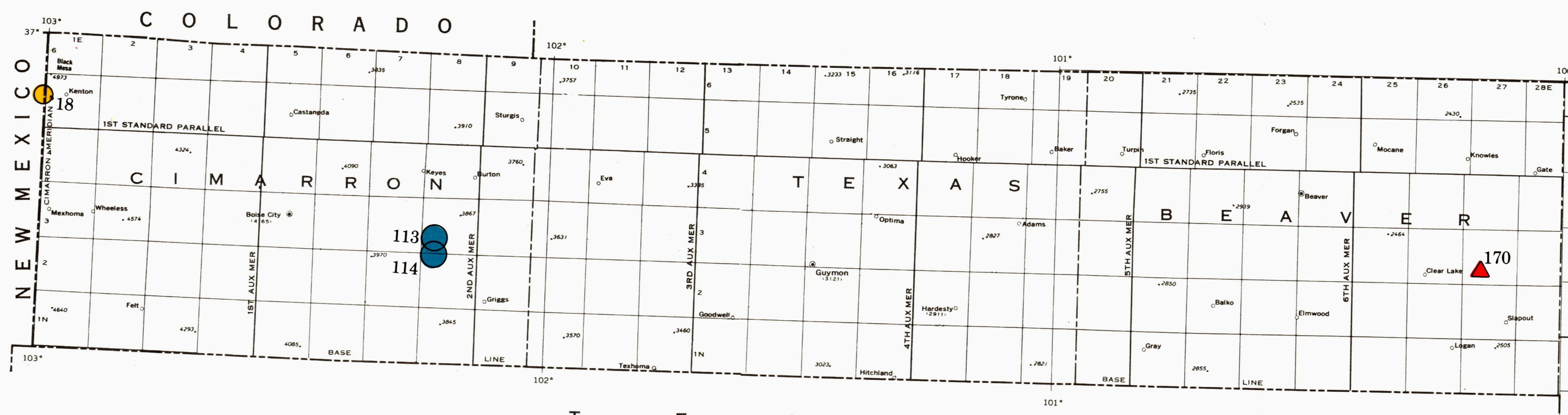

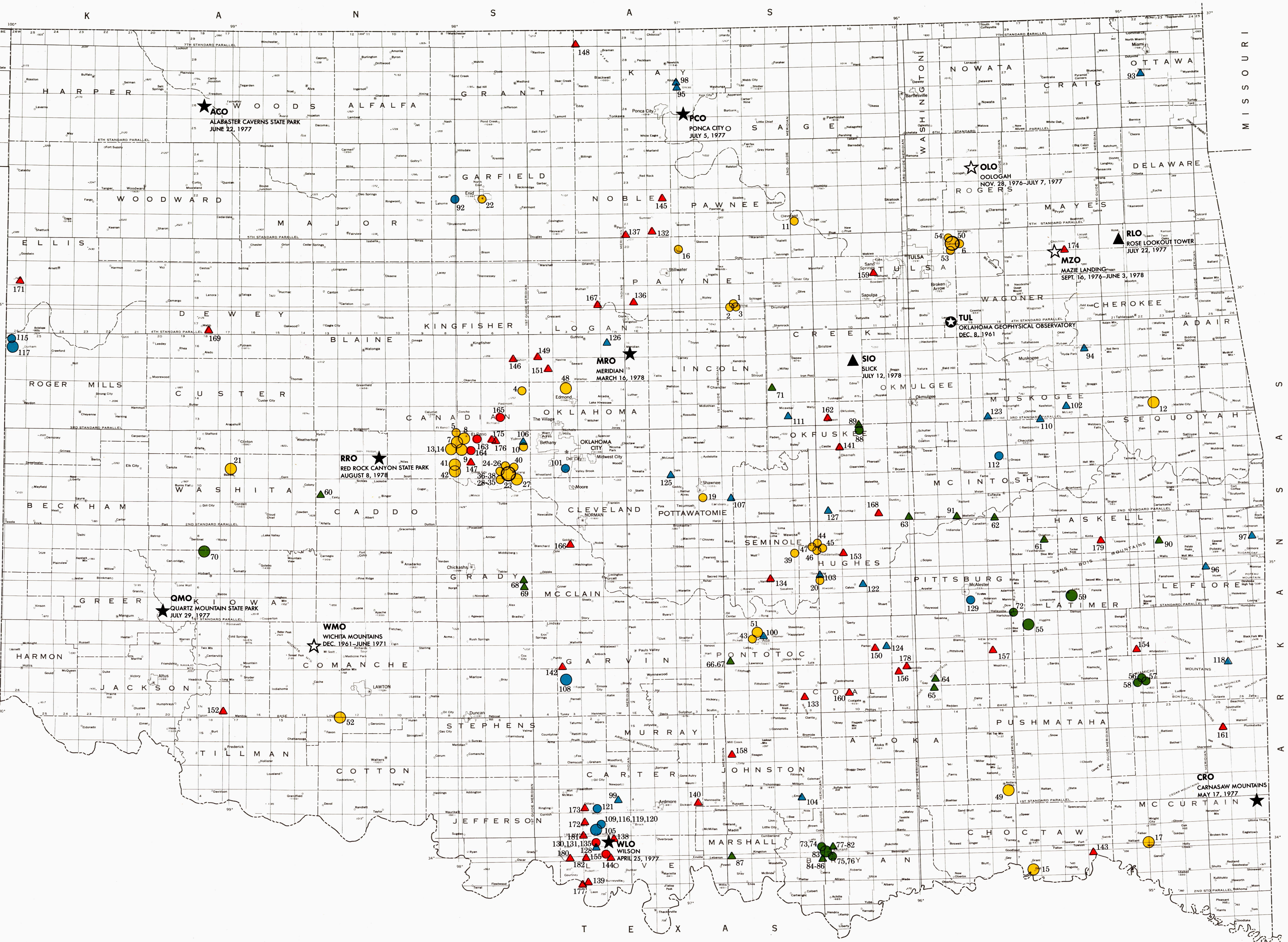

EARTHQUAKE CATALOG OF OKLAHOMA, 1900-1978

EVENT NUMBER	DATE AND ORIGIN TIME (UTC)[1]				COUNTY	INTENSITY[2]	MAGNITUDE[3]	LATITUDE DEGREES N.	LONGITUDE DEGREES W.	SOURCES[4]
1	1900	Dec			Payne	MM IV		36.0	96.8	W
2	1901	Apr	01		Payne	felt		36.0	96.8	W
3	1901	Apr	08	1330	Payne	felt		36.0	96.8	W
4	1908	Jul	19	Local A.M.	Canadian	MM III		35.7	97.7	D
5	1910				Canadian	felt		35.5	98.0	T,K
6	1915	Nov	08		Rogers	felt		36.2	95.8	T,K
7	1918	Sep	10	1630	Canadian	MM V		35.5	98.0	U
8	1918	Sep	11	0630	Canadian	MM VI		35.5	98.0	D
9	1918	Sep	11	0900	Canadian	MM VI		35.5	98.0	D
10	1918				Canadian	MM IV		35.5	97.7	D
11	1924	Jun	03		Pawnee	MM III		36.3	96.5	D,T,K
12	1926	Jun	20	1420	Sequoyah	MM V	3.6 ML	35.6	94.9	D,T
13	1929	Dec	28	0030	Canadian	MM VI	3.7 ML	35.5	98.0	U,T
14	1933	Aug	19	1930	Canadian	MM V		35.5	98.0	U,D,T
15	1934	Apr	11	1740	Choctaw	MM V	3.2 ML	33.9	95.5	U,T
16	1935	Nov	29		Payne	felt		36.2	97.0	T,K
17	1936	Mar	14	1720	McCurtain	MM V	2.4 ML	34.0	95.0	U,D,T
18	1936	Jul	12	0023	Cimarron	felt		36.9	103.0	U,D,T,K
19	1937	Jun	08	1426	Pottawatomie	MM IV		35.3	96.9	D,K
20	1939	Jun	01	0730	Hughes	MM IV	4.4 ML	35.0	96.4	U,D,T
21	1941	Oct	18	0748	Washita	MM V		35.4	99.0	U,D,T
22	1942	Jun	12	0550	Garfield	MM III	2.7 ML	36.4	97.9	U,D,T
23	1952	Apr	09	162915	Canadian	MM VII	5.5 mb	35.4	97.8	U,D,T,K
24	1952	Apr	09	1830	Canadian	felt		35.4	97.8	U,D,T,K
25	1952	Apr	11	2030	Canadian	MM IV		35.4	97.8	U,D,T,K
26	1952	Apr	16	0558	Canadian	felt		35.4	97.8	U,D,T
27	1952	Apr	16	0605	Canadian	MM V		35.4	97.8	U,D,T
28	1952	May	01	1140	Canadian	felt		35.4	97.8	T,K
29	1952	May	02	0155	Canadian	felt		35.4	97.8	T,K
30	1952	Jun	16		Canadian	felt		35.4	97.8	T,K
31	1952	Jun	16		Canadian	felt		35.4	97.8	T,K
32	1952	Jun	16		Canadian	felt		35.4	97.8	U,T,K
33	1952	Jun	16		Canadian	felt		35.4	97.8	T,K
34	1952	Jun	16		Canadian	felt		35.4	97.8	U,T,K
35	1952	Jun	16		Canadian	felt		35.4	97.8	U,T,K
36	1952	Jun	16	0030	Canadian	MM IV		35.4	97.8	U,D
