

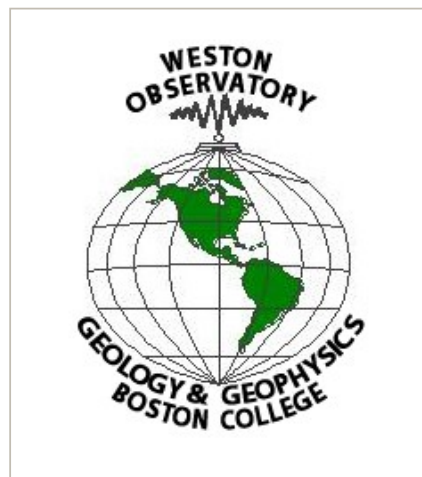
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A STUDY OF NEW ENGLAND SEISMICITY

Quarterly Earthquake Report

January - March, 2006

*NEW ENGLAND
SEISMIC NETWORK*



**Weston Observatory
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NEW ENGLAND SEISMIC NETWORK

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Award #04HQAG0020

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for

United States Geological Survey

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Notice

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Quarterly Earthquake Report

January - March, 2006

Table of Contents

- [Introduction](#)
- [Current Network Operation and Status](#)
- [Seismicity](#)
- [Data Management](#)
- Tables

- [Explanation of Tables](#)
- [Table 1](#) Project Personnel
- [Table 2](#) Seismic Stations
- [Table 3](#) Earthquake Hypocenter List
- [Table 4](#) Earthquake Phase Data List
- [Table 5](#) Microearthquakes and Other Non-locatable Events

- Figures

- [NESN Station Map](#)
 - [NESN Strong-Motion Station Map](#)
 - [NESN Quarterly Seismicity Map](#)
 - [NESN Cumulative Seismicity Map](#)
 - [Acknowledgments](#)
 - [References](#)
-

Introduction

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

This report summarizes the work of the NESN for the period January - March, 2006. 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 9 earthquakes that occurred within or near the network during this reporting period. Phase information for these earthquakes is included in this report.

[Return to Table of Contents](#)

Current Network Operation and Status

The New England Seismic Network of Weston Observatory of Boston College currently consists of 12 broadband three-component and 8 analog 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. The 12 stations consist 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. Weston Observatory also maintains 8 SMA-1 strong-motion instruments in New England.

[Return to Table of Contents](#)

Seismicity

There were 9 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.

[Return to Table of Contents](#)

Data Management

Recent event locations are available at www.bc.edu/research/westonobservatory/northeast/recenteqs/. Waveform data are saved in Nanometrics, ASCII, and SEED formats and are available by contacting, Anastasia Macherides Moulis, via email. Earthquake lists can be found at www.bc.edu/research/westonobservatory/northeast/eqcatalogs/. Currently available on the Weston Observatory web page is the full catalog of northeastern U.S. earthquake activity to the present time. This will be updated as new Northeastern U.S. Seismic Network Quarterly Earthquake Reports are produced.

For more information on matters discussed in this report or general earthquake information (reports, maps, catalogs, etc.) consult our web site www.bc.edu/westonobservatory or contact:
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[Return to Table of Contents](#)

Explanation of Tables

Table 1: List of personnel operating the NESN

Table 2: List of Seismic and Strong Motion Stations

- Code = station name
- Lat = station latitude, degrees north
- Long = station longitude, degrees west
- Elev = station elevation in meters
- Location = geographic location
- Operator = network operator

Table 3: Earthquake Hypocenter List

- Date = date event occurred, Yr (year)/Mo (month)/Dy (day)
 - Time = origin time of event, Hr (hour):Mn (minute):Sec (second)
- in UCT (Universal Coordinated Time, same as Greenwich Mean Time)
- Lat = event location, latitude north in degrees
 - Long = event location, longitude west in degrees
 - Depth = event depth in kilometers
 - Mn = Nuttli Magnitude
 - Mc = Coda Magnitude
 - Int = event epicentral intensity
 - Location = event geographic location

