

GEOLOGICAL SURVEY CIRCULAR 819-D



**Earthquakes
in the United States
October–December 1978**

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By B. G. Reagor, C. W. Stover, J. H. Minsch,
and P. Hubiak

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United States Department of the Interior

CECIL D. ANDRUS, *Secretary*



Geological Survey

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INTRODUCTION

The earthquake information in this publication supplements that published in the NEIS (National Earthquake Information Service) publications, PDE ("Preliminary Determination of Epicenters") and "Preliminary Determination of Epicenters, Monthly Listing," to the extent of providing detailed felt and intensity data, as well as isoseismal maps for U.S. earthquakes. The purpose is to provide a complete listing of macroseismic effects of earthquakes, which can be used in risk studies, nuclear power plant site evaluations, seismicity studies, and answering inquiries by the public.

This publication contains two major sections. The first (table 1) is a tabular listing of earthquakes in chronological order by State, consisting of the following basic information: date, origin time, hypocenter, magnitude, maximum intensity, and computational source of the hypocenter. The second section consists of five maps and table 2, which lists detailed intensity information. The list of earthquakes in table 1 was compiled from those located in Alaska or off the coasts that were published in the PDE; from hypocenters located in the conterminous United States using the U.S. Geological Survey program SEDAS; from hypocenters in California above magnitude 3.0, supplied by California Institute of Technology, Pasadena, the University of California, Berkeley, and other offices of the U.S. Geological Survey; from hypocenters in Hawaii supplied by the Hawaiian Volcano Observatory; and from any others that were felt or that caused damage, regardless of magnitude or availability of a hypocenter. Known or suspected explosions are also listed.

The intensities and macroseismic data were compiled from information obtained through questionnaires, from newspaper articles, and with the cooperation of other Government agencies, State institutions, local organizations, and individuals. (See "Acknowledgments" for a list of collaborators.)

Figure 1 is the questionnaire in current use by the NEIS. Other versions of this questionnaire are used by State agencies, engineering firms, and other Government agencies to collect intensity data. Anyone wishing to submit felt or damage information on earthquakes for inclusion in future reports should send it to the National Earthquake Information Service, Stop 967, Box 25046, Denver Federal Center, Denver, CO 80225. Copies of the current "Earthquake Report" questionnaire can be obtained at this address.

The primary method used by the NEIS to collect macroseismic information is a questionnaire canvass using the "Earthquake Report" forms, which are mailed to postmasters in the area affected by the earthquake. The postmasters complete the forms and return them to the NEIS, where they are evaluated and an intensity value is assigned. The intensity observations are mapped and contoured by isoseismals. Isoseismal contours present a generalization of intensity data and an extrapolation of these data to regions from which there are no observations; they do not necessarily account for every individual observation.

The data in table 2 will be included in the "Earthquake Description" section of "United States Earthquakes," an annual publication, to which later data from other sources may be added for the purpose of updating and completeness. "United States Earthquakes" is published jointly by the U.S. Geological Survey, Department of the Interior, and the Environmental Data Service, National Oceanic and Atmospheric Administration, Department of Commerce.

DISCUSSION OF TABLES

The parameters for the earthquakes in table 1 and table 2 include the date, origin time, hypocenter (epicenter and focal depth), magnitude, intensity, and hypocenter source. The origin time and date are listed in Universal

**U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
EARTHQUAKE REPORT**

Form Approved
OMB No. 42-R1700

Please answer this questionnaire and return as soon as possible

1. Was an earthquake felt by anyone in your town near the date and time indicated on the opposite page?

☐ No: Please refold and tape for return mail.

☐ Yes: Date _____ Time _____ ☐ AM ☐ Standard time
☐ PM ☐ Daylight time

Name of person filling out form _____

Address _____

City _____ County _____

State _____ Zip code _____

If you felt the earthquake, complete the following section. If others felt the earthquake but you did not, skip the personal report and complete the community report.

PERSONAL REPORT

- 2a. Did you personally feel the earthquake? 1 ☐ Yes ☐ No
b. Were you awakened by the earthquake? 2 ☐ Yes ☐ No
c. Were you frightened by the earthquake? 3 ☐ Yes ☐ No
d. Were you at 4 ☐ Home 5 ☐ Work 6 ☐ Other? _____
e. Town and zip code of your location at time of earthquake _____
f. Check your activity when the earthquake occurred:
7 ☐ Walking 8 ☐ Sleeping 9 ☐ Lying down 10 ☐ Standing
11 ☐ Driving (car in motion) 12 ☐ Sitting 13 ☐ Other _____
g. Were you 14 ☐ Inside or 15 ☐ Outside?
h. If inside, on what floor were you? 16 _____
i. Vibration could be described as 17 ☐ Light 18 ☐ Heavy
j. Was there earth noise? ☐ No 19 ☐ Faint 20 ☐ Moderate 21 ☐ Loud
k. Direction of noise ☐ North ☐ South ☐ East ☐ West
l. Estimated duration of shaking 22 ☐ Sudden, sharp (less than 10 secs) 23 ☐ Long (30-60 secs)
24 ☐ Short (10-30 secs)

Continue on to next section which should include personal as well as reported observations.

COMMUNITY REPORT

Town and zip code _____

DO NOT INCLUDE EFFECTS FROM OTHER COMMUNITIES/TOWNS

Check one box for each question that is applicable.

- 3a. The earthquake was felt by ☐ No one 25 ☐ Few 26 ☐ Several 27 ☐ Many 28 ☐ All?
b. This earthquake awakened ☐ No one 29 ☐ Few 30 ☐ Several 31 ☐ Many 32 ☐ All?
c. This earthquake frightened ☐ No one 33 ☐ Few 34 ☐ Several 35 ☐ Many 36 ☐ All?
4. What indoor physical effects were noted in your community?
Windows, doors, dishes rattled 37 ☐ Yes ☐ No
Buildings creaked 38 ☐ Yes ☐ No
Building trembled (shook) 39 ☐ Slightly 40 ☐ Strongly
Hanging pictures (more than one) 41 ☐ Swung 42 ☐ Out of place 43 ☐ Fallen
Liquid in small containers 44 ☐ Spilled 45 ☐ Slightly disturbed
Windows 46 ☐ Few cracked 47 ☐ Some broken 48 ☐ Many broken
Were small objects (dishes, knick-knacks, lamps) ☐ Unmoved 49 ☐ Moved
50 ☐ Overturned 51 ☐ Broken?
Were light furniture or small appliances ☐ Unmoved 52 ☐ Moved
53 ☐ Overturned 54 ☐ Damaged seriously
Were heavy furniture or appliances ☐ Unmoved 55 ☐ Overturned
56 ☐ Moved 57 ☐ Damaged seriously
Did hanging objects or doors swing? 58 ☐ Slightly 59 ☐ Moderately 60 ☐ Violently
Can you estimate direction? ☐ North/South ☐ East/West ☐ Other _____
Pendulum clocks 61 ☐ Stopped 62 ☐ Started 63 ☐ Faster or slower

Continued on the reverse side

FIGURE 1.--Example of the "Earthquake Report" form used for evaluating the intensities of earthquakes. A, front side.

