789	-72.3525	168.0	Belchertown, MA	WES
TRY	42.7311	-73.6669	131.0	Troy, NY	WES

UMM	44.7100	-67.4583	35.0	Machias, ME	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	10.0	New Haven, CT	WES
PQI	46.6710	-68.0168	175.0	Presque Isle, ME	WES

STRONG MOTION STATIONS OF THE NEW ENGLAND SEISMIC NETWORK

SM2-73.10Newport, RISM4-71.30WES42.39-71.54WES

Code	Lat	Long	Location	Operator
SM1	44.90	-67.25	Dennysville, ME	WES
44.49	Essex Junction, VT	WES		
SM3	41.45	-71.33	WES	
42.38	-71.32	Weston, MA	WES	
SM5	42.66	Lowell, MA		
SM6	42.30	-71.34	Natick, MA	WES
SM7	Huds on, MA	WES		
SM8	44.48	-69.61	North Vassalboro, ME	

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TABLE 3

NEW ENGLAND AND ADJACENT REGIONS

April - June, 2003

Date	Time	Lat	Long	Depth	Mag	Int	Location
Yr/Mo/Dy	Hr:Mn:Sec			(km)			
2003/04/08	15:06:14.38	44.6195	-74.3635	2.05	3.1		NY, 55 KM SE OF MASSENA
2003/04/20	12:24:44.47	41.3598	-74.3640	1.23	2.0		NY, 3.38 KM NNW OF FLORIDA
2003/04/25	12:27:30.08	47.2685	-66.4340	14.95	2.7		CANADA, NEW BRUNSWICK, 63 KM NW OF MIRAMICHI CITY
2003/04/25	12:43:23.91	47.2328	-66.3823	15.58	3.3		CANADA, NEW BRUNSWICK, 65 KM NW OF MIRAMICHI CITY
2003/05/05	16:32:37.67	37.9850	-78.0842	1.16	3.8		VA, 8.3 KM SW OF LOUISA
2003/05/12	06:22:04.78	44.5162	-67.1712	8.52	2.7		ME, 32.5 KM SE OF MACHIAS, OFFSHORE
2003/06/13	11:34:38.58	47.7710	-70.0208	5.0	3.4		CANADA, QUEBEC, 14 KM NE OF LA MALBAIE

* indicates Mc rather than Mn.

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TABLE 4

EARTHQUAKE PHASE DATA LIST
NEW ENGLAND AND ADJACENT REGIONS
April - June, 2003

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NORTHERN NY AND ADIRONDACKS
03APR08 NEW YORK, 55 KM (34.2 MI) SE OF MASSENA
 DATE     ORIGIN     LAT N     LONG W   DEPTH   MN  MC  ML GAP   RMS  ERH  ERZ Q
 30408 15 6 14.38 44-37.17  74-21.81    2.05  3.1  .0      53   .23   .9  3.2 B
 STN   DIST AZM   RMK HRMN    SEC    TOBS    TCAL    RES   WT AMX PRX XMAG FMP FMAG
 PTN   49.5 264 EP  0 15 6 22.16    7.78    7.86   -.12 1.96
MSNY   57.7 317 EP  0 15 6 23.33    8.95    9.11   -.18 1.91
 MIV   90.0 132 EP  3 15 6 28.00   13.62   14.00   -.44  .43
 VT1  132.0 104  S  0 15 6 50.54   36.16   36.25   -.13 1.64
ACCN  148.2 158 EP  3 15 6 36.86   22.48   22.82   -.40  .38
KGNO  175.2 256  P  0 15 6 41.43   27.05   26.91    .13 1.47
 TRQ  178.7 355  P  0 15 6 41.74   27.36   27.46   -.10 1.46
 MOQ  183.3  65  P  0 15 6 42.83   28.45   28.14    .17 1.44
 HNH  194.7 121 EPC0 15 6 44.11   29.73   29.87   -.17 1.38 301 .19  3.2
                S  4 15 6 66.65   52.27   53.17   -.96  .00
LBNH  198.7 102  P  0 15 6 45.35   30.97   30.48    .43 1.33
 GRQ  249.8 332  P  0 15 6 51.59   37.21   36.93    .23 1.18
 FFD  252.1 120 EP  4 15 6 54.84   40.46   37.21   3.23  .00
                S  4 15 6 83.82   69.44   66.24   3.16  .00
 DPQ  260.4  28  P  0 15 6 52.57   38.19   38.23   -.04 1.14
BINY  299.9 206 EP  3 15 6 57.42   43.04   43.11   -.15  .25
QUA2  306.8 148 EPD4 15 6 62.64   48.26   43.97   4.26  .00 228 .25  3.3
```

