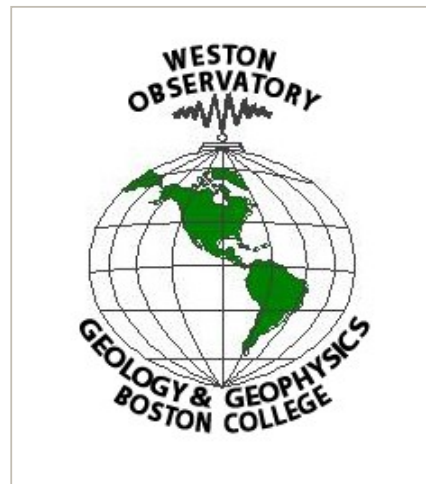


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A STUDY OF NEW ENGLAND SEISMICITY

Quarterly Earthquake Report

January-March, 2007



Weston Observatory
New England Seismic Network
381 Concord Road
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NEW ENGLAND SEISMIC NETWORK

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Notice

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Quarterly Earthquake Report
January-March, 2007

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Introduction

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

This report summarizes the work of the NESN for the period January-March, 2007. 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 11 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 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 40 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.

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Seismicity

There were 11 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 HYP078. 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 http://aki.bc.edu/cgi-bin/NESN/recent_events.pl. 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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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. Mn = Nuttli Magnitude
7. Mc = Coda Magnitude
8. Int = event epicentral intensity
9. Location = event geographic location

Table 4: Earthquake detailed hypocenter and phase data list

1. Geographic location
2. DATE = date event occurred, yr/mo/dy (year/month/day)
3. ORIGIN = event origin time (UCT) in hours, minutes, and seconds
4. LAT N = latitude north in degrees and minutes
5. LONG W = longitude west in degrees and minutes
6. DEPTH = event depth in kilometers
7. MN = Nuttli Lg phase magnitude with amplitude divided by period
8. MC = signal duration (coda) magnitude

WES: $2.23 \text{ Log(FMP)} + 0.12 \text{ Log(Dist)} - 2.36$ (Rosario, 1979)
MIT: $2.21 \text{ Log(FMP)} - 1.7$ (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	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
Weston Observatory		617-552-8300 617-552-8388 (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
BRYW	41.9199	-71.5342	107	Smithfield, RI	WES
FFD	43.4700	-71.6539	131	Franklin Falls Dam, NH	WES
HNH	43.7051	-72.2865	180	Hanover, NH	WES
QUA2	42.2790	-72.3521	168	Belchertown, MA	WES
TRY	42.7305	-73.6658	131	Troy, NY	WES
EMMW	44.7101	-67.4580	34	Machias, ME	WES
VT1	44.3317	-72.7536	125	Waterbury, VT	WES
WES	42.3848	-71.3218	60	Weston, MA	WES
WVL	44.5648	-69.6575	85	Waterville, ME	WES
YLE	41.3165	-72.9209	10	New Haven, CT	WES
PQI	46.6701	-68.0133	175	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

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TABLE 3

NEW ENGLAND AND ADJACENT REGIONS
January-March, 2007

Date M/D/Y	Time (UTC) Hr:Mn:Sec	Lat	Long	Depth (km)	Mn	Mc	Int	Location
01/06/2007	04:08:46.89	46.99	-76.23	18.00	3.1			PQ, 70KM NW of Ferme-Nueve
02/01/2007	01:04:42.23	43.86	-73.31	05.00	1.5	2.2		VT, 20KM SW of Middlebury
02/01/2007	16:48:45.58	44.27	-69.87	08.49	2.1	2.6		ME, 8.8KM SW of Augusta
02/06/2007	06:56:17.59	46.91	-68.63	09.72	1.3 [^]			ME, 8KM SW of Winterville
02/25/2007	03:44:45.12	42.15	-65.88	18.45	3.0	3.2		Atlantic Ocean, 420KM E of Boston, MA
02/26/2007	07:11:43.23	44.64	-68.46	10.47	1.7	2.5		ME, 10.8KM NNW of Ellsworth
03/04/2007	09:18:34.12	44.02	-68.46	13.80	2.2	2.4		ME, Offshore, 16KM SE of Isle Au Haut
03/11/2007	02:33:13.74	44.95	-73.84	10.85	2.2 [^]	2.5*		NY, 40KM NW of Plattsburgh
03/13/2007	05:21:55.51	43.35	-71.67	03.16	1.4	2.0		NH, 10KM SSW of Franklin
03/21/2007	15:55:37.95	43.76	-71.58	08.84	2.6	2.7		NH, 9KM E of Plymouth
03/23/2007	08:36:20.13	43.46	-72.21	09.25	0.8			NH, 15KM NE of Claremont

