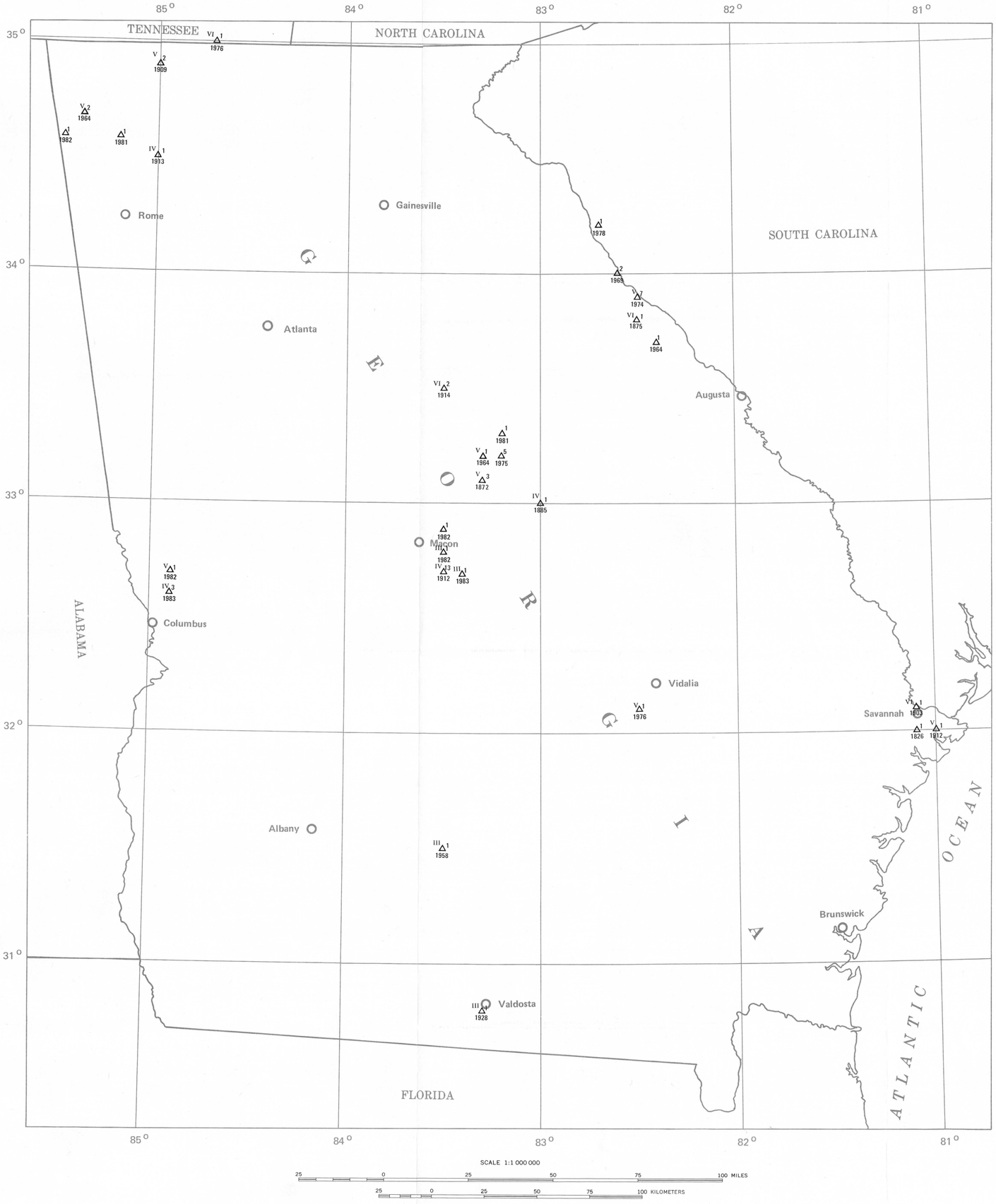
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1060



SEISMICITY MAP OF THE STATE OF GEORGIA

By

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INTRODUCTION

This map is one of a series of seismicity maps produced by the U. S. Geological Survey that show earthquake data of individual states or groups of states at the scale of 1:1,000,000. This map shows only those earthquakes with epicenters located within the boundaries of Georgia, even though earthquakes in nearby states or countries may have been felt or may have caused damage in Georgia.