37	1952	Jul	17	0200	Canadian	felt		35.4	97.8	U,D,T
38	1952	Aug	14	2140	Canadian	MM IV		35.4	97.8	U,D,T,K
39	1952	Oct	08	0415	Seminole	MM IV		35.1	96.5	U,D,T
40	1953	Mar	16	1250	Canadian	MM III		35.4	97.8	U,D,T
41	1953	Mar	17	1312	Canadian	MM V		35.4	98.0	U,D,T
42	1953	Mar	17	1425	Canadian	MM VI		35.4	98.0	U,D
43	1953	Jun	06	1740	Pontotoc	MM IV		34.8	96.7	U,D,T
44	1954	Apr			Hughes	MM IV		35.1	96.4	U
45	1954	Apr	11		Hughes	MM IV		35.1	96.4	U,D,T
46	1954	Apr	12	2305	Hughes	MM IV		35.1	96.4	U,D,T,K
47	1954	Apr	13	1848	Hughes	MM IV		35.1	96.4	U,D,T,K
48	1956	Feb	16	2330	Oklahoma	MM VI	3.8 ML	35.7	97.5	U,D,T
49	1956	Apr	02	160318	Pushmataha	MM V		34.2	95.6	U,D,T
50	1956	Oct	30	103621	Rogers	MM VII	4.2 ML	36.2	95.8	U,D,T
51	1959	Jun	15	1245	Pontotoc	MM V	2.7 ML	34.8	96.7	U,D,T,K
52	1959	Jun	17	102707	Comanche	MM VI	4.8 ML	34.5	98.5	U,D,T,K
53	1960	Mar	18	2130	Rogers	felt		36.2	95.8	T,K
54	1960	Mar	18	2330	Rogers	felt		36.2	95.8	T,K
55	1961	Jan	11	0140	Latimer	MM V		34.8	95.5	U,D,T,K
56	1961	Apr	26	0705	Pushmataha	MM III		34.6	95.0	D
57	1961	Apr	27	0300	Pushmataha	felt		34.6	95.0	U,D
58	1961	Apr	27	0500	Pushmataha	felt		34.6	95.0	U,D
59	1961	Apr	27	0730	Latimer	MM V		34.9	95.3	U,D
60	1962	Apr	28	060911	Caddo		3.3 ML	35.3	98.6	T
61	1962	May	18	024029.3	Pittsburg		2.6 ML	35.1	95.4	T
62	1962	Aug	04	001807.3	Pittsburg		2.2 ML	35.2	95.6	T
63	1962	Sep	01	020956.1	Hughes		2.8 ML	35.2	96.0	T
64	1963	Jan	15	053337.0	Atoka		2.2 ML	34.6	95.9	T
65	1963	Mar	13	093334.0	Atoka		3.1 ML	34.6	95.9	T
66	1963	Jun	12	120831.0	Pontotoc		2.1 ML	34.7	96.8	T
67	1963	Jun	12	163852.0	Pontotoc		2.6 ML	34.7	96.8	T
68	1963	Jul	14	080823.2	Grady		2.0 ML	35.0	97.7	T
69	1963	Jul	14	081027.0	Grady		2.6 ML	35.0	97.7	T
70	1964	Feb	02	082244.1	Kiowa	MM V	2.8 mbeus	35.1	99.1	O,D,I
71	1966	Mar	26	051709	Creek		2.3 m3Hz	35.7	96.6	O,Z
72	1968	Jan	04	2230	Pittsburg	MM IV		34.85	95.55	O,U
73	1968	Oct	11	022255	Bryan	felt	2.3 m3Hz	34.0	96.4	O,U,Z
74	1968	Oct	11	024042	Bryan	felt	1.9 m3Hz	34.0	96.4	O,U,Z
75	1968	Oct	11	085542	Bryan	felt	2.8 m3Hz	34.0	96.4	O,U,Z