5. Indicate effects of the following types to interior walls if any:

Plaster/stucco	64 <input type="checkbox"/> Large cracks	65 <input type="checkbox"/> Fell in large amounts
Dry wall	66 <input type="checkbox"/> Large cracks	67 <input type="checkbox"/> Fell in large amounts
Ceiling tiles	68 <input type="checkbox"/> Large cracks	69 <input type="checkbox"/> Fell in large amounts

6. What outdoor physical effects were noted in your community?

Trees and bushes shaken	70 <input type="checkbox"/> Slightly	71 <input type="checkbox"/> Moderately	72 <input type="checkbox"/> Strongly
Standing vehicles rocked	73 <input type="checkbox"/> Slightly	74 <input type="checkbox"/> Moderately	
Moving vehicles rocked	75 <input type="checkbox"/> Slightly	76 <input type="checkbox"/> Moderately	
Water splashed onto sides of lakes, ponds, swimming pools	77 <input type="checkbox"/> Yes	<input type="checkbox"/> No	
Elevated water tanks	78 <input type="checkbox"/> Cracked	79 <input type="checkbox"/> Twisted	80 <input type="checkbox"/> Fallen (thrown down)
Industrial cooling units	81 <input type="checkbox"/> Displaced	82 <input type="checkbox"/> Rotated	83 <input type="checkbox"/> Fallen
Tombstones	84 <input type="checkbox"/> Displaced	85 <input type="checkbox"/> Cracked	86 <input type="checkbox"/> Rotated
	87 <input type="checkbox"/> Fallen		
Chimneys	88 <input type="checkbox"/> Bricks loosened	89 <input type="checkbox"/> Twisted	90 <input type="checkbox"/> Fallen
	91 <input type="checkbox"/> Broken at roof line	92 <input type="checkbox"/> Bricks fallen	
Railroad tracks bent	93 <input type="checkbox"/> Slightly	94 <input type="checkbox"/> Greatly	
Stone or brick fences /walls	95 <input type="checkbox"/> Open cracks	96 <input type="checkbox"/> Fallen	97 <input type="checkbox"/> Destroyed
Underground pipes	98 <input type="checkbox"/> Broken	99 <input type="checkbox"/> Out of service	
Highways or streets	100 <input type="checkbox"/> Large cracks	101 <input type="checkbox"/> Large displacements	
Sidewalks	102 <input type="checkbox"/> Large cracks	103 <input type="checkbox"/> Large displacements	

7a. Check below any structural damage to buildings.

Foundation	104 <input type="checkbox"/> Cracked	105 <input type="checkbox"/> Destroyed
Interior walls	106 <input type="checkbox"/> Split	107 <input type="checkbox"/> Fallen
Exterior walls	109 <input type="checkbox"/> Large Cracks	110 <input type="checkbox"/> Bulged outward
	111 <input type="checkbox"/> Partial collapse	112 <input type="checkbox"/> Total collapse
Building	113 <input type="checkbox"/> Moved on foundation	114 <input type="checkbox"/> Shifted off foundation

b. What type of construction was the building that showed this damage?

115 <input type="checkbox"/> Wood	116 <input type="checkbox"/> Stone	117 <input type="checkbox"/> Brick veneer	118 <input type="checkbox"/> Other _____
119 <input type="checkbox"/> Brick	120 <input type="checkbox"/> Cinderblock	121 <input type="checkbox"/> Reinforced concrete	122 <input type="checkbox"/> Mobile home

c. What was the type of ground under the building?

<input type="checkbox"/> Don't know	123 <input type="checkbox"/> Sandy soil	124 <input type="checkbox"/> Marshy	125 <input type="checkbox"/> Fill
126 <input type="checkbox"/> Hard rock	127 <input type="checkbox"/> Clay soil	128 <input type="checkbox"/> Sandstone, limestone, shale	

d. Was the ground:

129 <input type="checkbox"/> Level	130 <input type="checkbox"/> Sloping	131 <input type="checkbox"/> Steep?
------------------------------------	--------------------------------------	-------------------------------------

e. Check the approximate age of the building:

132 <input type="checkbox"/> Built before 1935	133 <input type="checkbox"/> Built 1935-65	134 <input type="checkbox"/> Built after 1965
--	--	---

8. Check below any structural damage to

Bridges/Overpasses	135 <input type="checkbox"/> Concrete	136 <input type="checkbox"/> Wood	137 <input type="checkbox"/> Steel	138 <input type="checkbox"/> Other _____
Damage was	139 <input type="checkbox"/> Slight	140 <input type="checkbox"/> Moderate	141 <input type="checkbox"/> Severe	
Dams	142 <input type="checkbox"/> Concrete	143 <input type="checkbox"/> Large earthen		
Damage was	144 <input type="checkbox"/> Slight	145 <input type="checkbox"/> Moderate	146 <input type="checkbox"/> Severe	

9. What geologic effects were noted in your community?

Ground cracks	147 <input type="checkbox"/> Wet ground	148 <input type="checkbox"/> Steep slopes	149 <input type="checkbox"/> Dry and level ground
Landslides	150 <input type="checkbox"/> Small	151 <input type="checkbox"/> Large	
Slumping	152 <input type="checkbox"/> River bank	153 <input type="checkbox"/> Road fill	154 <input type="checkbox"/> Land fill
Were springs or well water disturbed?	155 <input type="checkbox"/> Level changed	156 <input type="checkbox"/> Flow disturbed	
	157 <input type="checkbox"/> Muddied	<input type="checkbox"/> Don't know	
Were rivers or lakes changed?	158 <input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Don't know

10a. What percentage of buildings were damaged?

Within 2 city blocks of your location	<input type="checkbox"/> None	159 <input type="checkbox"/> Few (about 5%)
	160 <input type="checkbox"/> Many (about 50%)	161 <input type="checkbox"/> Most (about 75%)

b. In area covered by your zip code

	<input type="checkbox"/> None	162 <input type="checkbox"/> Few (about 5%)
	163 <input type="checkbox"/> Many (about 50%)	164 <input type="checkbox"/> Most (about 75%)

Thank you for your time and information. Refold this card and tape for return mail.

FIGURE 1.--Example of the "Earthquake Report" form used for evaluating the intensities of earthquakes. B, reverse side.

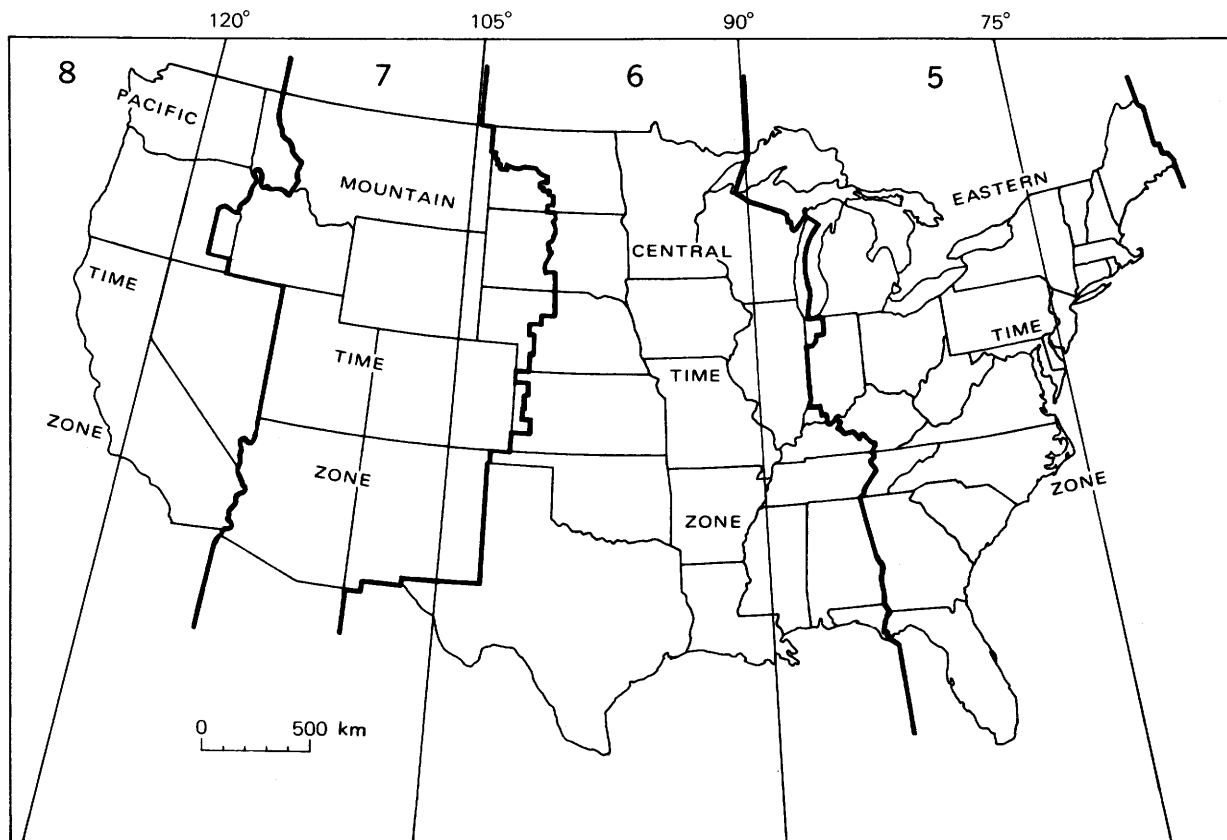


FIGURE 2.--Standard time zones of the conterminous United States. The number in each zone shows the number of hours to be subtracted from Universal Coordinated Time to convert to local standard time. (Subtract 1 hour less for local daylight-saving time.)