The data in table 1 were used to compile the seismicity map; these data are a corrected, expanded, and updated (through 1983) version of the data used by Algermissen (1969) for a study of seismic risk in the United States. The locations and intensities of some earthquakes were revised and intensities were assigned where none had been before. Many earthquakes were added to the original list from new data sources as well as from some old data sources that had not been previously used. The data in table 1 represent best estimates of the location of the epicenter, magnitude, and intensity of each earthquake on the basis of historical and current information. Some of the aftershocks from large earthquakes are listed, but not all, especially for earthquakes that occurred before seismic instruments were universally used.

The latitude and longitude coordinates of each epicenter were rounded to the nearest tenth of a degree and sorted so that all identical locations were grouped and counted. These locations are represented on the map by a triangle. The number of earthquakes at each location is shown on the map by the arabic number to the right of the triangle. A Roman numeral to the left of a triangle is the maximum Modified Mercalli intensity (Wood and Neumann, 1931) of all earthquakes at that geographic location. The absence of an intensity value indicates that no intensities have been assigned to earthquakes at that location. The year shown below each triangle is the latest year for which the maximum intensity was recorded.

EXPLANATION OF THE TABLES

The data in table 1 are listed chronologically in the following categories: date, origin time in Coordinated Universal Time (UTC), N. latitude, W. longitude, depth, hypocenter quality and reference, magnitude, intensity (Modified Mercalli), and intensity reference. The letter F is recorded in the intensity column if an earthquake was felt but not enough information was available to assign an intensity. Table 1 has some basic limitations in terms of the size (magnitude or intensity) of the earthquakes listed. All felt earthquakes or those with computed magnitudes greater than 2.5 are listed. If no magnitude was computed and the earthquake was felt or an epicenter published, it was included in the earthquake list. The low-magnitude events located in recent years with data from dense seismograph networks have not been included.

Listed below is an explanation of the symbols and codes used in table 1:

1. Leaders (..) indicate information not available.
2. Latitude and longitude are listed to a hundredth of a degree if they have been published with that degree of accuracy or greater; however, most historical events have assigned locations based on felt or damage information and are listed in table 1 only to the nearest degree or tenth of a degree. An asterisk (*) to the right of the longitude indicates that the latitude and longitude were not given in the source reference but were assigned by the compilers of the data file. An x to the right of the longitude indicates that the event is an explosion, a suspected explosion, a rockburst, or some other nontectonic event; these have not been plotted on the map. A question mark (?) to the right of the longitude indicates that published descriptions of the event are inconclusive and it may or may not be an earthquake.
3. The letter code in the HYPOCENTER, QUAL column is defined below:
   a. Determinations of instrumental hypocenters are estimated to be accurate within the ranges of latitude and longitude listed below; each range is letter coded as indicated:

A	0.0°-0.1°
B	0.1°-0.2°
C	0.2°-0.5°
D	0.5°-1.0°
E	1.0° or larger

   b. Determinations of noninstrumental epicenters from felt data are estimated to be accurate within the ranges of latitude and longitude listed below; each range is letter coded as indicated:

F	0.0°-0.5°
G	0.5°-1.0°
H	1.0°-2.0°
I	2.0° or larger

4. The reference identification numbers in the HYPOCENTER, REF and INTENSITY, REF columns indicate the sources of the hypocenter and intensity data. They are listed in numerical order in the list of data sources.
5. The magnitudes listed under USGS are mb (modified from Gutenberg and Richter, 1956) or Ms (Bath, 1966) values published in the Preliminary Determination of Epicenters (PDE) by the National Earthquake Information Center, U. S. Geological Survey and predecessor organizations. Associated with the magnitude values listed under OTHER are the source code and type. Type is defined by mb (Gutenberg and Richter, 1956), MD (duration or coda length), ML (Richter, 1958), Mn (Nuttli, 1973), Mnx (modified Mn), Ms (Bath, 1966 or Gutenberg, 1945). The source codes are listed below:

ATL - Georgia Institute of Technology, Atlanta, Ga.
BLA - Virginia Polytechnic Institute and State University, Blacksburg, Va.
DG - Dewey, J. W., and Gordon, D. W., 1984, U. S. Geological Survey, Miscellaneous Field Studies Map MF-1699 Phamphlet, 39 p.
GB - Bollinger, G. A., 1979, Seismological Society of America Bulletin, v. 69, no. 1, p. 45-63.
GS - National Earthquake Information Center (and predecessor organizations), U. S. Geological Survey, Golden, Colo.
JLM - Jones, F. B., Long, L. T., and McKee, J. H., 1977, Seismological Society of America Bulletin, v. 67, no. 6, p. 1503-1513.
TEC - Tennessee Earthquake Information Center, Memphis State University, Memphis, Tenn.