76	1968	Oct	11	093337	Bryan	felt	2.4 m3Hz	34.0	96.4	O,U,Z
77	1968	Oct	11	214457	Bryan		2.0 mbLg	34.0	96.4	O,Z
78	1968	Oct	12	035028	Bryan		1.8 mbLg	34.0	96.4	O,Z
79	1968	Oct	12	111906	Bryan		1.1 m3Hz	34.0	96.4	O,Z
80	1968	Oct	12	214644	Bryan		2.6 mbLg	34.0	96.4	O,Z
81	1968	Oct	14	034520	Bryan		2.0 m3Hz	34.0	96.4	O,Z
82	1968	Oct	14	142754	Bryan		1.5 MDUR	34.0	96.4	O,Z
83	1968	Oct	14	144254	Bryan	MM VI	3.5 m3Hz	34.0	96.4	O,U,Z
84	1968	Oct	17	071924	Bryan		1.7 mbLg	34.0	96.4	O,Z
85	1968	Oct	17	215457	Bryan		2.0 mbLg	34.0	96.4	O,Z
86	1968	Oct	18	211410	Bryan		2.8 mbLg	34.0	96.4	O,Z
87	1968	Nov	15	104125	Marshall		2.6 m3Hz	34.0	96.8	O,Z
88	1969	May	02	113322.5	Okfuskee	felt	3.6 mbeus	35.5	96.2	O,I
89	1969	May	02	115416	Okfuskee		0.8 MDUR	35.5	96.2	O,Z
90	1971	Mar	01	192732.1	Le Flore		2.5 mbeus	35.1	94.9	O
91	1971	Mar	13	192215.3	McIntosh		2.7 mbLg	35.2	95.8	O
92	1973	Jan	10	163815.3	Garfield	MM I	2.7 mbLg	36.4	98.0	O
93	1973	Sep	28	220303.1	Ottawa		2.0 m3Hz	36.8	94.9	O
94	1973	Oct	27	100845.4	Muskogee		1.9 m3Hz	35.8	95.2	O
95	1973	Nov	13	234339.3	Kay		1.9 m3Hz	36.8	97.0	O
96	1973	Nov	18	100352.7	Le Flore		3.1 mbLg	35.0	94.7	O
97	1973	Dec	25	041132.0	Le Flore		2.8 mbLg	35.1	94.5	O
98	1974	Jan	03	221205.8	Kay		2.2 mbLg	36.8	97.0	O
99	1974	May	10	011517.8	Carter		2.6 mbLg	34.2	97.3	O
100	1974	Nov	10	061918.6	Pontotoc		2.7 m3Hz	34.8	96.7	O
101	1974	Dec	16	023018.8	Oklahoma	MM III	2.6 m3Hz	35.4	97.5	O
102	1975	Mar	31	095206.0	Muskogee		2.9 m3Hz	35.6	95.3	O
103	1975	May	25	165846.2	Hughes		2.0 m3Hz	35.0	96.4	O
104	1975	Jun	16	015928.2	Johnston		2.9 m3Hz	34.2	96.5	O
105	1975	Sep	13	012502.1	Carter	MM V	3.4 mbLg	34.1	97.4	O
106	1975	Oct	12	025811.5	Canadian		3.2 mbLg	35.5	97.7	O
107	1975	Oct	30	003714.1	Pottawatomie		2.7 m3Hz	35.3	96.8	O
108	1975	Nov	29	142941.2	Garvin	MM V	3.6 mbLg	34.65	97.53	O
109	1975	Dec	19	052925.0	Carter	MM II	2.5 mbLg	34.1	97.4	O
110	1976	Jan	20	000525.4	McIntosh		2.1 m3Hz	35.54	95.42	O
111	1976	Feb	16	055949.1	Okfuskee		2.3 m3Hz	35.59	96.52	O