Table 4: Earthquake detailed hypocenter and phase data list

- Geographic location
 - DATE = date event occurred, yr/mo/dy (year/month/day)
 - ORIGIN = event origin time (UCT) in hours, minutes, and seconds
 - LAT N = latitude north in degrees and minutes
 - LONG W = longitude west in degrees and minutes
 - DEPTH = event depth in kilometers
 - MN = Nuttli Lg phase magnitude with amplitude divided by period
 - MC = signal duration (coda) magnitude
- WES: $2.23 \text{ Log(FMP)} + 0.12 \text{ Log(Dist)} - 2.36$ (Rosario, 1979)
MIT: $2.21 \text{ Log(FMP)} - 1.7$ (Chaplin *et al.*, 1980)
- ML = local magnitude
- WES: calculated from Wood-Anderson seismograms (Ebel, 1982)
GSC (Geological Survey of Canada): Richter Lg magnitude
- GAP = largest azimuthal separation, in degrees, between stations
 - RMS = root mean square error of travel time residual in seconds
 - ERH = standard error of epicenter in kilometers
 - ERZ = standard error of event depth in kilometers
 - Q = solution quality of hypocenter
- A = excellent
B = good
C = fair
D = poor

Table Body: earthquake phase data

- STN = station name
 - DIST = epicentral distance in kilometers
 - AZM = azimuthal angle in degrees measured clockwise between true north and vector pointing from epicenter to station
 - Description of onset of phase arrival
- I = impulsive
E = emergent
- R = phase

P = first P arrival
S = first S arrival

- M = first motion direction of phase arrival

U = up or compression
D = down or dilatation

- 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)

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

Table 5: Microearthquakes and other non-locatable events

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

[Return to Table of Contents](#)

TABLE 1

WESTON OBSERVATORY PERSONNEL

Name	Position	voice phone	email address
John E. Ebel	Observatory Director, Seismologist, Principal Investigator	617-552-8319	ebel@bc.edu
Alan Kafka	Research Seismologist	617-552-8300	kafka@bc.edu
Anastasia Macherides Moulis	Seismologist, Analyst	617-552-8325	macherid@bc.edu
Dina Smith	Associate Director of Operations, Seismologist	617-552-8335	dina.smith.1@bc.edu
Michael Hagerty	New England Seismic Network Manager, Seismologist	617-552-8337	hagertmb@bc.edu
		617-552-8300	
Weston Observatory		617-552-8388 (FAX)	

[Return to Table of Contents](#)

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
BRYW	41.9178	-71.5388	380.0	Smithfield, RI	WES
FFD	43.4702	-71.6533	131.0	Franklin Falls Dam, NH	WES
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
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

* = not in operation during this quarter

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

[Return to Table of Contents](#)

TABLE 3

NEW ENGLAND AND ADJACENT REGIONS

January - March, 2006

Date	Time (UTC)	Lat	Long	Depth	Mn	Mc	Int	Location
M/D/Y	Hr:Mn:Sec			(km)				
01/09/2006	15:35:41.20	45.07	-73.91	15.67	3.9			PQ, 2.67KM NW OF ST-ANTOINE-ABBE
01/17/2006	17:49:27.25	42.50	-71.10	09.14	1.3			MA, 1.8KM SW OF WAKEFIELD
01/20/2006	11:37:39.84	45.00	-69.08	15.19	1.7			ME, 21KM SE OF DOVER-FOXCROFT
01/20/2006	11:50:15.38	45.13	-69.13	00.57	1.8			ME, 9.3KM SE OF DOVER-FOXCROFT
02/07/2006	04:07:22.32	46.33	-75.29	23.55	2.6	3.3		PQ, 28KM SE OF MONT-LAURIER
02/16/2006	23:43:22.99	41.14	-74.51	07.92	2.7			NJ, 5.5KM ESE OF HAMBURG
02/25/2006	01:39:22.78	45.61	-75.23	14.04	4.0	4.0		PQ, 6.4KM N OF THURSO
02/26/2006	04:09:22.63	45.55	-74.72	15.94	2.5	3.4		ON, 11KM (6.8MI) SW OF HAWKESBURY
03/01/2006	19:54:14.08	43.75	-72.59	08.89	1.1	2.4		VT, 51.5KM S OF MONTPELIER