Coordinated Time (UTC) and local standard time based on the time-zone maps in figures 2 and 3. The epicenters, which were taken from those published in the PDE, or from other sources as noted, are listed here to two decimals. The accuracy of the epicenters is that claimed by the institution supplying the hypocenter and is not necessarily the accuracy indicated by the number of decimals listed. The epicenters located by the NEIS have a varying degree of accuracy, usually two-tenths of a degree or less, depending on their continental or oceanic location. The oceanic hypocenters are less accurate than those on the continent, even though both are listed to two decimals. Depths are listed to the nearest whole kilometer.

Figures 4-6 are maps summarizing the earthquake activity for the conterminous United States, Alaska, and Hawaii for the period October-December 1978. The annual summaries are shown in figures 7-9. The magnitudes plotted in these figures are based on ML or mblg; if neither was computed, then on MS; and finally on mb, when it was the only magnitude computed.

The magnitude values listed in tables 1 and 2 were furnished by cooperating institutions or determined by the NEIS. The computational sources are labeled according to the assigned letter codes shown in headnotes to tables 1 and 2; the letter follows the value listed under the column heading "Magnitude." In table 1 the absence of a letter code indicates that the NEIS is the source. In table 2 the magnitude source is the same as the location source unless indicated otherwise, by an alphabetic character to the right of the magnitude value. The magnitude values calculated by the NEIS are based on the following formulas:

$$MS = \log(A/T) + 1.66 \log D + 3.3, \quad (1)$$

as adopted by the International Association of Seismology and Physics of the Earth's Interior (IASPEI; Bath, 1966, p. 153), where A is the maximum vertical surface-wave ground amplitude, in micrometers; T is the period, in seconds, and $18 \leq T \leq 22$; and D is the distance, in geocentric degrees (station to epicenter), and $20^\circ \leq D \leq 160^\circ$. No depth correction is made for depths less than 50 km.

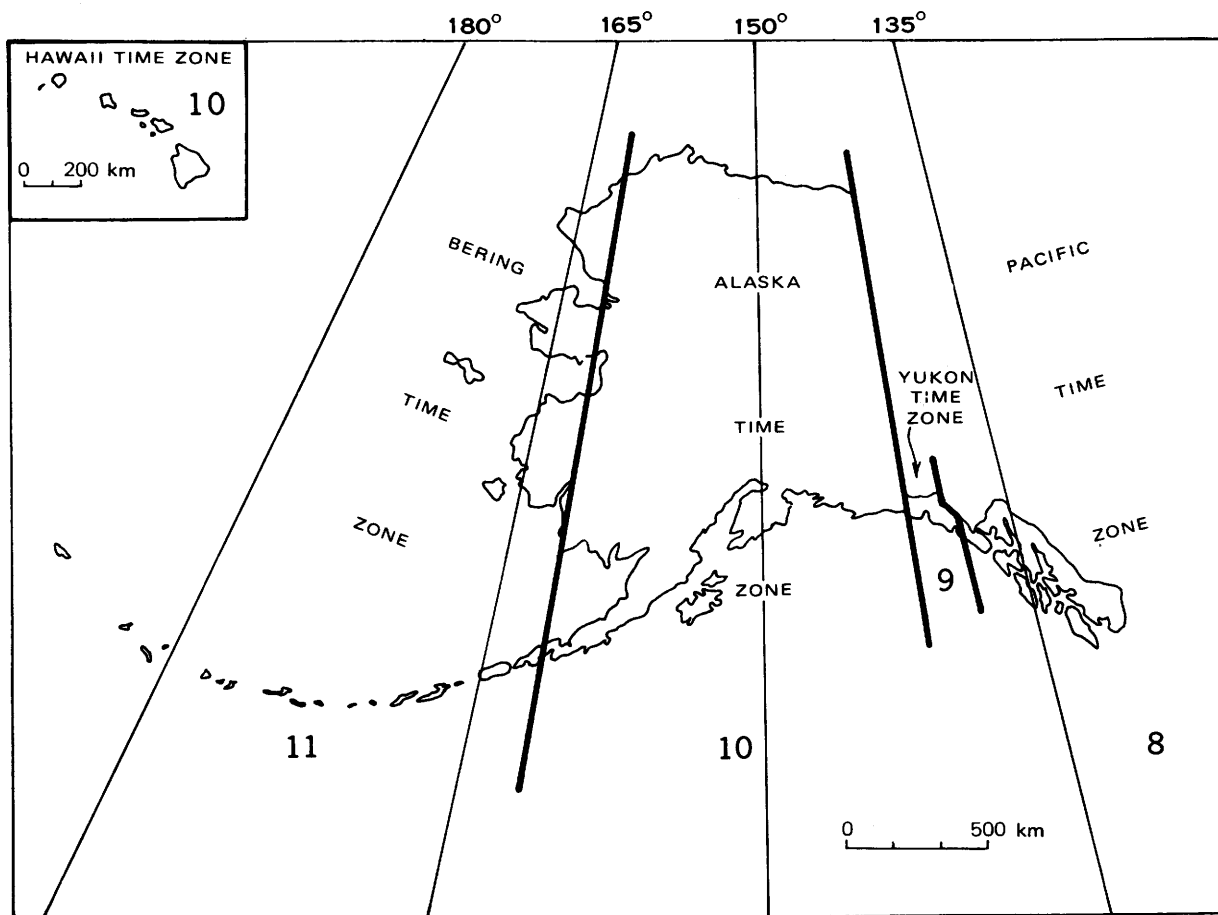


FIGURE 3.--Standard time zones of Alaska and Hawaii. The number in each zone shows the number of hours to be subtracted from Universal Coordinated Time to convert to local standard time. (Subtract 1 hour less for local daylight-saving time.)

$$mb = \log(A/T) + Q(D, h), \quad (2)$$

as defined by Gutenberg and Richter (1956), except that T , the period in seconds, is restricted to $0.1 \leq T \leq 3.0$, and A , the ground amplitude in micrometers, is not necessarily the maximum of the P-wave group. Q is a function of distance D and depth h , where $D \geq 5^\circ$.

$$ML = \log A - \log A_0, \quad (3)$$

as defined by Richter (1958, p. 340), where A is the maximum trace amplitude in millimeters, written by a Wood-Anderson torsion seismometer, and $\log A_0$ is a standard value as a function of distance, where the distance is ≤ 600 km. ML values are also calculated from other seismometers by conversion of recorded ground motion to the expected response of the torsion seismometer.

$$mbLg = 3.75 + 0.90(\log D) + \log(A/T) \quad (4)$$

$$0.5^\circ \leq D < 4^\circ,$$

$$mbLg = 3.30 + 1.66(\log D) + \log(A/T)$$

$$4^\circ \leq D < 30^\circ,$$

as proposed by Nuttli (1973), where A/T is expressed in micrometers per second, calculated from the vertical-component 1-second Lg waves, and D is the distance in geocentric degrees.