```
                  S 4 15 6 96.14  81.76  78.27  3.44  .00
 HRV 326.2 136    P 3 15 6 60.46  46.08  46.36  -.32  .21
 WES 349.5 135 EP 0 15 7  4.04  49.66  49.24   .41  .77  32 .11  3.0
                  S 4 15 7 49.19  94.81  87.65  7.14  .00
 WVL 373.1  92 EP 4 15 7 15.37  60.99  52.14  8.83  .00  97 .25  3.1
                  S 4 15 7 56.78 102.40  92.82  9.56  .00
 PAL 403.3 175    P 0 15 6 71.70  57.32  55.88  1.42  .02
BRNJ 437.6 182    P 3 15 6 76.76  62.38  60.12  2.25  .00
SSPA 528.7 213    P 0 15 6 86.72  72.34  71.36   .95  .05
 MVL 538.7 198    P 4 15 6 93.12  78.74  72.59  6.12  .00
SE OF NEW YORK, HUGHES & LUETGERT
03APR20 NEW YORK, 3.38 KM (2.1 MI) NNW OF FLORIDA, 5.47 KM (3.4 MI) SE OF GOSHEN,
                 7.2 KM (4.5 MI) W OF CHESTER
 DATE      ORIGIN     LAT N    LONG W   DEPTH    MN  MC  ML GAP   RMS  ERH  ERZ Q
 30420 1224 44.47 41-21.59  74-21.84   1.23  2.0  .0     114   .29   .9 **** C
 STN   DIST AZM   RMK HRMN    SEC    TOBS    TCAL    RES    WT AMX PRX XMAG FMP FMAG
ARNY  21.8 107 IPC0 1224 47.77   3.30   3.39  -.15 1.16
                  S 0 1224 50.51   6.04   6.03  -.11 1.16
 TBR  27.0 154 EPC0 1224 48.61   4.14   4.17  -.07 1.15
                  S 0 1224 52.02   7.55   7.43   .05 1.15
 GPD  38.9 192 IPD0 1224 50.33   5.86   5.98  -.18 1.11
                  S 0 1224 55.07  10.60  10.65  -.16 1.12
MANY  44.2 110    P 0 1224 51.41   6.94   6.80   .12 1.11
                  S 0 1224 56.71  12.24  12.11   .09 1.11
 PAL  54.9 136    P 0 1224 53.04   8.57   8.44   .11 1.09
                  S 0 1224 59.53  15.06  15.02   .01 1.09
CRNY  68.5  94    P 4 1224 57.38  12.91  10.52  2.34  .00
                  S 0 1224 63.36  18.89  18.72   .08 1.06
CPNY  71.7 152    P 0 1224 55.45  10.98  11.00  -.02 1.05
                  S 0 1224 63.50  19.03  19.58  -.55  .94
BRNJ  77.1 193    P 3 1224 57.75  13.28  11.82  1.45  .00
                  S 0 1224 66.45  21.98  21.04   .92  .58
BINY 163.4 304    P 0 1224 69.97  25.50  25.01   .41  .82
                  S 0 1224 88.97  44.50  44.51  -.15  .85
QUA2 195.9  59 EP 0 1225 13.96  29.49  29.96  -.50  .71  10 .15  1.8
                  S 0 1225 38.41  53.94  53.33   .56  .72
 WES 276.9  66    S 4 1225 55.09  70.62  72.52 -1.92  .00   3 .16  1.6
 HNH 311.6  33    S 4 1225 68.54  84.07  80.14  3.88  .00   6 .17  1.9
 FFD 323.7  44 EP 4 1225 36.11  51.64  46.51  5.11  .00  64 .22  2.9
                  S 4 1225 72.24  87.77  82.79  4.94  .00
NORTHWEST MAINE CRUSTAL STRUCTURE
03APR25 CANADA, NEW BRUNSWICK, 63 KM (39.1 MI) NW OF MIRAMICHI CITY
 DATE      ORIGIN     LAT N    LONG W   DEPTH    MN  MC  ML GAP   RMS  ERH  ERZ Q
 30425 1227 30.08 47-16.11  66-26.04  14.95  2.7  .0     191   .41  2.2  3.6 C
 STN   DIST AZM   RMK HRMN    SEC    TOBS    TCAL    RES    WT AMX PRX XMAG FMP FMAG
 PQI 137.5 241 EPC0 1227 52.55  22.47  22.11   .33 1.82 120 .16  2.6
                  S 0 1227 69.40  39.32  39.36  -.10 1.84
 GSQ 189.8 345 EP 0 1227 58.97  28.89  28.89  -.01 1.60
 LMN 200.9 142 EP 4 1227 58.88  28.80  30.27 -1.53  .00
 GGN 241.0 187 EP 0 1228  5.73  35.65  35.22   .42 1.33
 A21 250.0 281 EP 0 1228  6.68  36.60  36.33   .26 1.32
                  S 0 1228 34.93  64.85  64.67   .16 1.34
 CNQ 256.8 332 EP 3 1228  7.96  37.88  37.17   .68  .30
