

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Preliminary Isoseismal Map for the Blue Mountain Lake,
New York, earthquake of October 7, 1983

by

Carl W. Stover¹

Open-File Report 84-263

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey edited standards and stratigraphic nomenclature.

¹Denver, Colorado

INTRODUCTION

The Blue Mountain Lake, New York earthquake of October 7, 1983 was felt over a contiguous area of approximately 250,000 km² of the United States. This area includes all or parts of the nine New England states; Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont (fig. 1). Isolated felt reports were received from towns in Maryland, Michigan, and Ohio. Reports from Maryland and Ohio were not included in the felt area encompassed by the isoseismals. The hypocenter was located by the Lamont-Doherty Geological Observatory (PAL) of Columbia University at 43.938° N., 74.258° W., depth 13 km, origin time 10h18m46.1s UTC. The magnitudes published in the U.S. Geological Survey (USGS), Preliminary Determination of Epicenters were 5.1mb(USGS), 5.1ML(PAL), and 5.3Mn(Virginia Polytechnic and State University).

The published record of seismic activity in the Blue Mountain Lake area began with an earthquake swarm in early May 1971 (Sbar and others, 1972) and has continued at lower levels to the present time. The 1983 earthquake was the largest magnitude to occur here since the magnitude 3.6Mn(PAL) event of May 23, 1971. It is located about 18 km east of the 1971 swarm. The felt area within the United States (fig. 1) covers the largest land area since the magnitude 5.8Mn, Massena, New York-Cornwall, Ontario, earthquake of September 5, 1944 (fig. 2) which had a United States felt area of about 453,250 km² (Bodle, 1946).

ISOSEISMAL MAP

The preliminary isoseismal map shown in Figure 1 was completed from data obtained from a questionnaire canvass of postmasters and police departments (within 150 km of the epicenter), supplemented with information from numerous press reports. Intensities were rated using the Modified Mercalli Intensity Scale of 1931 (Wood and Neumann, 1931). The final version of the isoseismal map will be published in USGS Special Publication "United States Earthquakes, 1983" in 1985. It will be updated to include the intensity data from Canada when it is available.

No major damage resulted from this earthquake; however, a small area mostly south of the epicenter (fig. 1) was rated at intensity VI. The damage reported was minor; consisting of cracked chimneys, bricks fallen from chimneys, cracked dry wall, cracked foundations, and in one case, large cracks in an exterior cinderblock wall. The lack of substantial damage may be due in part to the location of the epicenter being in a lightly populated area of the Adirondack Mountains. Most questionnaires in the epicentral area contained reports of moderate to loud earth noise.

The intensity V isoseismals outline a generally circular area surrounding the epicenter plus a number of small anomalous outlying areas. These anomalous areas were delineated on the basis of three or more contiguous intensity V reports. Some isolated reports of intensity V were rated for locations within the intensity II-IV isoseismal.

The most common effects reported for locations rated at intensity V are listed below along with the percentage of the total questionnaires noting the particular effect. Four hundred and sixty-five questionnaires were rated at intensity V.

<u>Effect</u>	<u>Percent</u>
cracked windows	29.5
few small objects overturned	70.7
few small objects fell	80.3
few glassware/dishes broken	40.8
few groceries thrown from store shelves	29.9
hairline cracks in plaster/drywall	19.5
trees or bushes shaken slightly	33.6
standing vehicles rocked slightly	21.2
moving vehicles rocked slightly	15.5

Figures 2 and 3 are isoseismal maps for two other large earthquakes in the New England area; one in New York and one in New Hampshire. A comparison of the isoseismals shown in the three figures suggests an elongation of the isoseismals westward from the epicenters. This is more obvious for the 1982 New Hampshire and the 1983 New York events. The 1944 New York event trends more southwestward. These maps seem to indicate a pattern of lower attenuation of shaking in the New England area west of the epicenter as compared to the east. The attenuation difference is not as obvious in the north-south direction.