112	1976	Mar	16	073945.3	McIntosh	MM IV	2.7 m3Hz	35.43	95.60	O
113	1976	Mar	30	065316	Cimarron	MM V	2.1 mbLg	36.68	102.25	O
114	1976	Mar	30	092702.0	Cimarron	MM V	2.7 mbLg	36.68	102.25	O
115	1976	Apr	16	185946.1	Roger Mills	MM IV	3.4 mbLg	35.87	99.97	O
116	1976	Apr	17	024805.7	Carter	MM II	2.4 mbLg	34.1	97.4	O
117	1976	Apr	19	044243.9	Roger Mills	MM V	3.5 mbLg	35.87	99.97	O
118	1976	Jun	07	013049.6	Le Flore		1.9 mbLg	34.66	94.62	O
119	1976	Jun	23	082117.8	Carter	MM III	2.7 mbLg	34.1	97.4	O
120	1976	Jun	24	080239.5	Carter	MM II	1.4 m3Hz	34.1	97.4	O
121	1976	Sep	20	094016.2	Carter	MM III	2.1 mbLg	34.16	97.40	O
122	1976	Oct	03	163108.8	Hughes		2.3 m3Hz	34.93	96.22	O
123	1976	Oct	19	135136.9	Muskogee		1.6 m3Hz	35.56	95.68	O
124	1976	Oct	20	040539.8	Coal		2.5 mbLg	34.75	96.12	O
125	1976	Oct	22	171550.5	Pottawatomie		3.0 mbLg	35.38	97.06	O
126	1976	Nov	11	161221.9	Logan		2.2 mbLg	35.85	97.32	O
127	1976	Nov	19	055224.8	Hughes		2.3 m3Hz	35.23	96.38	O
128	1976	Dec	17		Love	felt		34.06	97.37	O
129	1976	Dec	19	082636.7	Pittsburg	MM I	2.9 mbLg	34.92	95.73	O
130	1977	Feb	04	205229.3	Love	MM II	1.9 mbLg	34.07	97.37	O
131	1977	Feb	10	012816.3	Love	MM II	2.0 mbLg	34.07	97.37	O
132	1977	Mar	03	140816.5	Noble		1.9 m3Hz	36.26	97.14	O
133	1977	Mar	09	162108.1	Coal		2.1 m3Hz	34.59	96.51	O
134	1977	Mar	12	210419.6	Seminole		2.3 mbLg	34.99	96.63	O
135	1977	Mar	26	213712.6	Love	MM III	2.4 mbLg	34.07	97.37	O
136	1977	Apr	28	023056.1	Payne		1.8 mbLg	36.01	97.20	O
137	1977	May	22	121504.7	Noble		1.4 mbLg	36.24	97.25	O
138	1977	Jun	16	020246.6	Love		2.0 mbLg	34.04	97.36	O
139	1977	Jun	16	222424.1	Love		1.8 MDUR	33.91	97.44	O
140	1977	Jun	30	230322.0	Carter		2.5 mbLg	34.19	96.96	O
141	1977	Jul	10	083909.3	Okfuskee		1.6 mbLg	35.48	96.30	O
142	1977	Aug	10	001118.2	Garvin		1.9 mbLg	34.68	97.55	O
143	1977	Sep	12	023630.1	Choctaw		2.5 m3Hz	33.95	95.24	O
144	1977	Sep	26	015510.6	Love		1.7 mbLg	33.99	97.35	O
145	1977	Sep	29	071901.1	Noble		2.1 m3Hz	36.39	97.07	O
146	1977	Oct	06	003608.4	Kingfisher		2.1 mbLg	35.82	97.77	O