* indicates magnitude as calculated by Lamont Doherty Earth Observatory

[^] indicates magnitude as calculated by Earthquakes Canada (Natural Resources Canada)

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EARTHQUAKE PHASE DATA LIST
NEW ENGLAND AND ADJACENT REGIONS
January-March, 2007

A7106A.XX

NORTHERN NY AND ADIRONDACKS

07JAN06 CANADA, PQ, 70KM NW OF FERME-NEUVE

Table with columns: DATE, ORIGIN, LAT N, LONG W, DEPTH, MN, MC, ML, GAP, RMS, ERH, ERZ, Q. Contains multiple rows of seismic event data for the 07JAN06 event.

A7201A.XX

NORTHERN NY AND ADIRONDACKS

07FEB01 VT, 20KM (12.4MI) SW OF MIDDLEBURY

Table with columns: DATE, ORIGIN, LAT N, LONG W, DEPTH, MN, MC, ML, GAP, RMS, ERH, ERZ, Q. Contains multiple rows of seismic event data for the 07FEB01 event.

None recorded this period.

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NESN Station Map

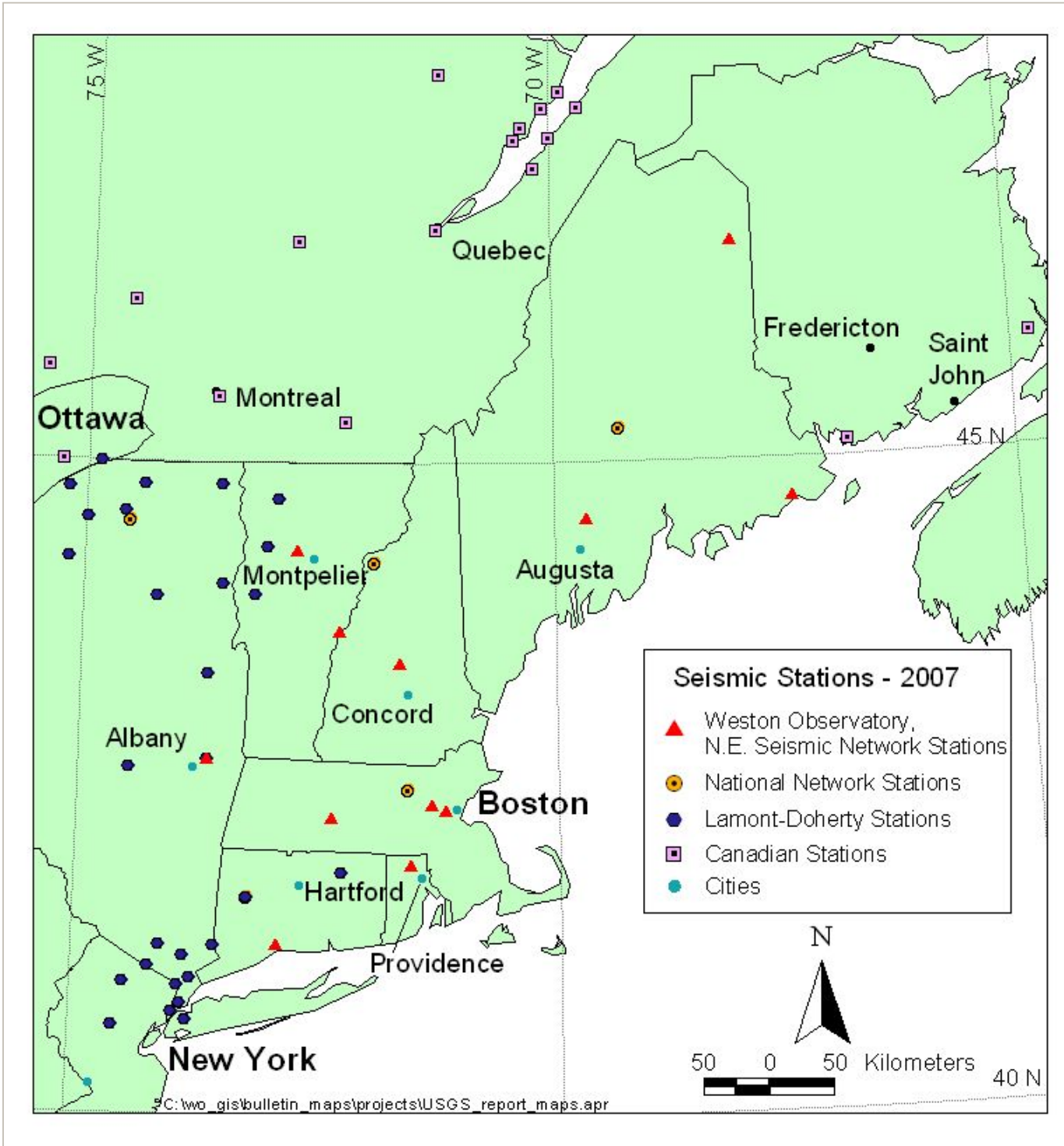


Figure 1: Map of stations of the New England Seismic Network (NESN) in operation during the period of this report. Also included are other Northeast U.S. and Canadian seismic stations in operation during this period.

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NESN Strong-Motion Station Map