6. An asterisk (*) in the INTENSITY, MM column indicates that the intensity was assigned by the compiler on the basis of the available data at the time the catalog was compiled.

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Table 1.--Chronological listing of earthquakes for the State of Georgia

DATE YEAR	MONTH	DAY	ORIGIN TIME H M S (UTC)	LAT.	LONG.	DEPTH (KM)	HYPOCENTER QUAL	HYPOCENTER REF	MAGNITUDE USGS (mb)	MAGNITUDE USGS (Ms)	MAGNITUDE OTHER	MAGNITUDE OTHER	MAGNITUDE MOMENT (M)	INTENSITY MM	INTENSITY REF
1826	OCT	15	.. .. ..	32.0 N.	81.1 W. *	..	H	84	..	..	...	...	.. ...	F	84
1872	JUN	17	20 00 ..	33.1 N.	83.3 W.	..	G	38	..	..	...	...	.. ...	V	38
1875	JUL	28	23 05 ..	33.1 N.	83.3 W.	..	H	86	..	..	...	...	.. ...	III	86
1875	NOV	02	02 55 ..	33.8 N.	82.5 W.	..	G	38	..	..	...	...	.. ...	VI	38
	Northern Georgia. Felt from Spartanburg and Columbia, South Carolina to Atlanta and Macon, Georgia and from Gainesville to Augusta, Georgia. Felt area estimated at 25,000 sq mi. There were several aftershocks.														
1884	MAR	31	10 00 ..	33.1 N.	83.3 W.	..	H	86	..	..	...	...	.. ...	III	86
1885	OCT	17	22 30 ..	33.0 N.	83.0 W.	..	H	86	..	..	...	...	.. ...	IV	86
1903	JAN	24	01 15 ..	32.1 N.	81.1 W.	..	G	38	..	..	...	...	.. ...	VI	38
	Georgia-South Carolina region. Felt at Tybee Island and Savannah, Georgia. Felt area estimated at 10,000 sq mi.														
1909	OCT	08	10 00 ..	34.9 N.	85.0 W. *	..	H	84	..	..	...	...	.. ...	V*	84
1912	JUN	20	.. .. ..	32.0 N.	81.0 W.	..	H	38	..	..	...	...	.. ...	V	38
1912	OCT	23	01 15 ..	32.7 N.	83.5 W.	..	H	84	..	..	...	...	.. ...	IV	84
1913	MAR	13	05	34.5 N.	85.0 W.	..	I	103	..	..	...	...	.. ...	IV	103
1914	MAR	05	20 05 ..	33.5 N.	83.5 W.	..	G	38	..	..	...	...	.. ...	VI	38
	Near Atlanta, Georgia. The earthquake was felt in parts of Alabama, Georgia, and Tennessee-an estimated area of 50,000 sq mi.														
1914	MAR	05	21 00 ..	33.5 N.	83.5 W.	..	F	289	..	..	...	...	.. ...	F	289
1928	MAY	23	10 15 ..	30.8 N.	83.3 W.	..	H	1	..	..	...	...	.. ...	III*	1
1933	JUN	09	11 30 ..	33.3 N.	83.5 W. x	..	H	86	..	..	...	...	.. ...	IV	102
1943	JUL	29	03 30 ..	33.4 N.	82.0 W. x	..	H	16	..	..	...	...	.. ...	III*	16
1958	APR	08	17	31.5 N.	83.5 W.	..	H	29	..	..	...	...	.. ...	III*	29
1963	OCT	08	06 01 43.4	33.9 N.	82.5 W.	..	C	110	..	..	3.2Mnx	JLM	.. ...	...	..
1964	FEB	17	22 47 ..	34.7 N.	85.4 W.	..	D	203	..	..	3.3Mnx	JLM	.. ...	...	..
1964	FEB	18	09 31 10.4	34.665N.	85.392W.	001	A	349	4.4	..	4.0Mn	GB	.. ...	V	35
1964	MAR	07	18 02 58.6	33.724N.	82.391W.	005	C	349	..	..	3.3Mnx	JLM	.. ...	...	..
1964	MAR	13	01 20 17.5	33.193N.	83.309W.	001	C	349	4.4	..	3.9Mnx	JLM	.. ...	V	35
1965	APR	07	07 41 10.2	33.9 N.	82.5 W.	..	C	110	..	..	...	...	.. ...	...	..
1965	JUL	22	23 55 33.3	33.2 N.	83.2 W.	..	C	115	..	..	...	...	.. ...	...	..
1965	NOV	08	12 58 01.0	33.2 N.	83.2 W.	..	C	115	..	..	3.3Mnx	JLM	.. ...	...	..
1965	NOV	08	13 04 11.5	33.2 N.	83.2 W.	..	C	115	..	..	...	...	.. ...	...	..
1969	MAY	05	17 14 ..	33.9 N.	82.5 W.	..	H	86	..	..	...	...	.. ...	F	86