*LD indicates magnitude as calculated by Lamont Doherty Earth Observatory

[Return to Table of Contents](#)

TABLE 4

EARTHQUAKE PHASE DATA LIST
NEW ENGLAND AND ADJACENT REGIONS
January - March, 2006

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A6109A.XX
NORTHERN NY AND ADIRONDACKS
06JAN09 CANADA, QUEBEC, 2.67KM (1.66MI) NW OF ST-ANTOINE-ABBE
DATE ORIGIN LAT N LONG W DEPTH MN MC ML GAP RMS ERH ERZ Q
60109 1535 41.20 45- 4.18 73-54.53 15.67 3.9 .0 46 .49 .8 1.0 C
STN DIST AZM RMK HRMN SEC TOBS TCAL RES WT AMX PRX XMAG FMP FMAG
MNT 53.1 25 P 0 1535 49.67 8.47 8.52 -.07 2.38
S 0 1535 56.75 15.55 15.16 .35 2.35
PTN 101.4 237 P 0 1535 56.45 15.25 15.72 -.50 2.12
S 0 1535 68.66 27.46 27.98 -.58 2.08
MIV 114.7 165 P 3 1535 57.57 16.37 17.72 -1.40 .29
NCB 124.7 192 IPD3 1535 59.41 18.21 19.23 -1.12 .41
S 3 1535 74.06 32.86 34.23 -1.55 .18
MOQ 132.8 78 P 0 1536 1.41 20.21 20.45 -.38 1.98
S 0 1536 17.85 36.65 36.41 -.01 2.00
TRQ 137.7 338 P 0 1536 2.67 21.47 21.19 .28 1.97
S 3 1536 20.00 38.80 37.72 1.07 .38
GAC 141.6 300 P 0 1536 3.38 22.18 21.79 .38 1.93
S 0 1536 20.27 39.07 38.79 .26 1.95
OTT 146.5 284 P 0 1536 3.97 22.77 22.52 .24 1.93
S 4 1536 27.77 46.57 40.09 6.46 .00
LBNH 182.2 120 P 0 1536 8.60 27.40 27.35 -.01 1.76
S 0 1536 29.84 48.64 48.68 -.15 1.76
HNH 199.3 140 EPD0 1536 10.92 29.72 29.45 .24 1.681137 .16 3.8
S 0 1536 34.27 53.07 52.43 .59 1.63
DPQ 199.4 26 P 0 1536 11.34 30.14 29.47 .67 1.61
S 0 1536 33.33 52.13 52.46 -.33 1.68
KGNO 225.6 245 P 0 1536 14.27 33.07 32.70 .36 1.54
S 3 1536 37.55 56.35 58.20 -1.87 .04
GRQ 228.5 318 P 0 1536 14.35 33.15 33.06 .04 1.54
S 0 1536 39.28 58.08 58.84 -.85 1.43
FFD 253.0 135 EP 0 1536 17.95 36.75 36.08 .65 1.36
S 4 1536 48.20 67.00 64.22 2.74 .00
TRY 260.6 176 EP 0 1536 19.00 37.80 37.02 .73 1.31 304 .15 3.5
S 0 1536 48.40 67.20 65.90 1.21 .93
QCQ 278.9 47 P 0 1536 21.08 39.88 39.28 .58 1.26
S 0 1536 50.73 69.53 69.92 -.42 1.28
CRLO 291.4 292 P 0 1536 21.78 40.58 40.83 -.28 1.24
S 0 1536 53.81 72.61 72.68 -.13 1.24
QUA2 334.5 158 EP 0 1536 27.40 46.20 46.15 .02 1.03 287 .15 3.7
S 4 1536 68.50 87.30 82.15 5.10 .00
WVL 341.0 100 EP 0 1536 28.23 47.03 46.95 .07 1.00 726 .25 3.9
S 4 1536 74.25 93.05 83.57 9.46 .00
WES 364.0 145 EP 0 1536 30.20 49.00 49.79 -.80 .84 342 .26 3.6
S 4 1536 77.20 96.00 88.63 7.35 .00
A11 374.7 50 P 0 1536 32.23 51.03 51.11 -.09 .84
S 0 1536 71.50 90.30 90.97 -.69 .81
A54 378.1 45 P 0 1536 32.62 51.42 51.53 -.17 .82
S 3 1536 71.27 90.07 91.72 -1.76 .04
WLVO 379.0 250 P 3 1536 31.83 50.63 51.65 -1.03 .18
S 3 1536 71.18 89.98 91.93 -1.97 .01
DAQ 381.4 32 P 0 1536 32.68 51.48 51.94 -.62 .78
S 4 1536 71.50 90.30 92.45 -2.43 .00
LMQ 390.0 45 P 0 1536 34.37 53.17 53.00 .10 .77
S 3 1536 74.22 93.02 94.33 -1.44 .09
    