 ICQ 258.1 346 EP 0 1228  7.85  37.77  37.33   .43 1.26
                  S 0 1228 36.80  66.72  66.44   .26 1.29
 A64 267.8 283 EP 4 1228 11.54  41.46  38.52  2.92  .00
                  S 0 1228 38.62  68.54  68.57  -.07 1.26
 A61 279.6 280 EP 0 1228  9.97  39.89  39.98  -.10 1.20
                  S 3 1228 39.96  69.88  71.16 -1.30  .17
 UMM 295.3 196 EPC0 1228 11.48  41.40  41.91  -.52 1.11  52 .22  2.7
                  S 4 1228 50.22  80.14  74.61  5.51  .00
 LMQ 295.5 276 EP 3 1228 11.03  40.95  41.94 -1.06  .22
                  S 0 1228 44.98  74.90  74.66   .11 1.13
 SMQ 329.1 357 EP 0 1228 15.91  45.83  46.09  -.32  .98
 DAQ 369.8 282    S 0 1228 61.37  91.29  90.99   .01  .80
 WVL 394.5 219 EPD1 1228 22.55  52.47  54.16 -1.70  .06  36 .24  2.8
                  S 4 1228 79.83 109.75  96.41 13.32  .00
 MNQ 401.1 335 EP 0 1228 24.04  53.96  54.98 -1.11  .48
                  S 0 1228 66.99  96.91  97.87 -1.12  .48
NORTHWEST MAINE CRUSTAL STRUCTURE
03APR25 CANADA, NEW BRUNSWICK, 65 KM (40.4 MI) NW OF MIRAMICHI CITY
 DATE      ORIGIN     LAT N    LONG W   DEPTH    MN  MC  ML GAP   RMS  ERH  ERZ Q
 30425 1243 23.91 47-13.97  66-22.94  15.58  3.3  .0     146   .30  1.1  1.8 C
 STN   DIST AZM   RMK HRMN    SEC    TOBS    TCAL    RES    WT AMX PRX XMAG FMP FMAG
 PQI 139.1 243 EP 0 1243 46.60  22.69  22.32   .34 2.09 294 .14  3.0
                  S 3 1243 63.59  39.68  39.73  -.10  .54
 GSQ 194.7 344 EP 0 1243 53.59  29.68  29.43   .24 1.85
 LMN 195.5 142 EP 0 1243 53.33  29.42  29.53  -.17 1.87
 GGN 237.6 188 EP 3 1243 59.33  35.42  34.74   .68  .33
 A21 254.6 282 EP 0 1244  1.18  37.27  36.84   .43 1.49
                  S 0 1244 29.48  65.57  65.57  -.01 1.55
 CNQ 262.1 331 EP 0 1244  1.54  37.63  37.76  -.15 1.52
 ICQ 262.9 345    S 0 1244 31.48  67.57  67.38   .18 1.50
 A11 289.1 270 EP 0 1244  4.91  41.00  41.09  -.10 1.37
                  S 0 1244 37.04  73.13  73.15  -.03 1.37
 UMM 292.6 197 EPD4 1243 54.60  30.69  41.52-10.83  .00 234 .25  3.3
                  S 4 1243   .00 -23.91  73.90-97.82  .00
 LMQ 299.8 277 EP 0 1244  6.18  42.27  42.41  -.21 1.32
                  S 3 1244 38.63  74.72  75.50  -.90  .18
 SMQ 333.3 356 EP 0 1244 10.22  46.31  46.55  -.30 1.13
 HAL 360.7 143 EP 3 1244 14.68  50.77  49.93   .83  .14
                  S 0 1244 53.10  89.19  88.88   .30  .98
 DAQ 374.5 283 EP 0 1244 15.43  51.52  51.63  -.26  .91
                  S 3 1244 54.60  90.69  91.90 -1.49  .00
 WVL 394.0 220 EP 0 1244 17.58  53.67  54.04  -.38  .80 131 .30  3.2
                  S 4 1244 73.32 109.41  96.19 13.20  .00
 MNQ 406.3 334 EP 0 1244 18.66  54.75  55.56  -.90  .42
                  S 4 1244 60.75  96.84  98.90 -2.22  .00
 DPQ 490.3 263 EP 0 1244 29.56  65.65  65.93  -.27  .31
                  S 0 1244 80.88 116.97 117.35  -.38  .30
 MOQ 500.2 245    S 4 1244 23.06  59.15 119.54-60.64  .00
LBNH 545.1 232 EP 0 1244 36.63  72.72  72.69  -.03  .03
                  S 4 1244 91.60 127.69 129.39 -1.80  .00
 FFD 587.5 225    S 3 1245 70.77 166.86 138.72 28.11  .00
 HNH 605.4 230    S 3 1245 74.80 170.89 142.66 28.18  .00  78 .41  3.3
 TRQ 635.2 260 EP 0 1244 46.83  82.92  83.81  -.89  .00
 BCX 663.2 215    S 3 1245 88.71 184.80 155.35 29.40  .00  85 .43  3.4
```