REFERENCES CITED

- Bodle, R. R., 1946, United States Earthquakes, 1944: U.S. Coast and Geodetic Survey, Serial No. 682, 43 p.
- Sbar, M. L., Armbruster, John, and Aggarwal, Y. P., 1972, The Adirondack, New York, earthquake swarm of 1971 and tectonic implications: Seismological Society of America Bulletin, V. 62, no. 5, p. 1303-1317.
- Smith, W. E. T., 1966, Earthquakes of eastern Canada and adjacent areas, 1928-1959: Publications of the Dominion Observatory, Ottawa, V. 32, no.3, p. 87-121.
- Stover, C. W., Minsch, J. H., Reagor, B. G., and Baldwin, F. W., 1983, Earthquakes in the United States, January-March 1982: U. S. Geological Survey Circular 896-A, 42 p.

Wood, H. O., and Neumann, Frank, 1931 Modified Mercalli Intensity Scale of 1931: Seismological Society of America Bulletin, V. 21, no. 4, p. 277-283.

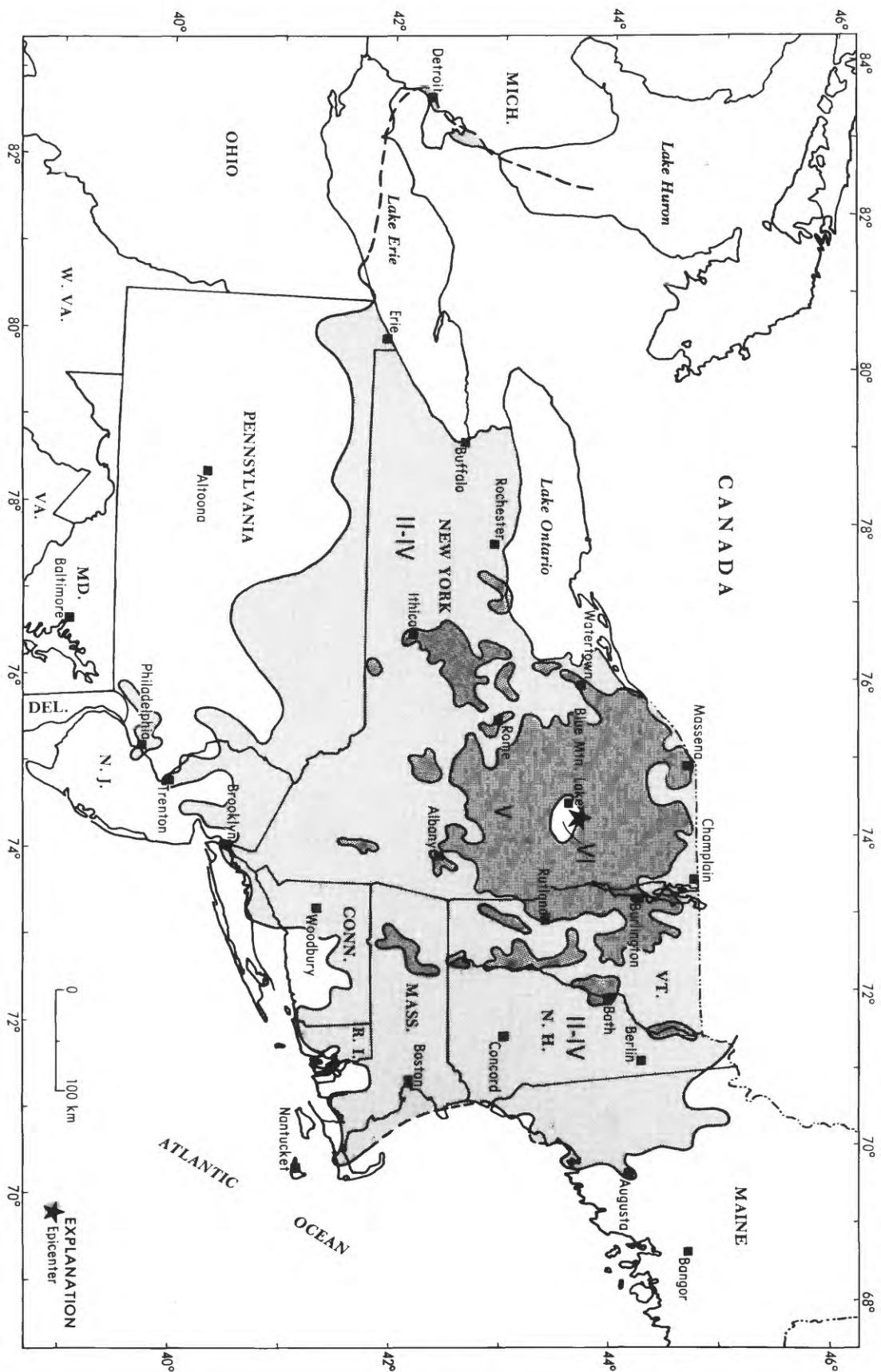


FIGURE 1.--Isoseismal map for the Blue Mountain Lake, New York, earthquake of 7 October 1983. Roman numerals represent Modified Mercalli intensities between isoseismals.