```



```

S 4 410 34.30 71.67 66.74 4.82 .00
HNH 282.0 137 EP 3 410 5.05 42.42 39.64 2.75 .00 22 .16 2.4
ES 4 410 38.30 75.67 70.57 5.05 .00
TRY 324.8 165 EP 0 410 7.80 45.17 44.93 .19 .66 52 .33 2.6
ES 4 410 47.00 84.37 79.97 4.31 .00
FFD 336.3 134 EP 3 410 11.20 48.57 46.34 2.21 .00 232 3.4
ES 4 410 54.10 91.47 82.49 8.94 .00
EEO 357.7 290 P 0 410 11.05 48.42 48.98 -.63 .55
S 0 410 48.05 85.42 87.19 -1.90 .05
DAQ 377.3 45 P 0 410 14.17 51.54 51.41 -.03 .51
S 0 410 52.63 90.00 91.51 -1.79 .07
QUA2 410.6 152 ES 4 410 67.10 104.47 98.82 5.60 .00 38 .40 2.6
WVL 414.4 106 ES 4 410 75.10 112.47 99.66 12.79 .00 9 .14 2.5
HRV 423.0 143 EP 3 410 20.90 58.27 57.05 1.19 .07 211 3.4
ES 4 410 75.10 112.47 101.55 10.86 .00
WES 445.2 142 ES 4 410 82.80 120.17 106.44 13.71 .00 19 .50 2.4
UCCT 463.6 154 ES 4 410 81.90 119.27 110.46 8.75 .00
A6301A.XX
HUGHES AND LUETGERT NH
06MARS01 VT, 51.5KM (32MI) S OF MONTPELIER
DATE ORIGIN LAT N LONG W DEPTH MN MC ML GAP RMS ERH ERZ Q
60301 1954 14.08 43-44.70 72-35.19 8.89 1.1 2.4 181 .50 5.8 13.6 D
STN DIST AZM RMK HRMN SEC TOBS TCAL RES WT AMX PRX XMAG FMP FMAG
HNH 24.6 100 EP 3 1954 17.17 3.09 4.39 -1.33 .22 33 .12 1.1