All of the intensity values (indicated by Roman numerals) listed in this summary were derived, using the Modified Mercalli Intensity Scale of 1931 (Wood and Neumann, 1931) shown below, from the evaluation of "Earthquake Report" forms; from field reports by U.S. Geological Survey personnel, engineering firms, or universities; and from detailed macroseismic data communicated to the NEIS by people in the area affected by the earthquake. All earthquake reports received which contain minimal information are assigned

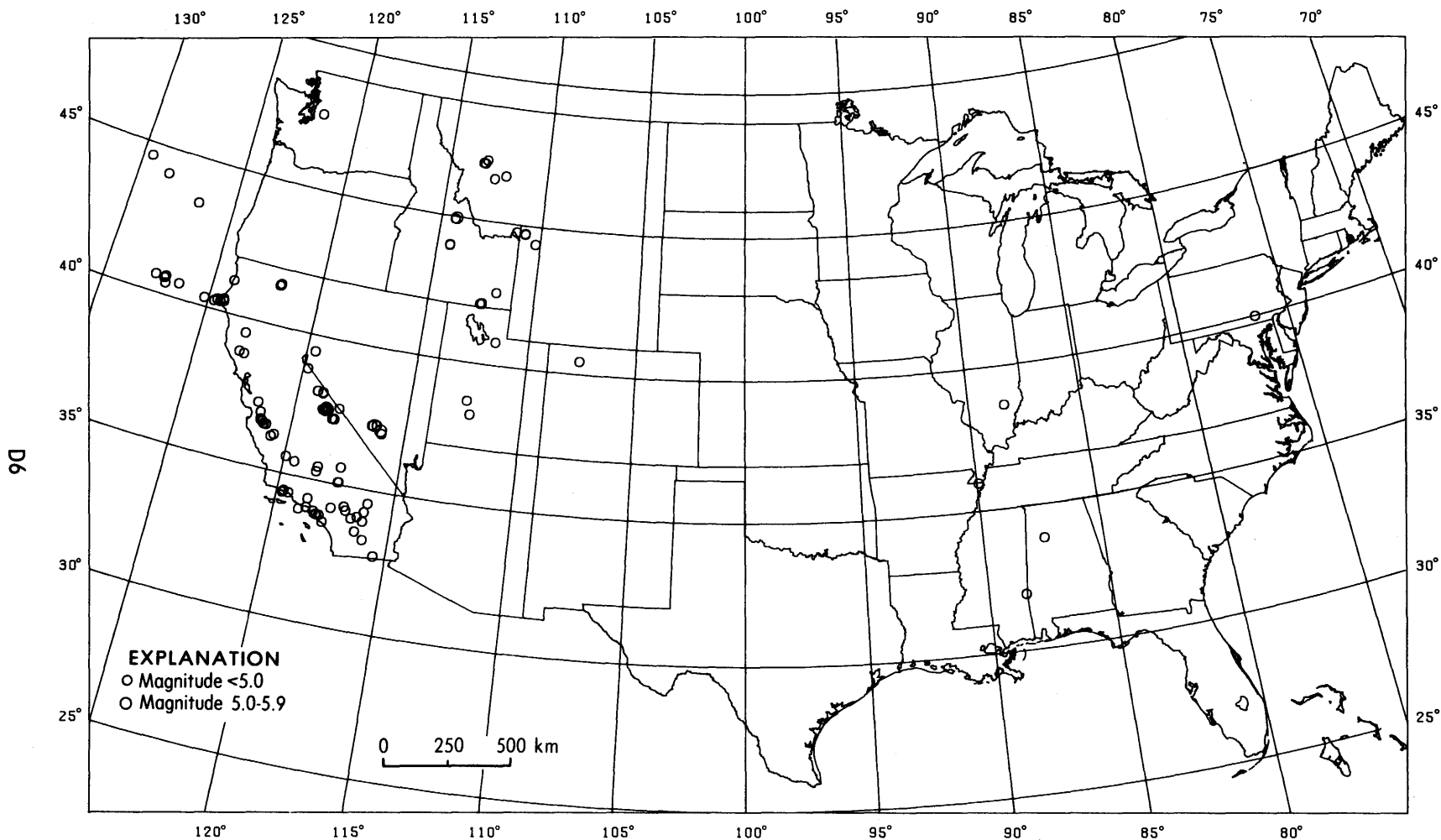


FIGURE 4.--Earthquake epicenters in the conterminous United States for October-December 1978, plotted from table 1.

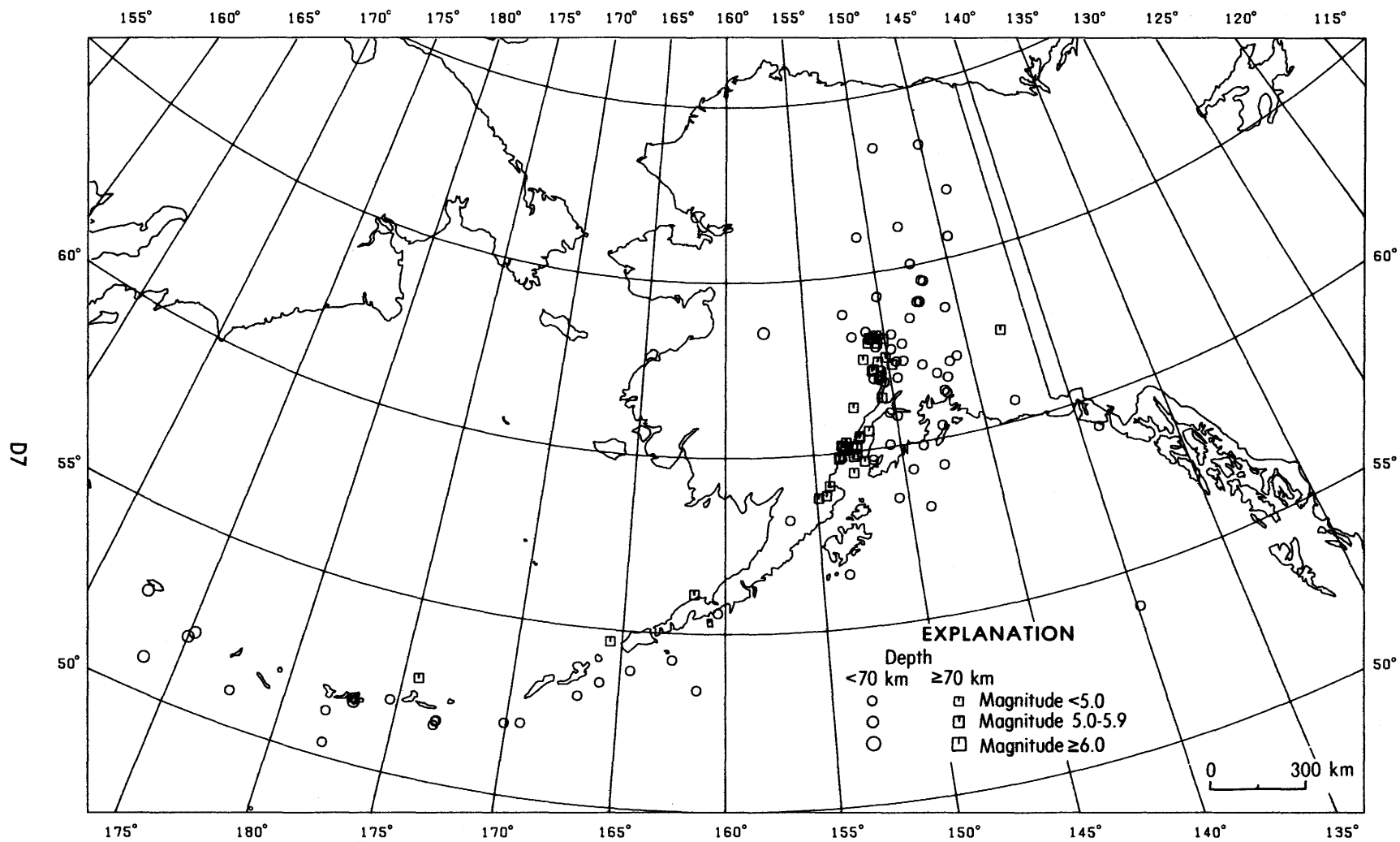


FIGURE 5.--Earthquake epicenters in Alaska for October-December 1978, plotted from table 1.