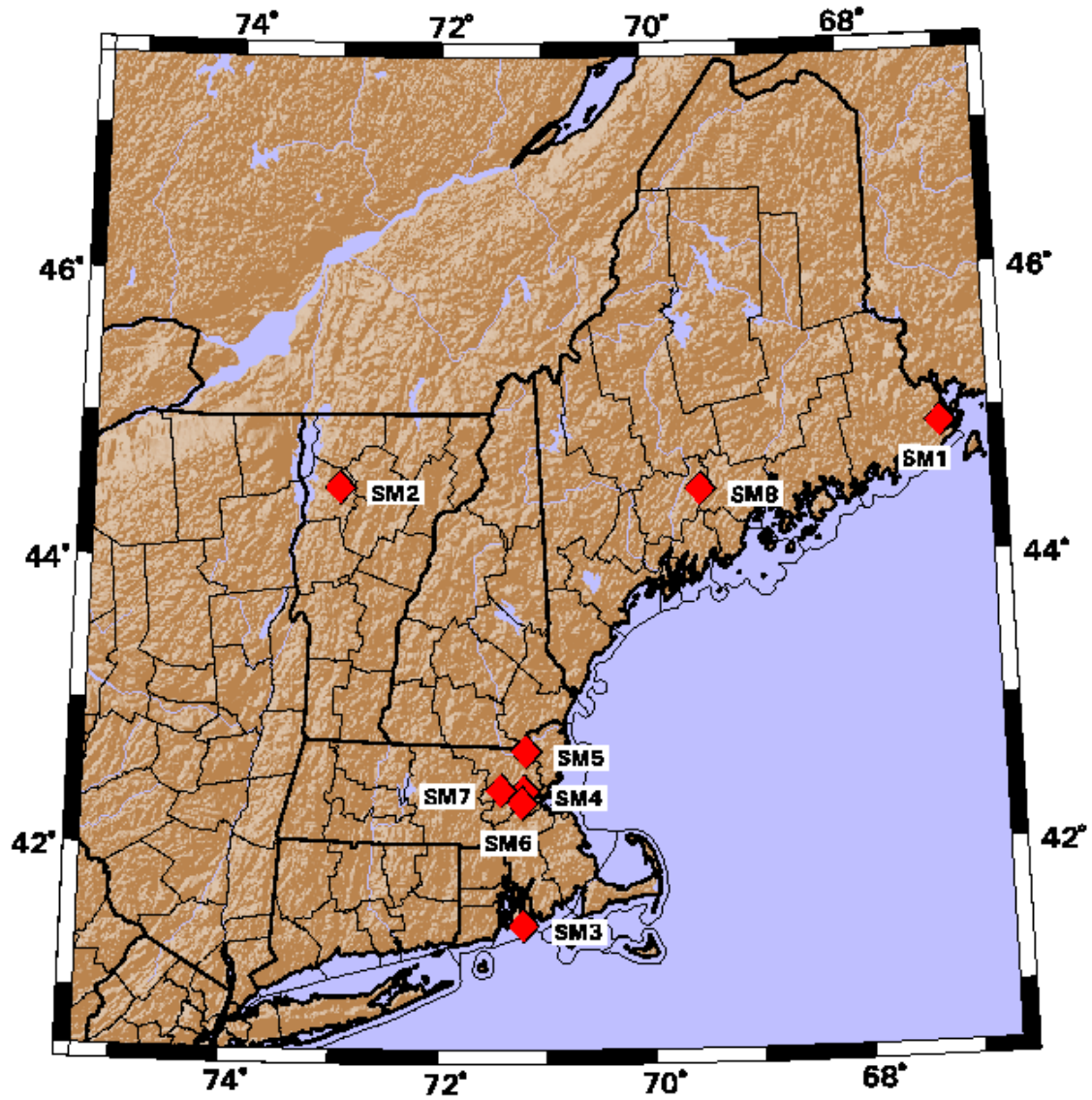


Figure 2: Map of strong-motion stations of the New England Seismic Network (NESN) in operation during the period of this report.