147	1977	Dec	08	194740.2	Canadian		2.0 mbLg	35.45	97.93	O
148	1978	Jan	08	041633.6	Kay		1.5 m3Hz	36.97	97.46	O
149	1978	Jan	08	101917.7	Logan		2.1 m3Hz	35.82	97.64	O
150	1978	Feb	10	064202.4	Coal		2.1 m3Hz	34.71	96.16	O
151	1978	Feb	14	010938.6	Logan		1.7 m3Hz	35.78	97.59	O
152	1978	Feb	21	111248.1	Tillman		2.2 mbLg	34.54	99.00	O
153	1978	Mar	03	022437.3	Hughes		2.5 m3Hz	35.09	96.28	O
154	1978	Mar	05	144650.5	Le Flore		2.9 mbLg	34.70	95.03	O
155	1978	Mar	09	063050.8	Love	MM II	2.6 mbLg	34.01	97.38	O
156	1978	Apr	02	213248.1	Atoka		2.5 m3Hz	34.64	96.06	O
157	1978	Apr	11	085102.4	Pittsburg		1.7 m3Hz	34.69	95.68	O
158	1978	Apr	13	034350.8	Johnston		2.0 mbLg	34.35	96.82	O
159	1978	Apr	19	142054.1	Tulsa		1.5 m3Hz	36.09	96.14	O
160	1978	Apr	20	081304.0	Coal		1.7 m3Hz	34.59	96.29	O
161	1978	May	01	225913.4	McCurtain		2.2 mbLg	34.40	94.67	O
162	1978	May	04	043552.9	Okfuskee		1.3 m3Hz	35.59	96.35	O
163	1978	May	17	231115.7	Canadian	MM I	2.3 mbLg	35.53	97.91	O
164	1978	May	18	001922.4	Canadian	MM III	2.7 mbLg	35.50	97.95	O
165	1978	May	18	003217.6	Canadian	MM II	2.1 mbLg	35.60	97.83	O
166	1978	May	19	003937.5	McClain		2.0 mbLg	35.14	97.50	O
167	1978	May	19	062732.7	Logan		1.8 m3Hz	36.00	97.37	O
168	1978	May	28	091900.2	Hughes		2.1 m3Hz	35.21	96.14	O
169	1978	Jun	22	051015.5	Dewey		2.0 m3Hz	35.92	99.09	O
170	1978	Aug	03	003537.1	Beaver		2.1 mbLg	36.69	100.16	O
171	1978	Aug	06	042856.8	Ellis		2.6 MDUR	36.07	99.94	O
172	1978	Aug	08	120748.7	Carter		2.2 mbLg	34.13	97.46	O
173	1978	Aug	26	145752.0	Carter		1.4 MDUR	34.18	97.46	O
174	1978	Sep	08	051606.6	Mayes		1.4 MDUR	36.16	95.28	O
175	1978	Sep	26	211717.7	Canadian		2.2 mbLg	35.52	97.87	O
176	1978	Sep	27	015603.8	Canadian		2.1 mbLg	35.52	97.84	O
177	1978	Sep	27	205603.8	Love		2.4 m3Hz	33.88	97.48	O
178	1978	Dec	08	111853.9	Atoka		1.8 mbLg	34.68	96.06	O
179	1978	Dec	19	020028.9	Haskell		1.7 mbLg	35.09	95.13	O
180	1978	Dec	27	220030.0	Love		2.0 m3Hz	34.00	97.51	O
181	1978	Dec	28	053032.4	Love		1.4 m3Hz	34.08	97.46	O
182	1978	Dec	28	135409.8	Love		1.9 m3Hz	33.99	97.46	O