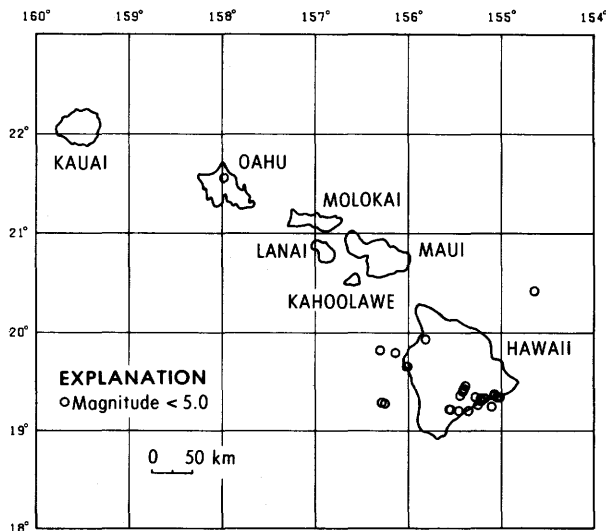


FIGURE 6.--Earthquake epicenters in Hawaii for October-December 1978, plotted from table 1.

an Intensity II. These reports are filed in the offices of the NEIS or in government archives and are available for detailed study.

MODIFIED MERCALLI INTENSITY SCALE OF 1931

Adapted from Sieberg's Mercalli-Cancani scale, modified and condensed.

- 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 experience. 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, especially in the upper range of this grade. Hanging objects swung, in numerous instances. Disturbed liquids in open vessels slightly. 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 slightly.
- 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 slightly 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. Disturbed persons driving motor cars. Trees shaken strongly--branches, trunks, broken off, especially palm trees. Ejected sand and mud in small amounts. Changes: temporary, 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 sometimes 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.

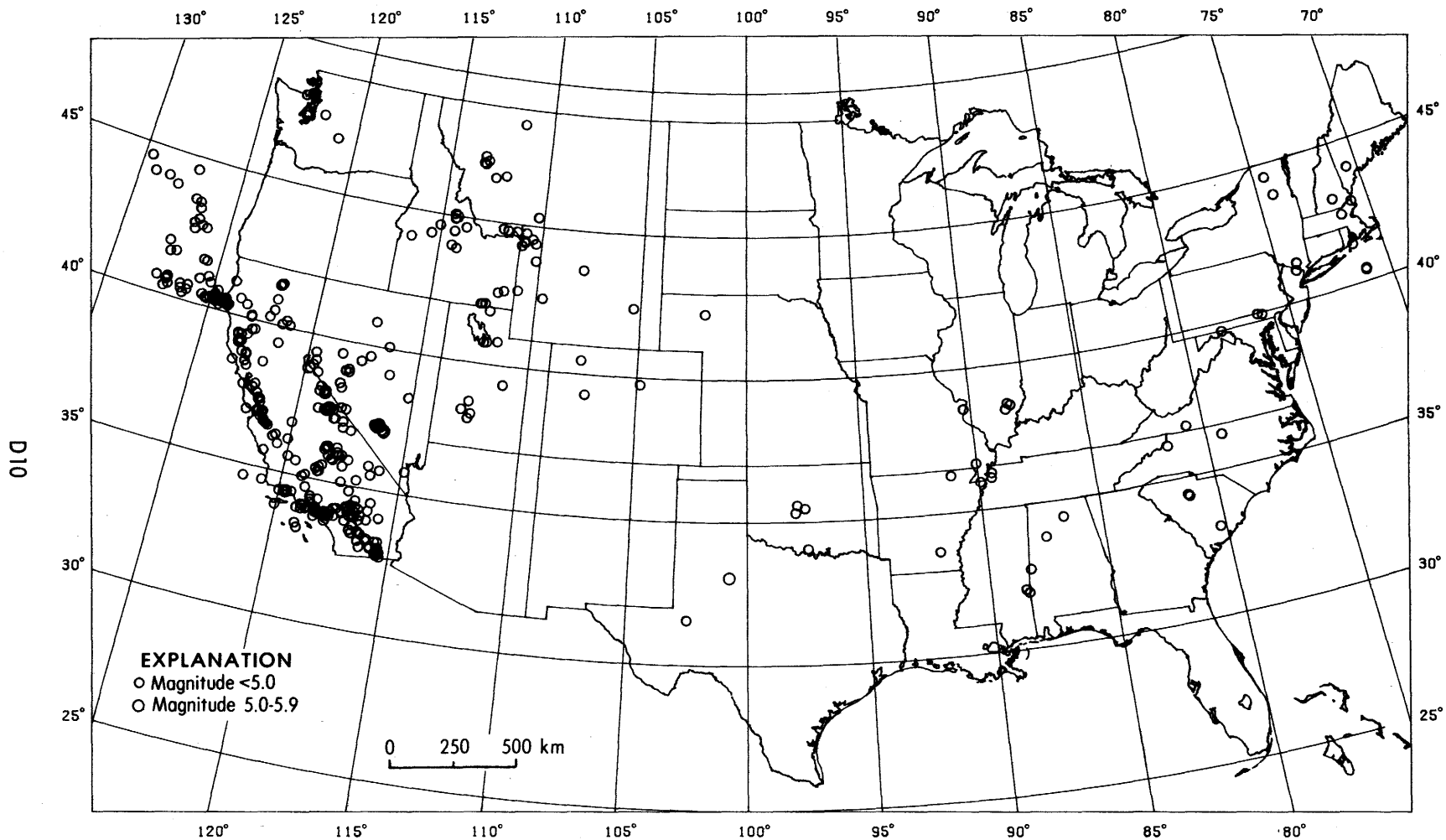


FIGURE 7.--Summary of earthquake epicenters in the conterminous United States for January-December 1978.