```
 WES 665.6 216  S 3 1245 90.95 187.04 155.89 31.14  .00  66 .40  3.4
 SOUTHEAST MAINE CRUSTAL MODEL
 03MAY05 VA, 8.3 KM (5.2 MI) SW OF LOUISA
  DATE     ORIGIN     LAT N    LONG W   DEPTH   MN  MC  ML GAP   RMS  ERH  ERZ Q
  30505 1632 37.67 37-59.10  78- 5.05   1.16  3.8  .0     314   .50 25.1 27.5 D
  STN   DIST AZM  RMK HRMN   SEC   TOBS   TCAL   RES   WT AMX PRX XMAG FMP FMAG
 SDMD 191.7  34 EPC3 1633  5.83  28.16  29.85 -1.69  .45
                 S 0 1633 30.53  52.86  53.13  -.27 3.63
  MVL 269.4  34  P 0 1633 16.40  38.73  39.44  -.73 2.76
                 S 0 1633 47.90  70.23  70.20  -.01 2.85
 SSPA 294.8   3  P 0 1633 20.41  42.74  42.58   .13 2.59
                 S 3 1633 56.14  78.47  75.79  2.63  .01
 LUPA 372.7  39 EPD0 1633 30.40  52.73  52.20   .49 1.78
                 S 0 1633 71.24  93.57  92.92   .58 1.78
 BRNJ 426.4  45  P 3 1633 37.18  59.51  58.83   .68  .31
                 S 0 1633 82.17 104.50 104.71  -.23 1.25
  GPD 458.8  43  P 3 1633 41.14  63.47  62.83   .58  .23
                 S 3 1633 90.79 113.12 111.84  1.17  .21
 CPNY 472.5  49  P 0 1633 42.41  64.74  64.52   .22  .79
                 S 0 1633 92.80 115.13 114.84   .29  .79
  TBR 482.6  43  P 0 1633 43.87  66.20  65.76   .40  .68
                 S 0 1633 94.68 117.01 117.06  -.12  .68
  PAL 491.2  47 IPC3 1633 45.03  67.36  66.83   .51  .15
                 S 0 1633 97.27 119.60 118.96   .61  .59
 BINY 500.3  21  P 0 1633 46.40  68.73  67.96   .69  .49
 ARNY 502.0  43  P 0 1633 45.64  67.97  68.16  -.26  .49
                 S 3 1633 97.50 119.83 121.33 -1.62  .07
 MANY 510.2  45  P 0 1633 46.94  69.27  69.17   .08  .40
 GENY 531.4   2  P 3 1633 50.75  73.08  71.80  1.28  .04
 CRNY 536.9  47  P 4 1633 46.63  68.96  72.47 -3.56  .00
 QUA2 682.8  46 EPC0 1634  7.08  89.41  90.48 -1.10  .00 136 .33  3.8
                 S 4 1634   .00  82.33 161.05-78.77  .00
 ACCN 706.3  32  P 0 1634 10.77  93.10  93.38  -.34  .00
                 S 3 1634 82.58 164.91 166.22 -1.41  .00
  NCB 739.9  26  P 0 1634 15.27  97.60  97.53  -.03  .00
                 S 4 1634 89.30 171.63 173.60 -2.14  .00
  WES 755.1  50 EP 0 1634 17.21  99.54  99.41   .12  .00  80 .28  3.8
  BCX 761.5  51  S 4 1635 72.68 215.01 178.35 36.61  .00 128 .33  3.9
  MIV 777.2  30  P 0 1634 19.44 101.77 102.14  -.42  .00
                 S 0 1634 99.19 181.52 181.81  -.38  .00
  MDV 785.0  32  P 0 1634 20.31 102.64 103.10  -.48  .00
  LOZ 793.0  22  P 0 1634 21.26 103.59 104.09  -.57  .00
  HNH 801.9  38  S 4 1635 78.94 221.27 187.23 33.99  .00  83 .35  3.8
  FFD 816.4  42  S 4 1635 76.79 219.12 190.42 28.67  .00
 LBNH 866.1  37  P 3 1634 32.34 114.67 113.12  1.50  .00
  WVL1012.6  44 EPC4 1635 35.03 177.36 131.20 46.15  .00  90 .57  3.8
SOUTHEAST MAINE CRUSTAL MODEL
03MAY12 ME, 32.5 KM (20 mi) SE OF MACHIAS (OFF THE COAST)
 DATE     ORIGIN     LAT N    LONG W   DEPTH   MN  MC  ML GAP   RMS  ERH  ERZ Q
 30512  622  4.86 44-30.97  67-10.27   2.62  2.7 2.9     147   .46  1.9  1.8 C
 STN   DIST AZM  RMK HRMN   SEC   TOBS   TCAL   RES   WT AMX PRX XMAG FMP FMAG
 UMM  31.4 313 IPD0  622 10.10   5.24   5.29  -.06 2.57 314 .08  2.2 211  3.0
                 S 0  622 14.15   9.29   9.42  -.15 2.57
 WVL 198.5 270 EP 0  622 36.18  31.32  30.53   .79 1.61  98 .18  2.7 134  2.9