[1]UTC refers to Coordinated Universal Time, formerly Greenwich Mean Time. The first two digits refer to the hour on a 24-hour clock. The next two digits refer to the minute, and the remaining digits are the seconds. To convert to local Central Standard Time, subtract six hours.

[2]MODIFIED MERCALLI (MM) EARTHQUAKE-INTENSITY SCALE (abridged)

- I Not felt except by a very few under especially favorable circumstances.
- II Felt only by a few persons at rest, especially on upper floors of buildings. Suspended objects may swing.
- III Felt quite noticeably indoors, especially on upper floors of buildings. Standing motor cars may rock slightly.
- IV During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, doors, windows disturbed. Standing motor cars rocked noticeably.
- V Felt by nearly everyone, many awakened. Some dishes, windows, etc., broken; unstable objects overturned. Pendulum clocks may stop.
- VI Felt by all; many frightened and run outdoors.
- VII Everybody runs outdoors. Damage negligible in buildings of good design and construction. Shock noticed by persons driving motor cars.
- VIII Damage slight in specially designed structures; considerable in ordinary substantial buildings; great in poorly built structures. Fall of chimneys, stacks, columns. Persons driving motor cars disturbed.
- IX Damage considerable even in specially designed structures; well-designed frame structures thrown out of plumb. Buildings shifted off foundations. Ground cracked conspicuously.
- X Some well-built wooden structures destroyed; ground badly cracked, rails bent. Landslides and shifting of sand and mud.
- XI Few if any (masonry) structures remain standing. Broad fissures in ground.
- XII Damage total. Waves seen on ground surfaces.

Modified Mercalli Intensity Scale of 1931; Wood, H. A., and Newmann, F., 1931, Bulletin Seismological Society of America, vol. 21, no. 4. p. 277–283.

[3]Earthquake magnitude is a measurement of energy and is based on data from seismograph records. There are several different scales used in the catalog to report magnitude. They are as follows: ML (Richter), mb (Gutenberg and Richter), mbLg (Nuttli), mbeus (Evernden), m3Hz (Nuttli), and MDUR (Lawson). Each magnitude scale was established to accommodate specific criteria, such as the distance from the epicenter, as well as the availability of certain seismic data.

The Richter magnitude, ML, as used in the catalog, is derived from the following equation:

$$ML = \log A - \log A_o + 0.95 - 0.73 \log \Delta - \log (V/2800),$$

where A = the maximum center-to-peak amplitude of Sg waves measured, in millimeters, on a seismogram recorded on a short-period, vertical seismograph with a frequency response that does not differ greatly from that of a Wood-Anderson seismograph; V = displacement magnification of the vertical-motion seismograph at periods below 0.8 seconds; $-\log A_o$ = Richter's empirical distance correction function for southern California; and Δ = great-circle distance from epicenter to seismograph measured in kilometers. This equation is Eysteinn Tryggvason's unpublished approximation to Charles Richter's local magnitude scale for southern California, when applied to Oklahoma (Richter, C. F., 1958, Elementary seismology: W. H. Freeman, San Francisco, p. 340–345).