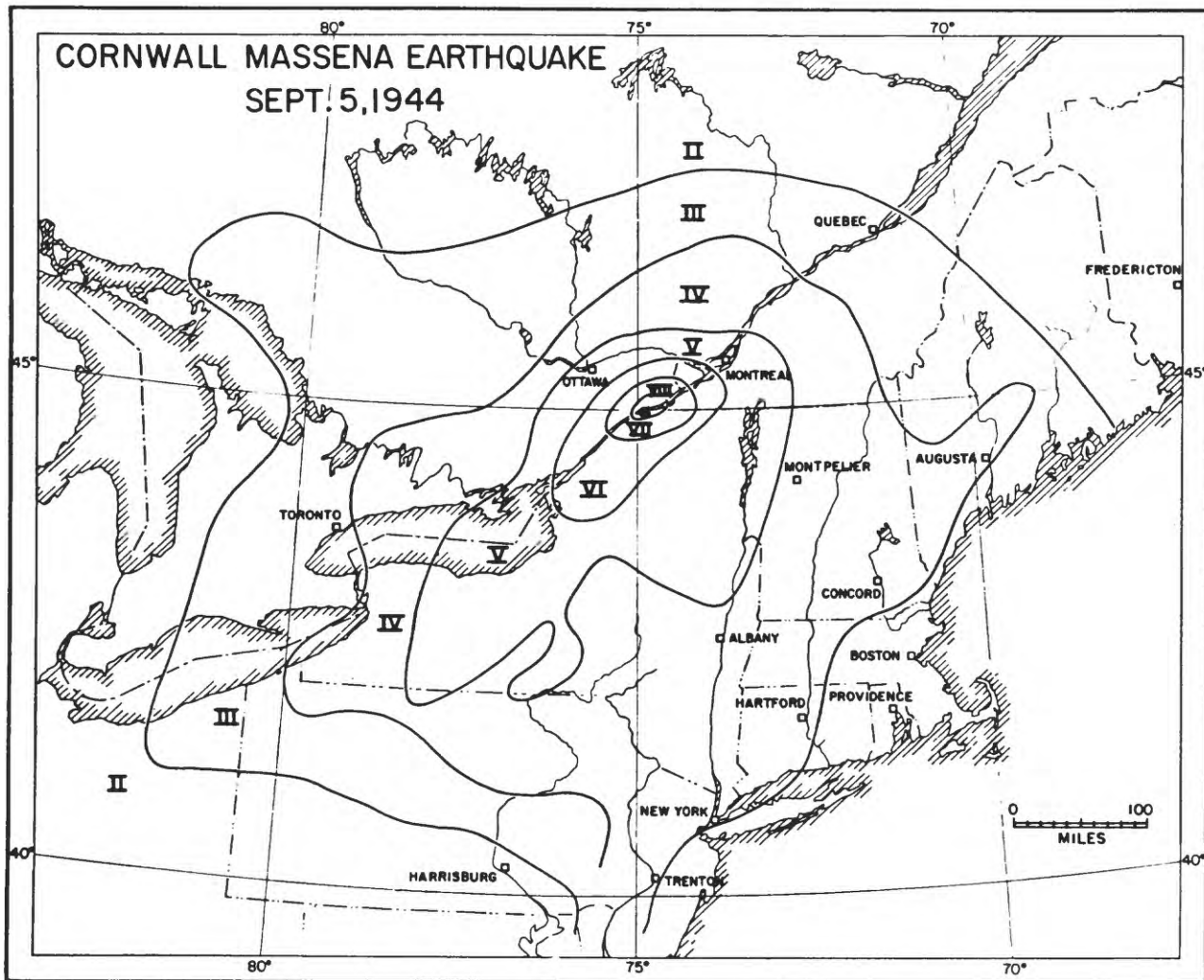


FIGURE 2.--Isoseismal map for the Massena, New York-Cornwall, Ontario, earthquake of 5 September, 1944 (Smith, 1966). Roman numerals represent Modified Mercalli intensities between isoseismals.