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NESN Quarterly Seismicity Map

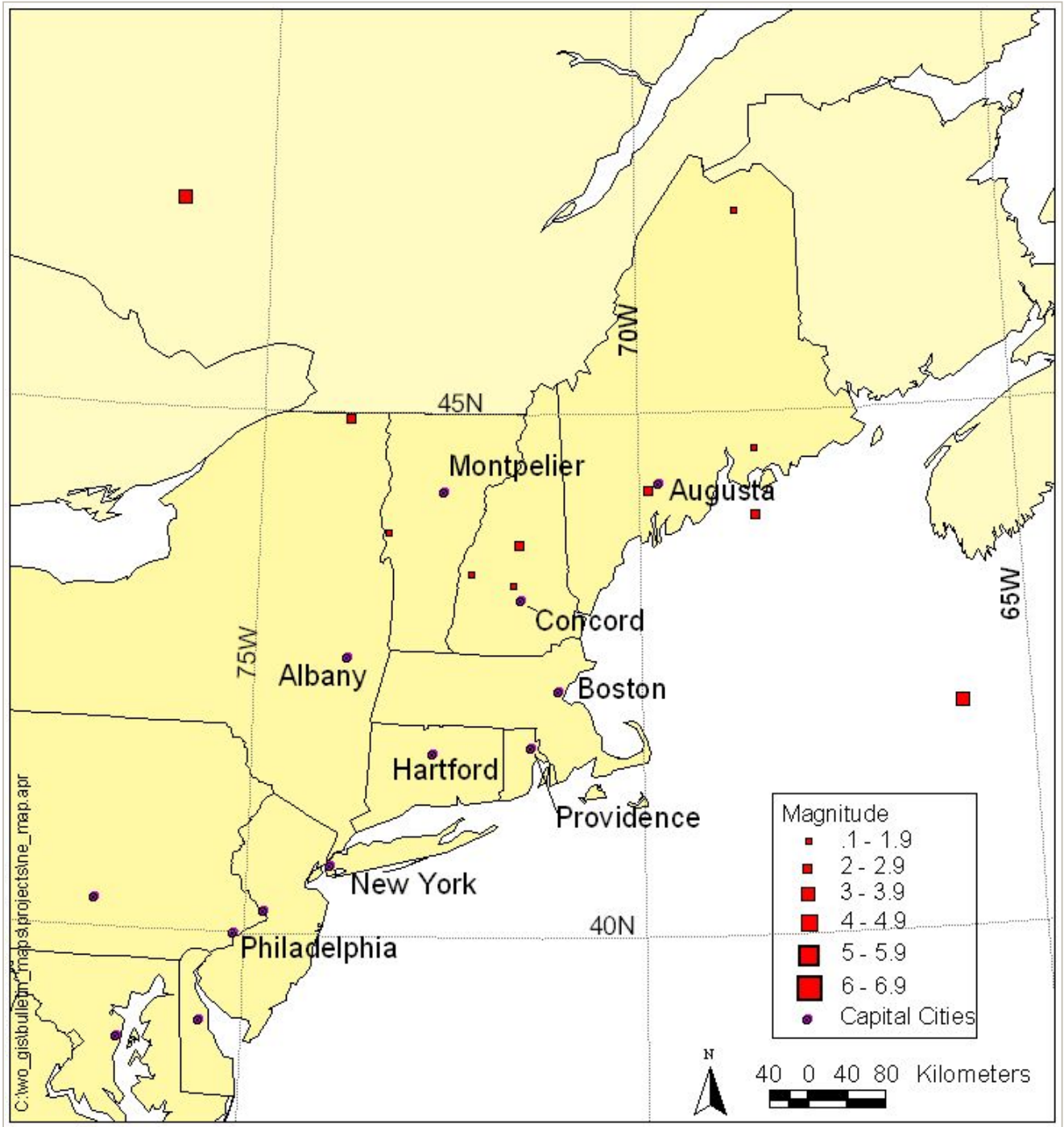


Figure 3: Earthquake epicenters located by the NESN during the period of this report.