1969	MAY	09	.. .. ..	33.95 N.	82.58 W.	..	B	164	..	..	3.3Mn	ATL	.. ...	...	..
1969	MAY	18	.. .. ..	33.95 N.	82.58 W. *	..	F	164	..	..	3.5Mn	ATL	.. ...	F	164
1969	NOV	04	18 58 23	33.2 N.	83.2 W.	..	C	115	..	..	...	...	.. ...	...	..
1969	NOV	08	01 52 ..	33.9 N.	82.5 W.	..	C	115	..	..	...	...	.. ...	...	..
1971	APR	16	07 31 ..	33.9 N.	82.5 W.	..	B	110	..	..	...	...	.. ...	...	..
1973	OCT	08	13 38 ..	33.9 N.	82.5 W.	..	B	110	..	..	...	...	.. ...	...	..
1976	AUG	02	06 52 11.1	33.908N.	82.534W.	004	A	349	4.3	..	4.1Mn	GB	.. ...	V	47
1975	APR	01	21 09 ..	33.2 N.	83.2 W.	..	D	203	..	..	3.9Mnx	JLM	.. ...	...	..
1976	FEB	04	19 53 53.0	34.971N.	84.702W.	014	A	349	..	..	3.6Mn	DG	.. ...	VI	49
	Near Conasauga, Tennessee in the Lake Ocoee Dam area. Cracked masonry and a chimney, a 4-year old cement block building was cracked.														
1976	DEC	27	06 57 15.2	32.060N.	82.504W.	014	B	349	..	..	3.7Mn	BLA	.. ...	V	49
1978	MAY	02	01 46 11.8	34.187N.	82.738W.	010	B	339	..	..	2.8MD	GS	.. ...	...	..
1978	JUN	05	21 37 44.9	33.524N.	82.600W. x	003	B	339	..	..	2.5MD	GS	.. ...	...	..
1980	SEP	10	19 49 46.4	34.122N.	82.947W. x	013	C	339	..	..	2.5MD	GS	.. ...	...	..
1981	APR	04	09 19 38.3	33.253N.	83.211W.	..	C	339	..	..	2.5MD	ATL	.. ...	...	..
1981	SEP	04	17 21 44.5	34.634N.	85.166W.	003	B	339	..	..	3.0MD	TEC	.. ...	...	..
1982	FEB	23	09 19 07.9	34.61 N.	85.46 W.	000	B	350	..	..	2.5ML	ATL	.. ...	...	..
1982	MAY	05	11 11 02.6	32.71 N.	83.47 W.	..	B	350	..	..	2.7MD	ATL	.. ...	...	..
1982	MAY	12	01 21 52.2	34.90 N.	85.02 W.	010	B	350	..	..	2.6MD	TEC	.. ...	...	..
1982	OCT	31	03 07 36.7	32.67 N.	84.87 W.	000	B	350	..	..	3.0Mn	ATL	.. ...	V	350
1982	OCT	31	03 12 12.2	32.64 N.	84.89 W.	000	B	350	..	..	3.1ML	ATL	.. ...	F	350
1982	DEC	07	00 19 25.6	32.71 N.	83.47 W.	..	B	350	..	..	2.7MD	ATL	.. ...	...	..
1982	DEC	08	23 36 56	32.72 N.	83.46 W.	003	B	350	..	..	2.9ML	ATL	.. ...	...	..
1982	DEC	11	00 12 22.4	32.71 N.	83.47 W.	..	B	350	..	..	2.5MD	ATL	.. ...	...	..
1982	DEC	11	00 25 08.3	32.85 N.	83.53 W.	000	B	350	..	..	3.0MD	ATL	.. ...	...	..
1982	DEC	11	03 47 28.1	32.71 N.	83.47 W.	..	B	350	..	..	2.6MD	ATL	.. ...	...	..
1982	DEC	13	01 21 18.9	32.71 N.	83.47 W.	..	B	350	..	..	2.7MD	ATL	.. ...	...	..
1982	DEC	13	22 57 18.6	32.71 N.	83.47 W.	..	B	350	..	..	2.5MD	ATL	.. ...	...	..
1982	DEC	13	22 58 16.4	32.71 N.	83.47 W.	..	B	350	..	..	2.6MD	ATL	.. ...	...	..
1982	DEC	20	20 29 49.8	32.71 N.	83.47 W.	..	B	350	..	..	2.6MD	ATL	.. ...	...	..
1982	DEC	21	05 30 46.2	32.80 N.	83.52 W.	000	B	350	..	..	2.7MD	ATL	.. ...	III	350
1982	DEC	21	08 01 59.5	32.71 N.	83.47 W.	..	B	350	..	..	2.7MD	ATL	.. ...	...	..
1982	DEC	23	11 52 11.3	32.71 N.	83.47 W.	..	B	350	..	..	2.6MD	ATL	.. ...	...	..
1983	JAN	17	02 06 06.9	32.745N.	83.524W.	000	B	360	..	..	2.8MD	ATL	.. ...	...	..
1983	JAN	26	14 07 44.8	32.728N.	83.375W.	005	B	360	..	..	3.5Mn	GS	.. ...	III	360
1983	DEC	31	06 31 12.1	32.599N.	84.898W.	005	C	360	..	..	2.6MD	TEC	.. ...	IV	360
1983	DEC	31	17 17 27.2	32.568N.	84.917W.	005	D	360	..	..	2.6MD	TEC	.. ...	IV	360