The Gutenberg and Richter magnitude, mb, is defined as

$$mb = \log (A/T) + Q,$$

where A = the maximum center-to-peak vertical-ground amplitude of P waves measured in microns, recorded at distances between 5 and 105 great-circle degrees from the epicenter; T = dominant P-wave period measured in seconds; and Q = Gutenberg and Richter's empirical distance and depth correction factor (Richter, C. F., 1958, Elementary seismology: W. H. Freeman, San Francisco, p. 347–348, 688).

Otto Nuttli's earthquake magnitude, mbLg, for seismograph stations located between 55.6 km and 445 km from the epicenter, is derived from the following equation:

$$mbLg = \log (A/T) - 1.09 + 0.90 \log (\Delta).$$

When seismograph stations are located between 445 km and 3,360 km from the epicenter, mbLg is defined as

$$mbLg = \log (A/T) - 3.10 + 1.66 \log (\Delta),$$

where A = the maximum center-to-peak vertical-ground amplitude sustained for 3 or more cycles of Sg waves measured in nanometers, near 1 hertz in frequency; T = period of the Sg waves measured in seconds; and Δ = the great-circle distance from station to epicenter measured in kilometers (Nuttli, O. W., 1973, Seismic wave attenuation and magnitude relations for eastern North America: Journal of Geophysical Research, v. 78, no. 5, p. 876–885).

The Evernden magnitude scale, mbeus, is defined as

$$mbeus = \log (A/T) - 3.27 + 2 \log (\Delta),$$

where A = the center-to-peak vertical-ground amplitude of Pn waves, measured in nanometers, recorded between 200 km and 2,100 km from the epicenter; T = period of Pn waves measured in seconds; and Δ = great-circle distance from the epicenter measured in kilometers (Evernden, J. F., 1967, Magnitude determination at regional and near-regional distances in the United States: Bulletin of the Seismological Society of America, v. 57, no. 4, p. 591–639).

For earthquake epicenters located between 11 km and 222 km from a seismograph station, Otto Nuttli developed the m3Hz magnitude scale. This magnitude is derived from the following expression:

$$m3Hz = \log (A/T) - 1.63 + 0.87 \log (\Delta),$$

where A = the maximum center-to-peak vertical-ground amplitude sustained for 3 or more cycles of Sg waves measured in nanometers, near 3 hertz in frequency; T = period of the Sg waves measured in seconds, and Δ = great-circle distance from epicenter to station measured in kilometers (Zollweg, James, 1974, St. Louis University unpublished report, 15 p.).

The MDUR magnitude scale was developed by Jim Lawson for earthquakes in Oklahoma and adjacent areas. It is defined as

$$MDUR = 1.86 \log (DUR) - 1.49,$$

where DUR = the duration or difference, in seconds, between the Pg-wave arrival time and the time the final coda amplitude decreases to twice the background-noise amplitude. If the Pn wave is the first arrival, the interval between the earthquake origin time and the decrease of the coda to twice the background-noise amplitude is measured instead (Lawson, J. E., Jr., 1978, A preliminary duration magnitude scale for local and regional earthquakes recorded at Oklahoma Seismograph Stations: Oklahoma Geophysical Observatory, open-file report, 14 p.).

[4]Sources for Earthquake Data for the Catalog:

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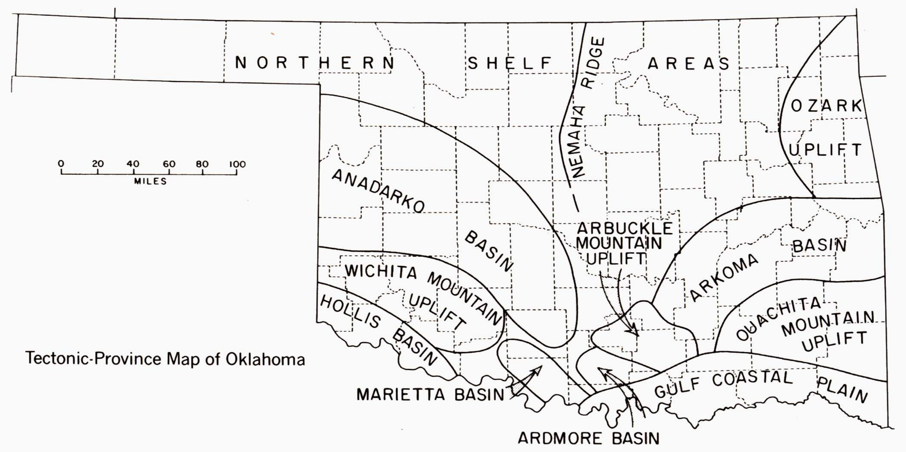
- I: International Seismological Centre, Edinburgh, Scotland, 1964, Bulletin, v. 1, no. 2, p. 9 and v. 6, no. 5, p. 24, 1969. (Relocated to Newbury, England in September 1973.)
- W: Wells, Laura Lou, 1975, Young Cushing in Oklahoma Territory: Frontier Printers, Inc., Stillwater, Oklahoma, 221 p.