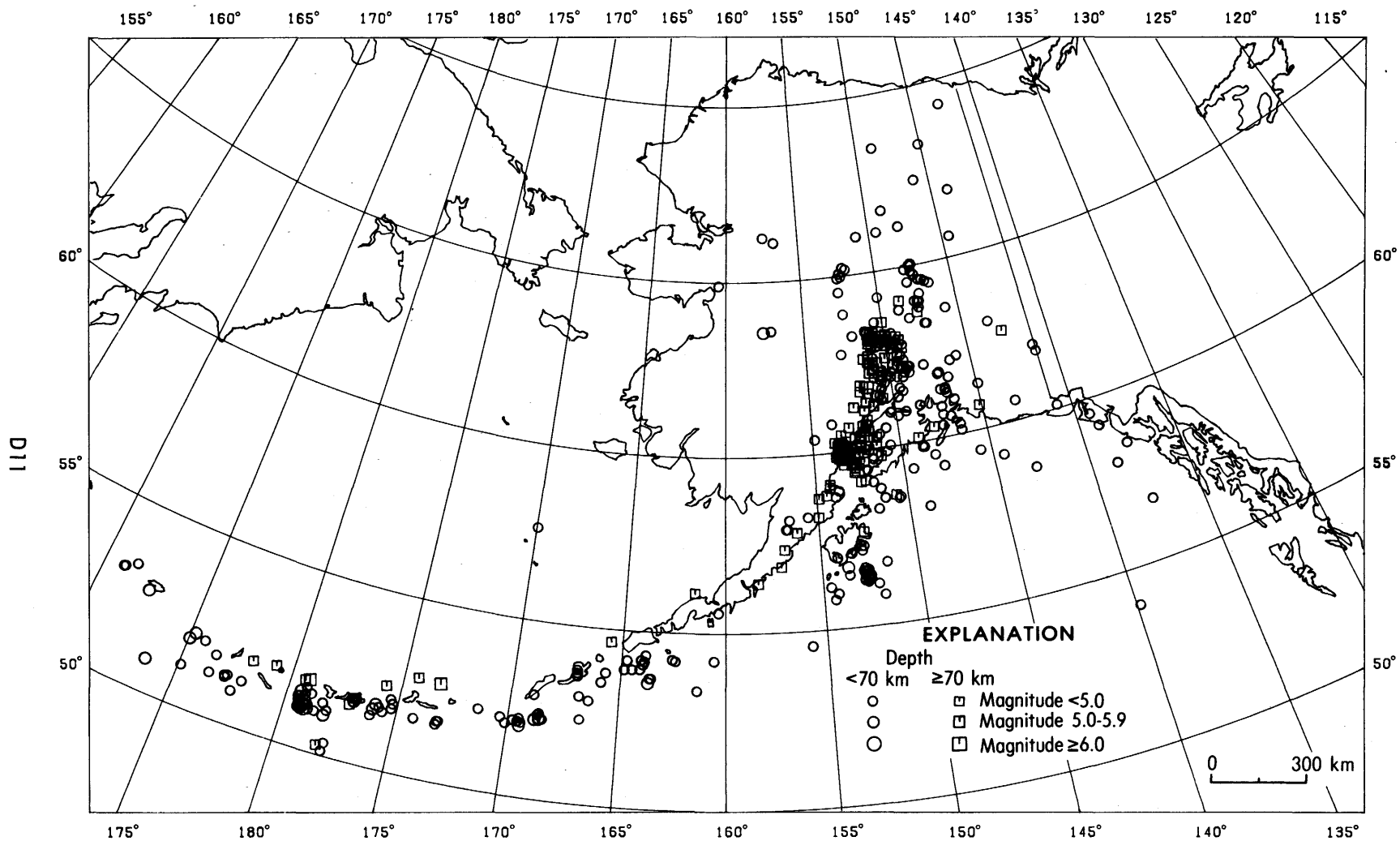


FIGURE 8.—Summary of earthquake epicenters in Alaska for January-December 1978.

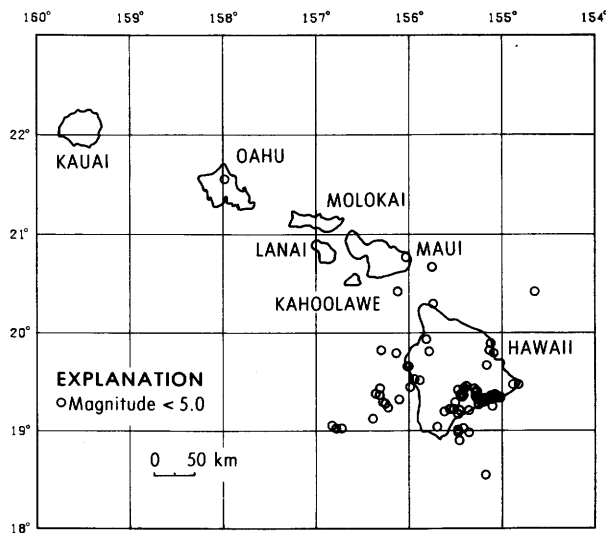


FIGURE 9.--Summary of earthquake epicenters in Hawaii for January-December 1978.

Table 1.--Summary of U.S. earthquakes for October-December 1978

[Sources of the hypocenters and magnitudes: (B) University of California, Berkeley; (E) U.S. Department of Energy, Las Vegas, Nevada; (G) U.S. Geological Survey, National Earthquake Information Service; (H) U.S. Geological Survey, Hawaiian Volcano Observatory; (P) California Institute of Technology, Pasadena; (S) St. Louis University, St. Louis,

Missouri; (U) University of Utah, Salt Lake City; (W) University of Washington, Seattle. N, Normal depth; UTC, Universal Coordinated Time. For names of local time zones, see figures 2 and 3. Leaders (...) indicate no information available]

Date (1978)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time				
	hr	min	s				mb	MS	ML or mbLg			Date	Hour			
ALABAMA																
OCT.	27	13	53	54.4	33.82 N.	87.45 W.	5	...	...	2.9T	...	G	OCT.	27	07 A.M.	CST
ALASKA																
OCT.	1	00	16	17.8	61.31 N.	146.88 W.	33N	...	...	3.0M	...	G	OCT.	0	02 P.M.	AST
OCT.	3	05	08	21.3	59.67 N.	152.15 W.	123	...	...	...	...	G	OCT.	2	07 P.M.	AST
OCT.	4	14	26	37.8	63.00 N.	151.08 W.	112	...	...	...	...	G	OCT.	4	04 A.M.	AST
OCT.	4	18	53	00.1	51.81 N.	177.05 W.	58	4.5	...	...	IV	G	OCT.	4	07 A.M.	BST
OCT.	4	19	55	17.5	50.93 N.	173.53 E.	33N	5.3	5.0	...	III	G	OCT.	4	08 A.M.	BST
OCT.	6	05	54	05.2	61.93 N.	150.67 W.	6	...	...	4.6M	III	G	OCT.	5	07 P.M.	AST
OCT.	7	10	44	28.6	58.17 N.	156.52 W.	33N	...	...	3.3M	...	G	OCT.	7	00 A.M.	AST
OCT.	8	02	52	56.9	66.15 N.	147.85 W.	33N	...	...	3.5M	...	G	OCT.	7	04 P.M.	AST
OCT.	8	05	13	10.5	60.27 N.	153.08 W.	158	...	...	...	...	G	OCT.	7	07 P.M.	AST
OCT.	11	01	10	53.4	50.95 N.	177.58 E.	33N	4.8	...	...	...	G	OCT.	10	02 P.M.	BST
OCT.	11	18	06	52.1	63.63 N.	145.82 W.	12	...	...	3.0M	...	G	OCT.	11	08 A.M.	AST
OCT.	12	06	02	10.6	52.04 N.	175.37 W.	48	4.3	...	...	...	G	OCT.	11	07 P.M.	BST
OCT.	13	09	08	54.0	60.56 N.	143.07 W.	33N	...	...	3.4M	...	G	OCT.	12	11 P.M.	AST
OCT.	14	11	16	06.9	60.07 N.	152.49 W.	114	...	...	...	...	G	OCT.	14	01 A.M.	AST
OCT.	14	18	09	16.3	59.87 N.	153.48 W.	146	...	...	...	...	G	OCT.	14	08 A.M.	AST
OCT.	15	00	55	31.5	50.38 N.	177.81 W.	33N	4.3	...	...	...	G	OCT.	14	01 P.M.	BST
OCT.	15	00	57	42.2	63.11 N.	150.97 W.	45	...	...	...	...	G	OCT.	14	02 P.M.	AST
OCT.	15	19	27	46.9	59.08 N.	154.20 W.	141	...	...	...	...	G	OCT.	15	09 A.M.	AST
OCT.	17	20	50	48.7	51.72 N.	176.94 W.	61	5.0	...	...	VI	G	OCT.	17	09 A.M.	BST
OCT.	19	04	49	06.4	61.82 N.	147.14 W.	33N	...	...	3.1M	...	G	OCT.	18	06 P.M.	AST
OCT.	19	20	02	51.3	62.85 N.	150.65 W.	33N	...	...	3.5M	...	G	OCT.	19	10 A.M.	AST
OCT.	20	18	38	28.3	59.84 N.	152.69 W.	110	...	...	...	...	G	OCT.	20	08 A.M.	AST
OCT.	23	22	17	49.1	59.26 N.	149.48 W.	33N	...	...	3.2M	...	G	OCT.	23	12 P.M.	AST
OCT.	24	02	56	35.8	63.54 N.	148.21 W.	33N	3.5	...	3.4M	...	G	OCT.	23	04 P.M.	AST
OCT.	25	22	02	18.1	59.22 N.	147.75 W.	19	4.9	4.4	4.6M	...	G	OCT.	25	12 P.M.	AST