                 S 0  622 59.52  54.66  54.34   .31 1.72
 LMN 237.9  51 EP 0  622 40.35  35.49  35.39   .04 1.55
                 S 0  622 67.63  62.77  62.99  -.33 1.55
 PQI 248.4 345 EP 4  622 20.83  15.97  36.69-20.75  .00  71 .25  2.6
                 S 4  622 76.42  71.56  65.32  6.19  .00
 HAL 283.8  87 EP 0  622 46.31  41.45  41.07   .38 1.30
                 S 3  622 75.89  71.03  73.10 -2.08  .02
 FFD 377.8 252 EPD0  622 56.99  52.13  52.67  -.56  .84 250 .25  3.5
LBNH 380.0 265 EP 0  622 57.35  52.49  52.94  -.51  .83
                 S 3  622 96.95  92.09  94.24 -2.25  .00
 A16 395.0 326 EP 1  623   .70  55.84  54.79  1.06  .47
                 S 0  623 42.53  97.67  97.52   .15  .77
 BCX 404.6 233  S 4  623 53.36 108.50  99.63  8.82  .00  21 .15  2.8
 WES 410.8 235 EPD1  623   .12  55.26  56.74 -1.49  .29  17 .22  2.5
                 S 4  623 54.35 109.49 101.00  8.48  .00
 MOQ 411.1 282 EP 0  623  1.33  56.47  56.78  -.45  .68
                 S 4  623 43.86  99.00 101.07 -2.31  .00
 LMQ 416.3 324 EP 0  623  2.93  58.07  57.42   .58  .64
                 S 0  623 46.76 101.90 102.21  -.44  .65
 HNH 419.3 258 EPD0  623  2.05  57.19  57.79  -.63  .63  28 .26  2.7
                 S 4  623 59.33 114.47 102.87 11.55  .00
QUA2 487.8 239 EPD4  623  2.61  57.75  66.25 -8.52  .00  25 .29  2.7
                 S 4  623 77.04 132.18 117.92 14.21  .00
 DPQ 499.2 299 EP 0  623 12.51  67.65  67.65   .00  .25
                 S 4  623 62.37 117.51 120.42 -2.91  .00
 CNQ 536.5 353 EP 0  623 17.83  72.97  72.26   .69  .06
                 S 4  623 70.91 126.05 128.62 -2.62  .00
 ICQ 556.5 359 EP 0  623 19.30  74.44  74.73  -.30  .00
 TRQ 608.5 288 EP 4  623 23.31  78.45  81.14 -2.69  .00
                 S 3  623 87.46 142.60 144.43 -1.83  .00
 SMQ 635.4   3 EP 0  623 29.43  84.57  84.46   .05  .00
                 S 3  623 93.69 148.83 150.35 -1.62  .00
 WBO 643.5 275 EP 1  623 29.26  84.40  85.46 -1.07  .00
 GAC 667.1 281 EP 3  623 32.02  87.16  88.38 -1.22  .00
NORTHWEST MAINE CRUSTAL STRUCTURE
03JUN13 CANADA, QUEBEC, 14 KM (8.7 MI) NE OF LA MALBAIE
 DATE     ORIGIN     LAT N    LONG W   DEPTH   MN  MC  ML GAP   RMS  ERH  ERZ Q
 30613 1134 38.58 47-46.26  70- 1.25   5.00  3.6 3.9     279   .55 20.9 **** D
 STN   DIST AZM  RMK HRMN   SEC   TOBS   TCAL   RES   WT AMX PRX XMAG FMP FMAG
 PQI 195.0 129                                        265 .16  3.1
 WVL 361.3 176 EP 3 1135 28.42  49.84  51.06 -1.23  .77 190 .21  3.5 420  3.9
                 S 4 1135 71.62  93.04  90.89  2.13  .00
 UMM 393.5 150 EP 0 1135 33.76  55.18  55.05   .12 2.93 191 .18  3.6
                 S 4 1135 87.47 108.89  97.98 10.89  .00
LBNH 419.3 201 EP 0 1135 37.18  58.60  58.23   .31 2.45
 VT1 436.8 209  S 4 1135 87.43 108.85 107.49  1.32  .00
MSNY 483.3 230 EP 0 1135 44.97  66.39  66.13   .25 1.25
 HNH 485.1 201 EPD3 1135 47.83  69.25  66.35  2.87  .01 213 .34  3.6 400  3.9
                 S 4 1135   .00  21.42 118.10-96.74  .00
 MIV 493.0 214 EP 1 1135 45.42  66.84  67.32  -.53  .79
 FFD 494.7 195 EPD3 1135 48.02  69.44  67.54  1.88  .161065 .26  4.4
                 S 4 1135   .00  21.42 120.22-98.83  .00
 PTN 522.6 227  P 0 1135 49.13  70.55  70.98  -.46  .51
```