ES 0 1954 21.90 7.82 7.82 -.05 1.56
LBNH 76.4 44 EPD1 1954 27.62 13.54 12.75 .73 .98 87 2.3
ES 0 1954 36.59 22.51 22.70 -.29 1.41
FFD 81.3 112 EP 4 1954 21.81 7.73 13.55 -5.84 .00
ES 4 1954 29.77 15.69 24.12 -8.46 .00
NCB 133.9 281 EPC2 1954 36.95 22.87 21.79 .98 .52 81 2.4
ES 0 1954 52.63 38.55 38.79 -.41 1.23
LONY 186.8 301 EP 0 1954 43.60 29.52 29.39 .06 1.08
ES 4 1954 64.08 50.00 52.31 -2.43 .00

```

[Return to Table of Contents](#)

TABLE 5
MICROEARTHQUAKES AND OTHER NON-LOCATABLE EVENTS

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

[Return to Table of Contents](#)

NESN Station Map

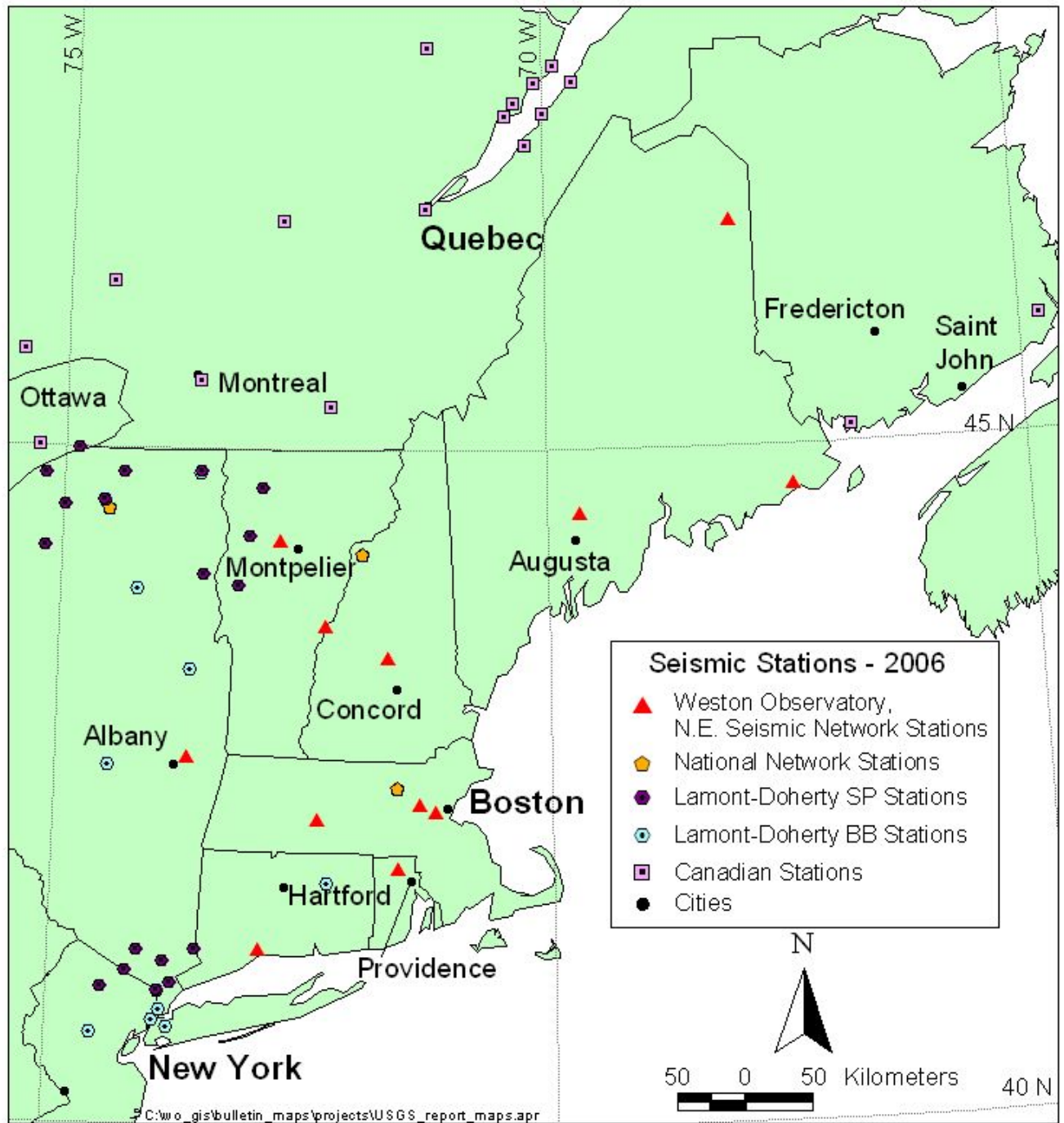


Figure 1: Map of stations of the New England Seismic Network (NESN) in operation during the period of this report. Also included are other Northeast U.S. and Canadian seismic stations in operation during this period.

[Return to Table of Contents](#)

NESN Strong-Motion Station Map

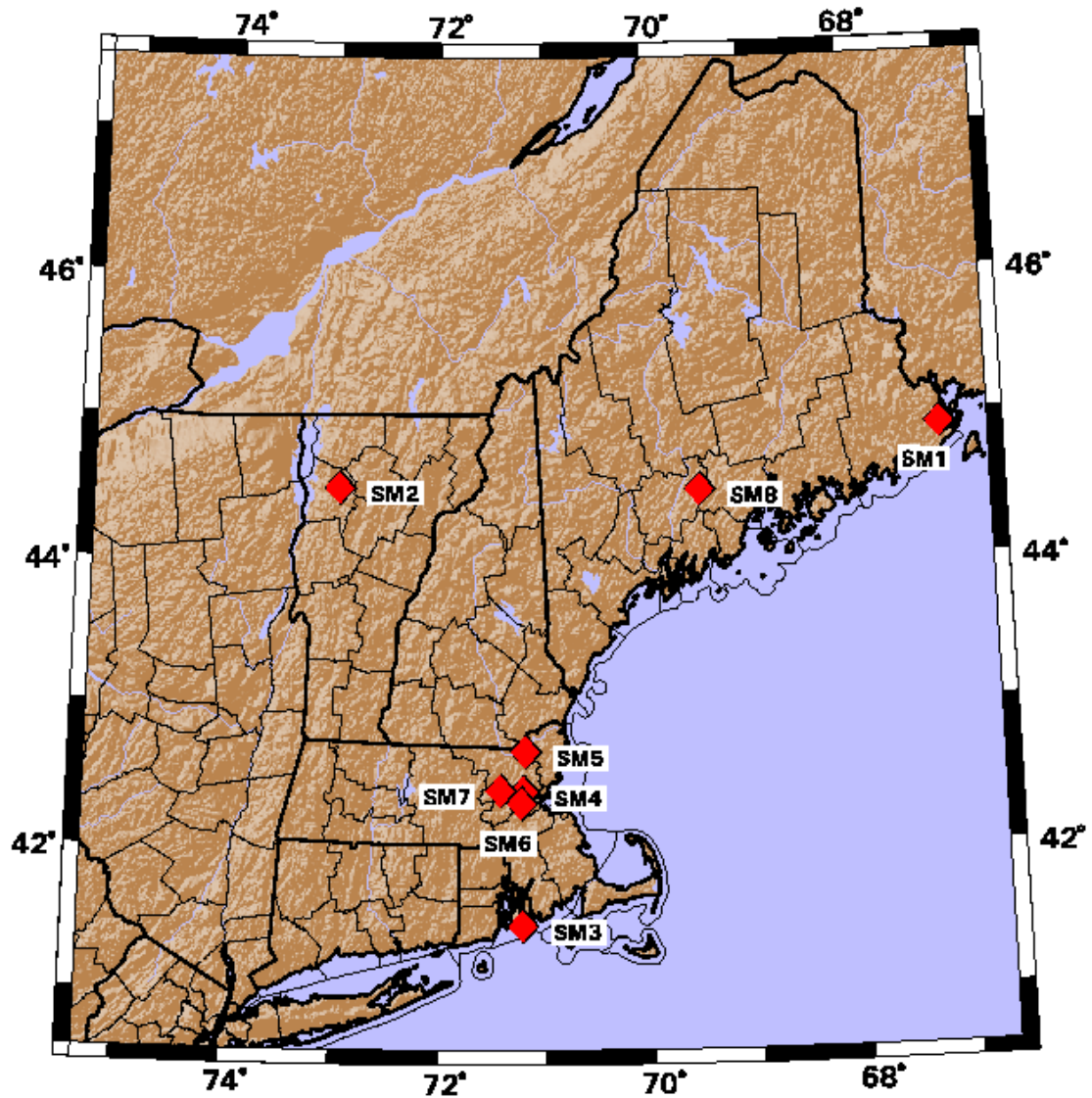


Figure 2: Map of strong-motion stations of the New England Seismic Network (NESN) in operation during the period of this report.

[Return to Table of Contents](#)

NESN Quarterly Seismicity Map