Table 1.—Summary of U.S. earthquakes for October-December 1978—Continued

Date (1978)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML or mblg			Date	Hour				
ALASKA--Continued																	
OCT.	27	03	39	02.7	68.48 N.	148.69 W.	33N	...	...	...	...	G	OCT.	26	05	P.M.	AST
OCT.	27	04	29	31.5	62.20 N.	151.05 W.	102	...	...	...	II	G	OCT.	26	06	P.M.	AST
OCT.	29	01	25	08.0	62.84 N.	148.99 W.	37	...	...	3.0M	...	G	OCT.	28	03	P.M.	AST
OCT.	30	11	11	38.4	60.96 N.	150.32 W.	48	3.3	...	...	III	G	OCT.	30	01	A.M.	AST
OCT.	31	12	28	30.1	61.91 N.	149.57 W.	33N	3.5	...	3.4M	II	G	OCT.	31	02	A.M.	AST
NOV.	1	15	00	16.3	59.17 N.	138.96 W.	23	3.2	...	...	...	G	NOV.	1	06	A.M.	YST
NOV.	1	15	17	22.4	62.53 N.	150.11 W.	88	...	...	...	...	G	NOV.	1	05	A.M.	AST
NOV.	1	23	12	17.9	63.10 N.	150.68 W.	129	3.4	...	...	...	G	NOV.	1	01	P.M.	AST
NOV.	2	00	12	52.8	60.19 N.	153.33 W.	155	...	...	...	...	G	NOV.	1	02	P.M.	AST
NOV.	2	05	22	18.6	53.89 N.	164.53 W.	27	4.6	...	...	...	G	NOV.	1	06	P.M.	BST
NOV.	2	16	47	17.8	53.40 N.	161.36 W.	33N	4.7	...	...	...	G	NOV.	2	05	A.M.	BST
NOV.	3	12	17	26.7	60.83 N.	149.90 W.	33N	...	...	3.2M	...	G	NOV.	3	02	A.M.	AST
NOV.	3	17	35	05.5	63.14 N.	150.95 W.	135	...	...	...	...	G	NOV.	3	07	A.M.	AST
NOV.	3	17	36	14.4	51.93 N.	175.01 E.	33N	4.9	5.1	...	...	G	NOV.	3	06	A.M.	BST
NOV.	4	18	22	56.7	53.96 N.	139.84 W.	10	4.4	...	...	...	G	NOV.	4	09	A.M.	YST
NOV.	5	06	35	30.1	58.51 N.	150.51 W.	33N	...	...	3.2M	...	G	NOV.	4	08	P.M.	AST
NOV.	5	09	29	11.5	63.90 N.	152.46 W.	44	...	...	3.0M	...	G	NOV.	4	11	P.M.	AST
NOV.	6	08	03	36.5	63.24 N.	152.04 W.	33N	...	...	3.1M	...	G	NOV.	5	10	P.M.	AST
NOV.	6	22	17	19.8	60.35 N.	147.43 W.	33N	...	...	3.0M	...	G	NOV.	6	12	P.M.	AST
NOV.	8	05	44	06.9	62.37 N.	149.07 W.	33N	...	...	3.0M	...	G	NOV.	7	07	P.M.	AST
NOV.	10	15	22	54.5	53.48 N.	165.94 W.	33N	4.7	...	...	...	G	NOV.	10	04	A.M.	BST
NOV.	10	23	42	03.8	58.13 N.	148.88 W.	33N	4.7	...	4.5M	...	G	NOV.	10	01	P.M.	AST
NOV.	13	12	05	49.0	66.88 N.	143.86 W.	10	...	...	3.2M	...	G	NOV.	13	02	A.M.	AST
NOV.	14	10	02	24.8	62.97 N.	150.49 W.	122	3.8	...	...	...	G	NOV.	14	00	A.M.	AST
NOV.	14	20	34	18.1	60.51 N.	151.71 W.	87	...	...	...	...	G	NOV.	14	10	A.M.	AST
NOV.	14	22	27	45.7	64.54 N.	147.03 W.	25	...	...	3.7M	II	G	NOV.	14	12	P.M.	AST
NOV.	15	10	20	22.5	63.18 N.	150.48 W.	112	...	...	...	...	G	NOV.	15	00	A.M.	AST
NOV.	15	13	33	30.5	61.83 N.	150.38 W.	48	...	...	...	...	G	NOV.	15	03	A.M.	AST
NOV.	15	15	59	35.3	60.10 N.	153.14 W.	151	...	...	...	...	G	NOV.	15	05	A.M.	AST
NOV.	15	18	09	24.0	62.61 N.	142.79 W.	76	4.3	...	...	...	G	NOV.	15	08	A.M.	AST
NOV.	15	21	06	31.6	62.24 N.	150.94 W.	77	...	...	...	...	G	NOV.	15	11	A.M.	AST
NOV.	16	07	58	51.9	63.12 N.	150.91 W.	143	...	...	...	...	G	NOV.	15	09	P.M.	AST
NOV.	16	14	44	12.8	62.74 N.	149.68 W.	40	...	...	...	...	G	NOV.	16	04	A.M.	AST
NOV.	16	17	54	02.4	64.50 N.	146.87 W.	7	...	...	3.2M	...	G	NOV.	16	07	A.M.	AST
NOV.	18	17	11	53.1	56.12 N.	161.55 W.	182	4.6	...	...	...	G	NOV.	18	06	A.M.	BST
NOV.	19	12	06	13.7	63.33 N.	151.12 W.	33N	4.0	...	4.3M	...	G	NOV.	19	02	A.M.	AST
NOV.	19	19	42	35.7	52.70 N.	172.48 E.	47	5.3	5.2	...	V	G	NOV.	19	08	A.M.	BST
NOV.	20	23	41	19.1	51.82 N.	176.95 W.	51	4.8	...	...	...	G	NOV.	20	12	P.M.	BST
NOV.	22	15	42	55.1	59.88 N.	148.72 W.	33N	3.6	...	3.7M	...	G	NOV.	22	05	A.M.	AST
NOV.	24	00	28	12.8	62.03 N.	150.52 W.	74	4.5	...	...	II	G	NOV.	23	02	P.M.	AST
NOV.	24	07	01	04.2	62.11 N.	146.26 W.	10	3.9	...	3.9M	...	G	NOV.	23	09	P.M.	AST
NOV.	24	08	50	45.4	61.99 N.	150.51 W.	77	3.2	...	...	II	G	NOV.	23	10	P.M.	AST
NOV.	25	02	41	58.5	61.23 N.	146.81 W.	33N	...	...	3.0M	...	G	NOV.	24	04	P.M.	AST
NOV.	26	00	45	46.6	59.83 N.	153.55 W.	145	...	...	...	...	G	NOV.	25	02	P.M.	AST
NOV.	27	06	01	32.0	58.81 N.	154.42 W.	163	...	...	...	...	G	NOV.	26	08	P.M.	AST
NOV.	28	17	41	04.1	52.03 N.	170.11 W.	11	5.2	4.5	...	...	G	NOV.	28	06	A.M.	BST
DEC.	2	21	57	20.0	59.69 N.	151.66 W.	13	...	...	3.7M	V	G	DEC.	2	11	A.M.	AST
DEC.	3	19	39	31.2	62.31 N.	149.75 W.	74	4.7	...	...	IV	G	DEC.	3	09	A.M.	AST
DEC.	4	12	11	06.4	65.04 N.	147.51 W.	24	...	...	3.3M	II	G	DEC.	4	02	A.M.	AST
DEC.	6	11	05	35.2	60.14 N.	153.26 W.	137	4.5	...	...	...	G	DEC.	6	01	A.M.	AST
DEC.	7	00	16	49.1	54.66 N.	165.59 W.	127	4.6	...	...	...	G	DEC.	6	01	P.M.	BST
DEC.	8	00	00	52.9	62.56 N.	151.51 W.	92	3.8	...	...	...	G	DEC.	7	02	P.M.	AST
DEC.	8	10	01	51.5	68.33 N.	145.17 W.	33N	...	...	4.0M	II	G	DEC.	8	00	A.M.	AST
DEC.	9	00	50	48.1	60.36 N.	152.29 W.	117	4.4	...	...	...	G	DEC.	8	02	P.M.	AST
DEC.	9	17	10	38.8	61.40 N.	150.65 W.	73	3.9	...	...	...	G	DEC.	9	07	A.M.	AST
DEC.	10	10	26	18.5	61.66 N.	146.54 W.	33N	3.4	...	3.9M	...	G	DEC.	10	00	A.M.	AST
DEC.	14	11	22	51.4	52.81 N.	174.31 W.	224	4.5	...	...	...	G	DEC.	14	00	A.M.	BST
DEC.	14	13	32	52.4	62.43 N.	150.64 W.	84	...	...	...	...	G	DEC.	14	03	A.M.	AST
DEC.	14	17	21	42.1	52.10 N.	169.39 W.	37	4.9	...	...	...	G	DEC.	14	06	A.M.	BST
DEC.	14	21	03	07.3	51.27 N.	178.04 W.	45	4.6	...	...	...	G	DEC.	14	10	A.M.	BST
DEC.	15	08	30	34.7	52.11 N.	175.23 E.	47	5.6	5.6	...	V	G	DEC.	14	09	P.M.	BST
DEC.	15	22	20	40.7	66.06 N.	150.85 W.	54	...	...	...	...	G	DEC.	15	12	P.M.	AST
DEC.	17	13	15	26.0	63.95 N.	147.42 W.	22	4.8	...	4.6M	IV	G	DEC.	17	03	A.M.	AST