MODIFIED MERCALLI INTENSITY SCALE OF 1931
Adapted from Sieberg's Mercalli-Cancani scale, modified and condensed (Wood and Neumann, 1931)

I. Not felt - or, except rarely under especially favorable circumstances. Under certain conditions, at and outside the boundary of the area in which a great shock is felt: sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced; sometimes trees, structures, liquids, bodies of water, may sway--doors may swing, very slowly.

II. Felt indoors by few, especially on upper floors, or by sensitive or nervous persons. Also, as in grade I, but often more noticeably: sometimes hanging objects may swing, especially when delicately suspended; sometimes trees, structures, liquids, bodies of water, may sway, doors may swing, very slowly; sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced.

III. Felt indoors by several, motion usually rapid vibration. Sometimes not recognized to be an earthquake at first. Duration estimated in some cases. Vibration like that due to passing of light, or lightly loaded trucks, or heavy trucks some distance away. Hanging objects may swing slightly. Movements may be appreciable on upper levels of tall structures. Rocked standing motor cars slightly.

IV. Felt indoors by many, outdoors by few. Awakened few, especially light sleepers. Frightened no one, unless apprehensive from previous experiences. Vibration like that due to passing of heavy or heavily loaded trucks. Sensation like heavy body striking building or falling of heavy objects inside. Rattling of dishes, windows, doors; glassware and crockery clink and clash. Creaking of walls, frame, expecially in the upper range of this grade. Hanging objects swung, in numerous instances. Disturbed liquids in open vessels slighlty. Rocked standing motor cars noticeably.

V. Felt indoors by practically all, outdoors by many or most: outdoors direction estimated. Awakened many, or most. Frightened few--slight excitement, a few ran outdoors. Buildings trembled throughout. Broke dishes, glassware to some extent. Cracked windows--in some cases, but not generally. Overturned vases, small or unstable objects, in many instances, with occasional fall. Hanging objects, doors, swing generally or considerably. Knocked pictures against walls, or swung them out of place. Opened, or closed, doors, shutters, abruptly. Pendulum clocks stopped, started, or ran fast or slow. Moved small objects, furnishings, the latter to slight extent. Spilled liquids in small amounts from well-filled open containers. Trees, bushes shaken slighlty.