```
 NCB 533.7 218 EP 2 1135 49.86  71.28  72.35 -1.17  .14
ACCN 564.6 210 EP 3 1135 57.48  78.90  76.16  2.68  .00
 HRV 597.5 192 EP 3 1135 56.60  78.02  80.22 -2.23  .00
 WES 607.3 190 EP 2 1136  1.42  82.84  81.43  1.39  .00 145 .51  3.5
               S 4 1136 83.89 165.31 144.95 20.34  .00
 BCX 610.8 189  S 4 1136 86.94 168.36 145.74 22.57  .00
QUA2 637.4 197 EP 3 1136  7.82  89.24  85.16  4.05  .00 114 .37  3.6
               S 4 1136 89.92 171.34 151.58 19.71  .00
```

TABLE 5

MICROEARTHQUAKES AND OTHER NON-LOCATABLE EVENTS

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

None recorded this period.

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NESN Station Map

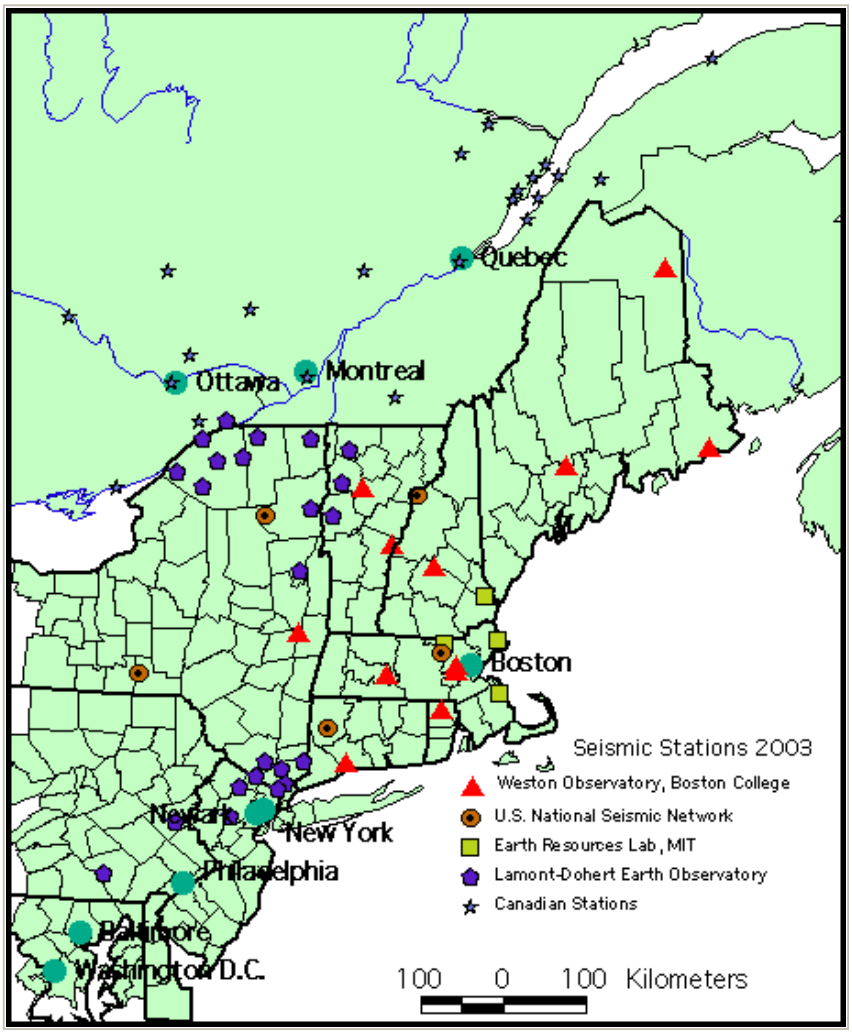

Figure 1: Map of stations of the New England Seismic Network (NESN) in operation during period April - June, 2003. Also included are the US National Seismic Network stations operating in New England during this period.

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NESN Strong-Motion Station Map

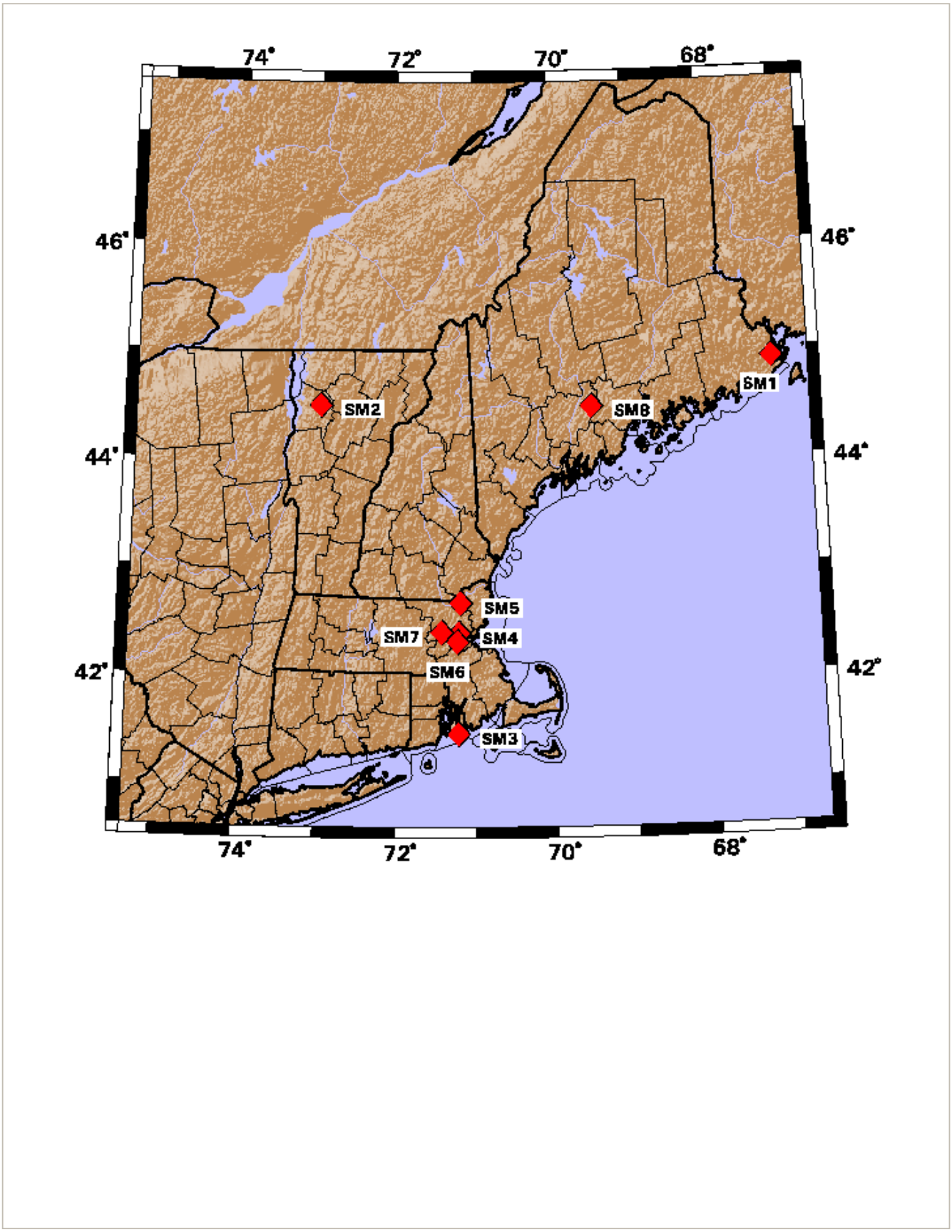

Figure 2: Map of strong-motion stations of the New England Seismic Network (NESN) in operation during period April - June, 2003.

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NESN Quarterly Seismicity Map

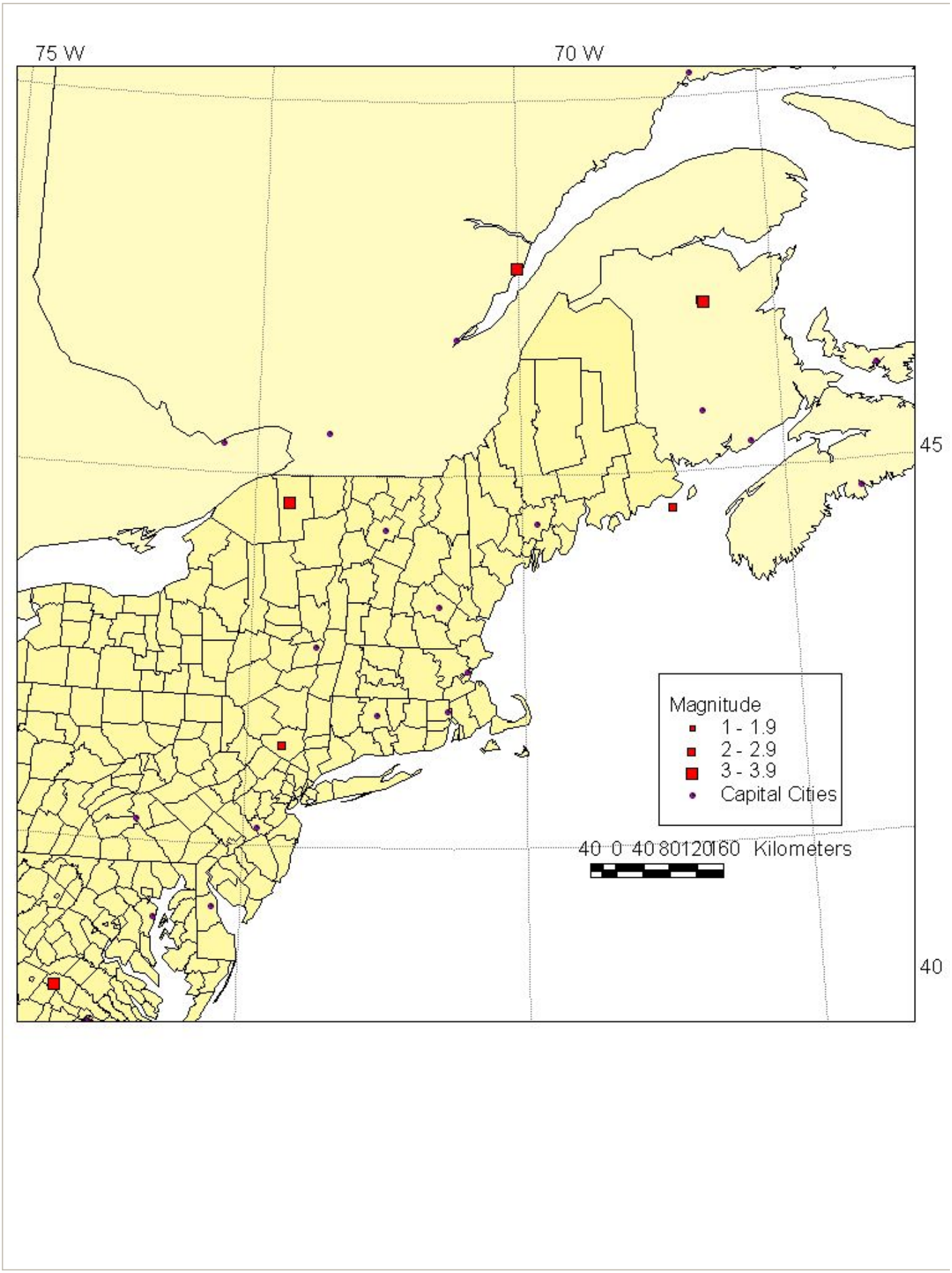
75 W
70 W
45
40
Magnitude
1 - 1.9
2 - 2.9
3 - 3.9
Capital Cities