Tectonic-Province Map of Oklahoma

EARTHQUAKE MAP OF OKLAHOMA

Compiled by

James E. Lawson, Jr., Robert L. DuBois, Paul H. Foster, and Kenneth V. Luza

1979

Earthquakes shown through 1978

Scale 1:750,000

Oklahoma is part of a geologic region referred to as the Stable Central Province (King, 1951; Hadley and Devine, 1974). This province extends from the western margin of the Appalachian Plateau to the eastern edge of the Rocky Mountain Uplift and from the Gulf Coastal Plain to south-central Canada. Compared to the Appalachian tectonic province, the Stable Central region has displayed little tectonic activity since Late Pennsylvanian time. The historical record of faulting and seismicity has been limited, with notable exceptions being the New Madrid, Missouri, area and adjacent regions in Kentucky, Tennessee, and Illinois. Nevertheless, the area is so large that despite the broad-scale historical picture of relative stability, there is within it considerable geologic diversity and sufficient seismic history to require a low to moderate seismic-risk classification.

This earthquake map displays 182 locatable earthquakes known to have occurred in Oklahoma. Prior to 1954, more than half the known Oklahoma earthquakes occurred in the vicinity of El Reno. The most intense disturbance in this area took place on April 9, 1952, and was felt in Des Moines, Iowa, as well as in Austin, Texas, and covered a felt area of approximately 362,000 square kilometers. The earliest documented earthquake in Oklahoma occurred near Cushing in December 1900. This event was followed by two additional earthquakes in the same area in April 1901.

The earthquake intensity data are grouped into four time-period intervals. The first time period, 1900 to 1960, represents an interval in which all earthquakes in Oklahoma were either located from historical accounts or from seismograph stations outside the State. In late 1961, the first two seismograph stations were installed in Oklahoma. One was located in the Wichita Mountains, WMO, by the United States Air Force, and the other was built near Leonard, TUL, by Jersey Production Research Co., which operated it until 1965. From 1965 to 1978, TUL was operated by The University of Oklahoma. In 1978, it was transferred to the Oklahoma Geological Survey and named the Oklahoma Geophysical Observatory. The short-period seismographs at these stations utilized passbands, between 0.5 to 1.5 hertz, which provided good records for distant earthquakes. Although the location and detection of small local earthquakes were greatly improved by the presence of these two stations, the records from seismographs with short-period passbands are of little use in recording small local earthquakes. In 1973, the Oklahoma Geophysical Observatory (TUL) began to record selected high-frequency seismic responses at increased magnifications. This greatly increased our capability to detect small earthquakes and to discriminate earthquakes from quarry blasts. However, the location of earthquakes depended either on finding felt reports and (or) having clear first-motion directions and horizontal-amplitude measurements made from the seismic records at the Oklahoma Geophysical Observatory. In 1976, a program was begun to install seven semipermanent, volunteer-operated seismograph stations and three radio-telemetry stations in Oklahoma with support from the U.S. Nuclear Regulatory Commission. These additional seismograph stations have tremendously improved earthquake detection and location accuracy in the State of Oklahoma as well as in the adjacent states.

REFERENCES CITED

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King, P. B., 1951, The tectonics of middle North America—east of the Cordilleran system: Princeton University Press, Princeton, N.J., 203 p.

This map is intended for use as a guide only to earthquake intensity and epicentral locations. The epicentral locations are based on data that may vary greatly in accuracy, particularly regarding earthquakes that occurred prior to 1960.

EXPLANATION

Intensity Values by Time Period

	1900–60	1961–72	1973–76	1977–78
Earthquakes that were instrumentally located but not known to be felt; probable intensity values, IV or less	(No data)	▲	▲	▲
Earthquake intensity IV or less	●	●	●	●
Earthquake intensity V or VI	●	●	●	*
Earthquake intensity VII or greater	●	*	*	*

Number beside intensity symbol refers to event number in earthquake catalog

* No record of earthquakes with these intensity values during selected time period

★ Semipermanent field station, active; includes station abbreviation, name, and installation date

☆ Semipermanent field station, inactive; includes station abbreviation, name, and operating dates

▲ Radio telemetry field station; includes station abbreviation, name, and installation date

✪ Oklahoma Geophysical Observatory