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NESN Cumulative Seismicity Map

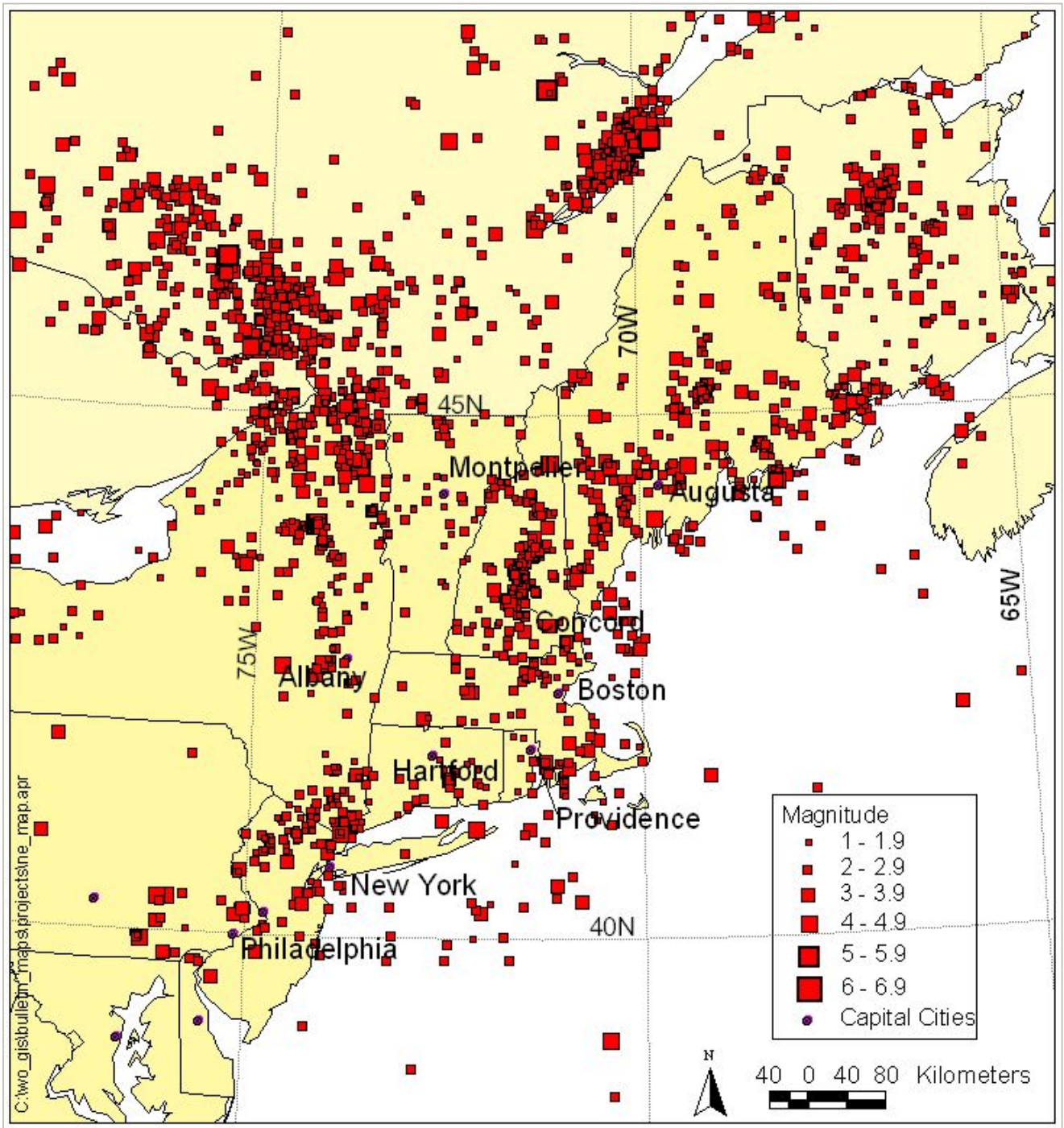


Figure 4: Seismicity for period October, 1975 - March, 2007.

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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.

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