40 0 40 80 120 160 Kilometers

Figure 3: Earthquake epicenters located by the NESN during period April - June, 2003.

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Map

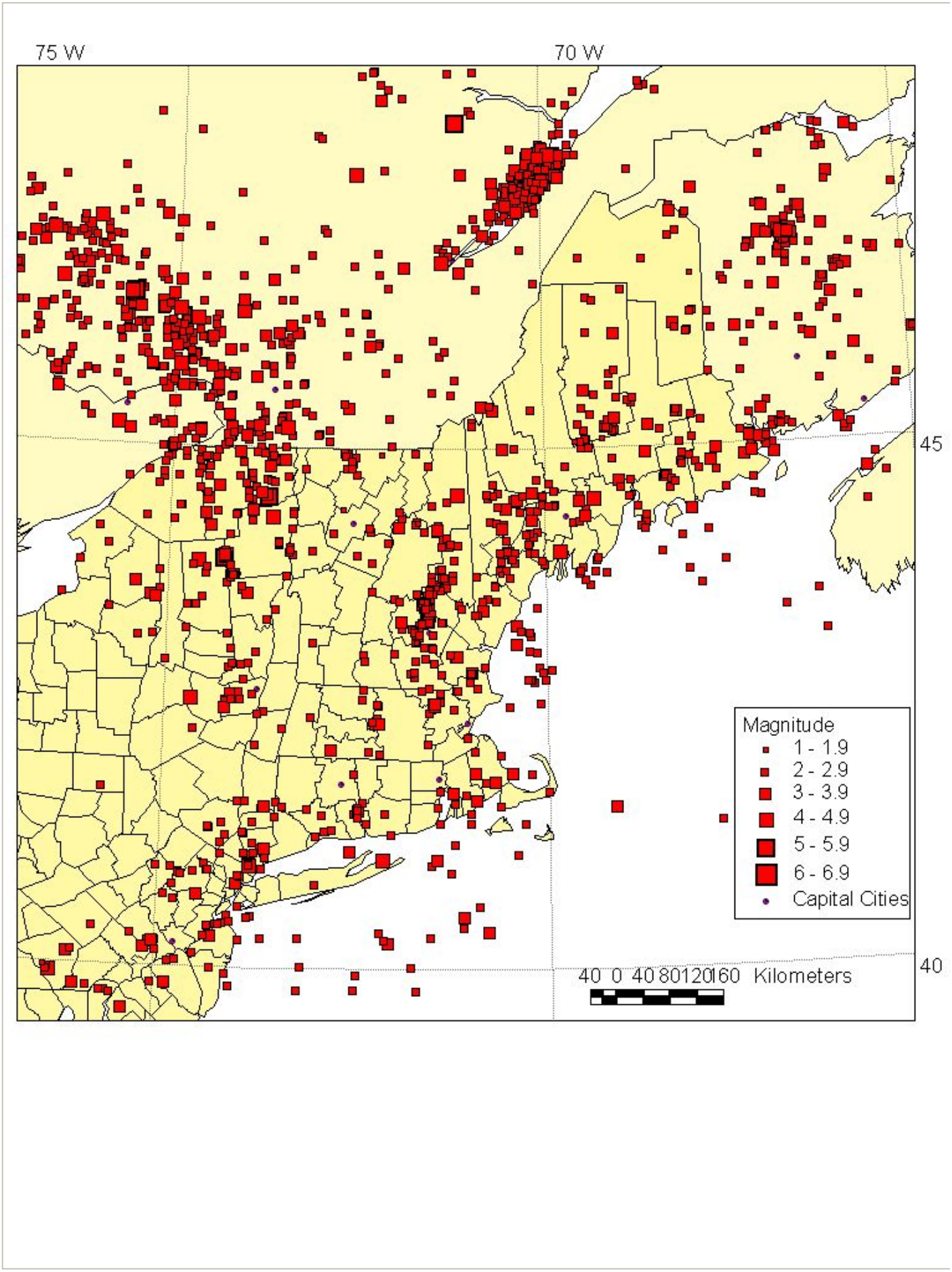
75 W
70 W
45
40
Magnitude
1 - 1.9
2 - 2.9
3 - 3.9
4 - 4.9
5 - 5.9
6 - 6.9
Capital Cities
40 0 40 80 120 160 Kilometers

Figure 4: Seismicity for period October, 1975 - June, 2003.

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Acknowledgments

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

References

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

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

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