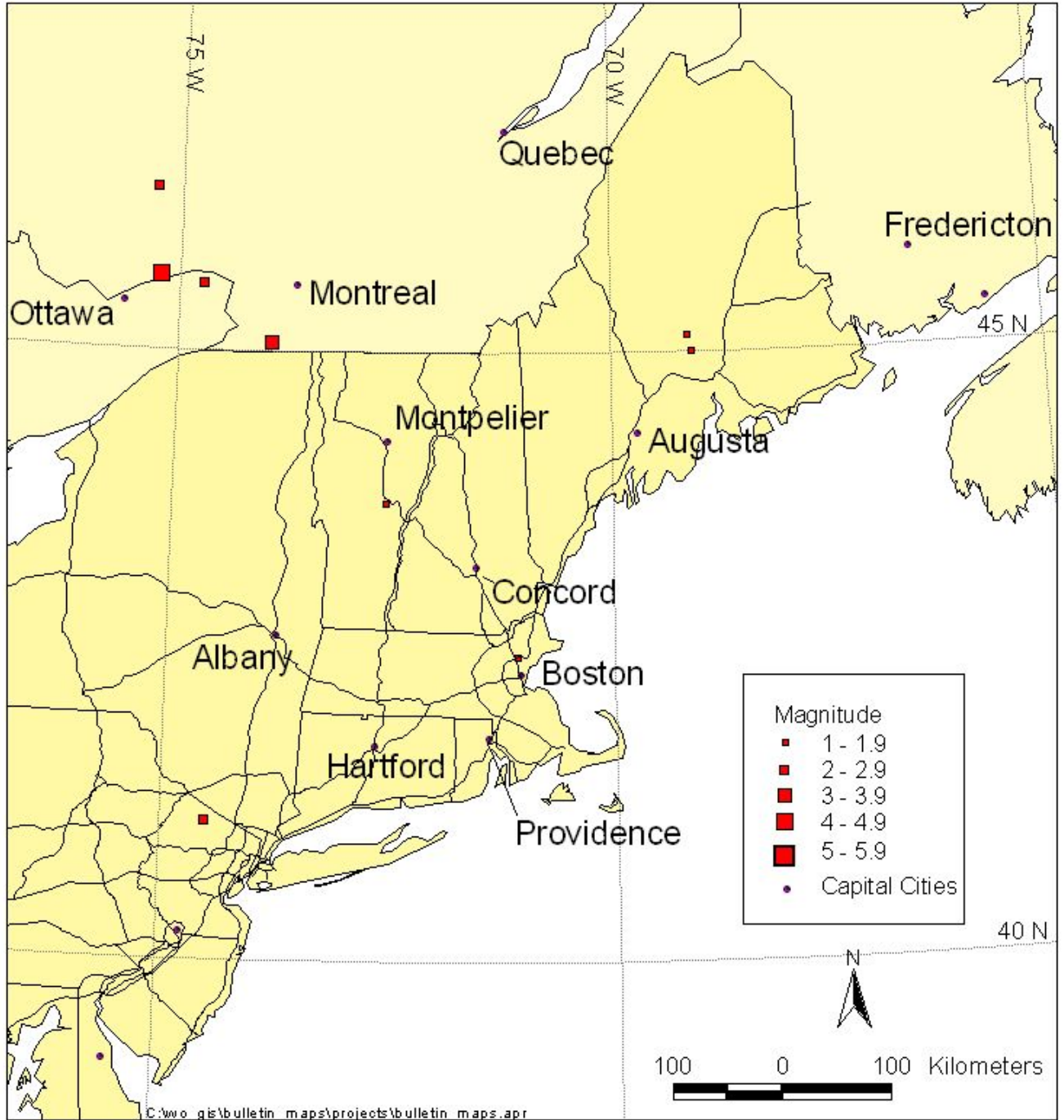


Figure 3: Earthquake epicenters located by the NESN during the period of this report.

[Return to Table of Contents](#)

NESN Cumulative Seismicity Map

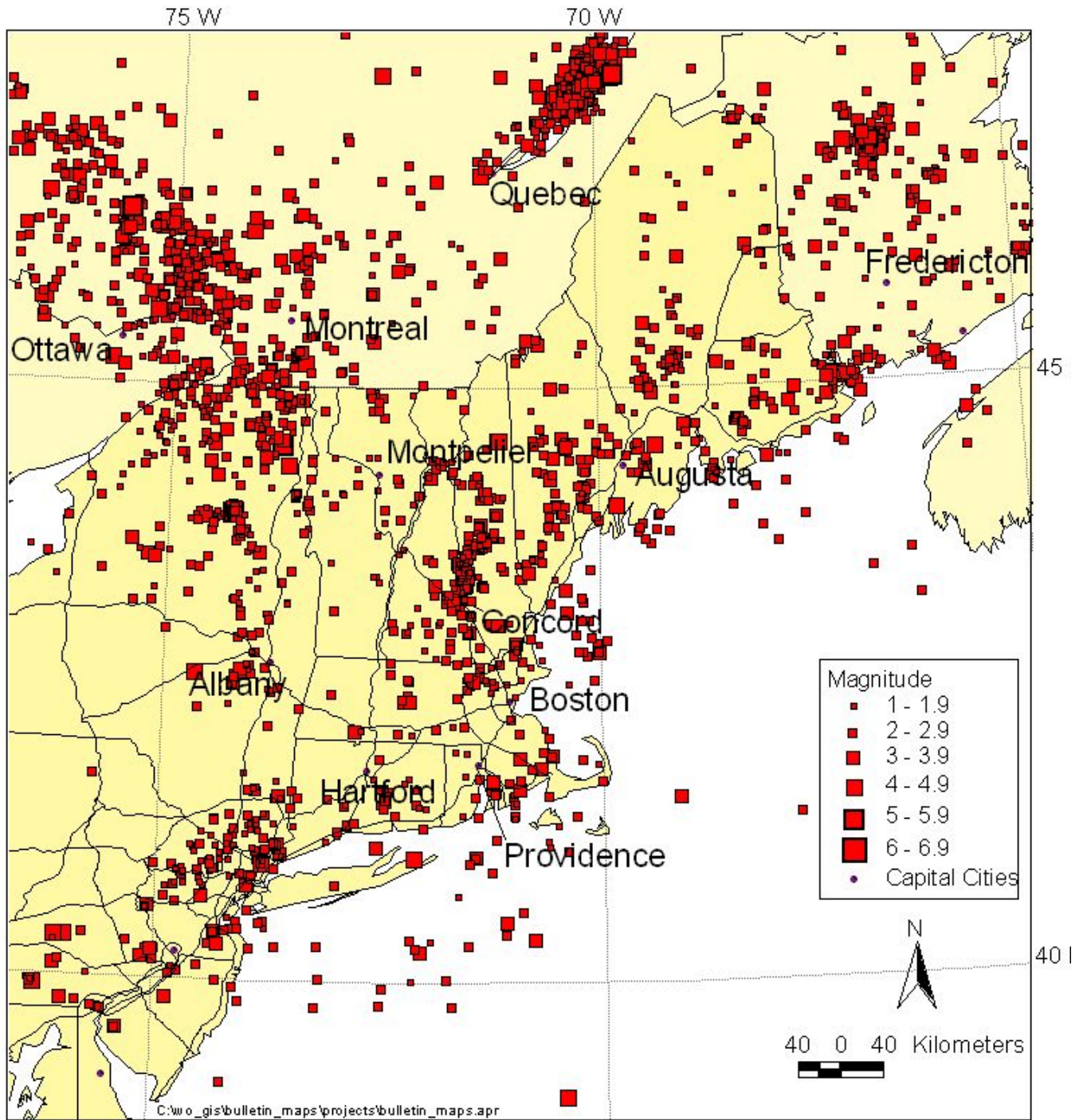


Figure 4: Seismicity for period October, 1975 - March, 2006.

[Return to Table of Contents](#)

Acknowledgments

Our map database has been developed in-house using ArcView and in part basemap data provided by ESRI, Inc., 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.

[Return to Table of Contents](#)

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