VI. Felt by all, indoors and outdoors. Frightened many, excitement general, some alarm, many ran outdoors. Awakened all. Persons made to move unsteadily. Trees, bushes, shaken slighlty to moderately. Liquid set in strong motion. Small bells rang--church, chapel, school, etc. Damage slight in poorly built buildings. Fall of plaster in small amount. Cracked plaster somewhat, especially fine cracks, chimneys in some instances. Broke dishes, glassware, in considerable quantity, also some windows. Fall of knick-knacks, books, pictures. Overturned furniture in many instances. Moved furnishings of moderately heavy kind.

VII. Frightened all--general alarm, all ran outdoors. Some, or many, found it difficult to stand. Noticed by persons driving motor cars. Trees and bushes shaken moderately to strongly. Waves on ponds, lakes, and running water. Water turbid from mud stirred up. Incaving to some extent of sand or gravel stream banks. Rang large church bells, etc. Suspended objects made to quiver. Damage negligible in buildings of good design and construction, slight to moderate in well-built ordinary buildings, considerable in poorly built or badly designed buildings, adobe houses, old walls (especially where laid up without mortar), spires, etc. Cracked chimneys to considerable extent, walls to some extent. Fall of plaster in considerable to large amount, also some stucco. Broke numerous windows, furniture to some extent. Shook down loosened brickwork and tiles. Broke weak chimneys at the roof-line (sometimes damaging roofs). Fall of cornices from towers and high buildings. Dislodged bricks and stones. Overturned heavy furniture, with damage from breaking. Damage considerable to concrete irrigation ditches.

VIII. Fright general--alarm approaches panic. Distrubed persons driving motor cars. Trees shaken strongly--branches, trunks, broken off, especially palm trees. Ejected sand and mud in small amounts. Changes, temporary or permanent: in flow of springs and wells; dry wells renewed flow; in temperature of spring and well waters. Damage slight in structures (brick) built especially to withstand earthquakes. Considerable in ordinary substantial buildings, partial collapse: racked, tumbled down, wooden houses in some cases; threw out panel walls in frame structures, broke off decayed piling. Fall of walls. Cracked, broke, solid stone walls seriously. Wet ground to some extent, also ground on steep slopes. Twisting, fall, of chimneys, columns, monuments, also factory stacks, towers. Moved conspicuously, overturned, very heavy furniture.

IX. Panic general. Cracked ground conspicuously. Damage considerable in (masonry) structures built especially to withstand earthquakes: Threw out of plumb some wood-frame houses built especially to withstand earthquakes; great in substantial (masonry) buildings, some collapse in large part; or wholly shifted frame buildings off foundations, racked frames, serious to reservoirs; underground pipes sometime broken.

X. Cracked ground, especially when loose and wet, up to widths of several inches; fissures up to a yard in width ran parallel to canal and stream banks. Landslides considerable from river banks and steep coasts. Shifted sand and mud horizontally on beaches and flat land. Changed level of water in wells. Threw water on banks of canals, lakes, rivers, etc. Damage serious to dams, dikes, embankments. Severe to well-built wooden structures and bridges, some destroyed. Developed dangerous cracks in excellent brick walls. Destroyed most masonry and frame structures, also their foundations. Bent railroad rails slightly. Tore apart, or crushed endwise, pipe lines buried in earth. Open cracks and broad wavy folds in cement pavements and asphalt road surfaces.

XI. Disturbances in ground many and widespread, varying with ground material. Broad fissures, earth slumps, and land slips in soft, wet ground. Ejected water in large amounts charged with sand and mud. Caused sea-waves ("tidal" waves) of significant magnitude. Damage severe to wood-frame structures, especially near shock centers. Great to dams, dikes, embankments often for long distances. Few, if any (masonry) structures remained standing. Destroyed large well-built bridges by the wrecking of supporting piers, or pillars. Affected yielding wooden bridges less. Bent railroad rails greatly, and thrust them endwise. Put pipe lines buried in earth completely out of service.

XII. Damage total--practically all works of construction damaged greatly or destroyed. Disturbances in ground great and varied, numerous shearing cracks. Landslides, falls of rock of significant character, slumping of river banks, etc., numerous and extensive. Wrenched loose, tore off, large rock masses. Fault slips in firm rock, with notable horizontal and vertical offset displacements. Water channels, surface and underground, disturbed and modified greatly. Dammed lakes, produced waterfalls, deflected rivers, etc. Waves seen on ground surfaces (actually seen, probably, in some cases). Distorted lines of sight and level. Threw objects upward into the air.

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