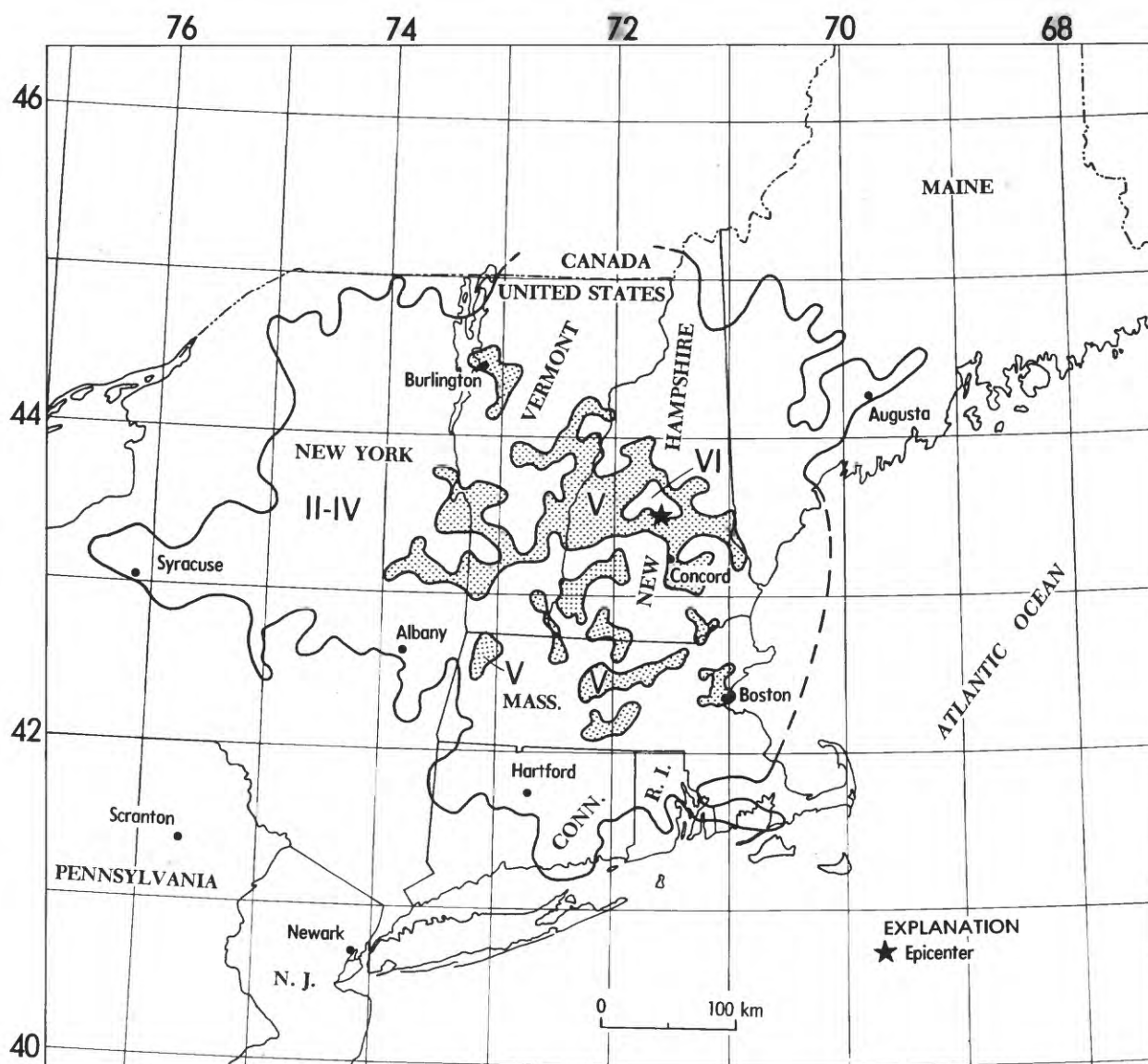


FIGURE 3.--Isoseismal map for the central New Hampshire earthquake of 19 January 1982 (Stover and others, 1983). Roman numerals represent Modified Mercalli intensities between isoseismals.