Table 1.--Summary of U.S. earthquakes for October-December 1978--Continued

Date (1978)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML or mbLg			Date	Hour				
ALASKA--Continued																	
DEC. DEC.	17 18	14 11	53 44	22.9 59.8	61.22 N. 63.95 N.	152.41 W. 147.55 W.	14 / 33N	...	...	...	...	G DEC.	DEC. DEC.	17 18	04 01	A.M. A.M.	AST AST
DEC. DEC. DEC. DEC. DEC.	20 20 22 22 24	07 10 03 06 09	17 15 25 37 59	03.5 41.7 29.9 54.2 21.7	63.17 N. 59.89 N. 55.57 N. 60.05 N. 65.59 N.	149.53 W. 152.52 W. 160.37 W. 150.58 W. 144.55 W.	33N 99 12 33N 33N	...	...	2.7M ... 4.2M 3.8M 4.6M	...	G G IV G G	DEC. DEC. DEC. DEC. DEC.	19 20 21 23 23	09 00 05 08 11	P.M. A.M. P.M. P.M. P.M.	AST AST AST AST AST
DEC. DEC. DEC. DEC. DEC.	24 24 24 25 25	10 13 19 06 09	46 13 31 52 24	18.9 08.1 58.4 12.0 25.4	64.27 N. 63.56 N. 59.39 N. 63.06 N. 58.75 N.	150.07 W. 157.59 W. 152.79 W. 150.06 W. 154.85 W.	33N 33N 91 121 158	...	...	3.1M 5.3M ... ... ...	...	G G G G G	DEC. DEC. DEC. DEC. DEC.	24 24 24 24 24	00 03 09 08 11	A.M. A.M. A.M. P.M. P.M.	AST AST AST AST AST
DEC. DEC. DEC. DEC. DEC.	25 25 25 27 28	16 16 16 19 02	03 12 25 50 42	37.3 12.7 20.9 33.1 45.4	51.74 N. 51.60 N. 51.72 N. 54.23 N. 61.97 N.	173.12 W. 173.22 W. 173.17 W. 162.57 W. 150.99 W.	33N 33N 33N 37 61	4.3 4.3 4.1 4.7 ...	...	...	...	G G G G G	DEC. DEC. DEC. DEC. DEC.	25 25 25 27 27	05 05 05 08 04	A.M. A.M. A.M. A.M. P.M.	BST BST BST BST AST
DEC. DEC. DEC. DEC. DEC.	28 29 29 29 30	13 01 09 10 09	41 10 00 08 40	23.8 42.6 48.1 01.6 54.0	63.94 N. 60.40 N. 53.05 N. 56.52 N. 62.16 N.	147.36 W. 152.20 W. 166.89 W. 153.59 W. 147.90 W.	33N 110 33N 28 33N	...	...	3.5M 3.0M	...	G G G G G	DEC. DEC. DEC. DEC. DEC.	28 28 28 29 29	03 03 10 00 11	A.M. P.M. P.M. A.M. P.M.	AST AST BST AST AST
DEC. DEC.	31 31	19 19	16 48	10.0 50.5	62.37 N. 62.21 N.	149.46 W. 145.78 W.	61 17	...	...	...	...	G G	DEC. DEC.	31 31	09 09	A.M. A.M.	AST AST
ARKANSAS																	
NOV.	21	23	31	22.1	35.97 N.	89.92 W.	10	...	...	2.3S	II	S	NOV.	21	05	P.M.	CST
CALIFORNIA																	
OCT. OCT. OCT. OCT. OCT.	4 4 4 4 4	03 16 16 16 16	34 42 48 57 59	26.8 48.6 24.0 04.8 04.6	41.46 N. 37.53 N. 37.52 N. 37.52 N. 37.53 N.	121.87 W. 118.63 W. 118.66 W. 118.63 W. 118.63 W.	2 9 10 9 12	...	...	3.3B 5.8P 3.2B 3.1P 4.4P	...	B P B P P	OCT. OCT. OCT. OCT. OCT.	3 4 4 4 4	07 08 08 08 08	P.M. A.M. A.M. A.M. A.M.	PST PST PST PST PST
OCT. OCT. OCT. OCT. OCT.	4 4 4 4 4	17 17 17 17 17	07 18 31 33 39	35.3 50.6 31.1 04.6 02.9	37.45 N. 37.50 N. 37.55 N. 37.53 N. 37.58 N.	118.67 W. 118.63 W. 118.60 W. 118.60 W. 118.62 W.	9 10 10 9 10	...	...	3.4P 3.0P 4.3P 3.8P 5.3P	...	P P P P P	OCT. OCT. OCT. OCT. OCT.	4 4 4 4 4	09 09 09 09 09	A.M. A.M. A.M. A.M. A.M.	PST PST PST PST PST
OCT. OCT. OCT. OCT. OCT.	4 4 4 4 4	17 17 17 17 18	43 46 49 54 01	46.8 47.5 28.5 11.3 53.3	37.55 N. 37.53 N. 37.55 N. 37.55 N. 37.53 N.	118.62 W. 118.62 W. 118.65 W. 118.57 W. 118.65 W.	10 8 9 10 8	...	...	3.8P 4.2P 3.5P 3.4P 3.9P	...	P P P P P	OCT. OCT. OCT. OCT. OCT.	4 4 4 4 4	09 09 09 09 10	A.M. A.M. A.M. A.M. A.M.	PST PST PST PST PST
OCT. OCT. OCT. OCT. OCT.	4 4 4 4 4	18 18 18 18 19	03 07 09 12 19	42.4 00.2 32.8 42.1 51.8	37.55 N. 37.55 N. 37.50 N. 37.53 N. 37.55 N.	118.50 W. 118.58 W. 118.58 W. 118.63 W. 118.60 W.	11 9 8 9 9	...	...	3.5P 3.3P 3.4P 3.1P 3.1P	...	P P P P P	OCT. OCT. OCT. OCT. OCT.	4 4 4 4 4	10 10 10 10 10	A.M. A.M. A.M. A.M. A.M.	PST PST PST PST PST
OCT. OCT. OCT. OCT. OCT.	4 4 4 4 4	18 18 18 19 19	20 22 44 22 47	47.1 41.6 43.2 25.0 41.9	37.52 N. 37.52 N. 37.53 N. 37.48 N. 37.57 N.	118.62 W. 118.62 W. 118.60 W. 118.78 W. 118.58 W.	9 9 9 9 10	...	...	3.2P 4.4P 3.5P 3.3P 3.0P	...	P P P P P	OCT. OCT. OCT. OCT. OCT.	4 4 4 4 4	10 10 10 11 11	A.M. A.M. A.M. A.M. A.M.	PST PST PST PST PST
OCT. OCT. OCT. OCT. OCT.	4 4 4 4 5	20 20 20 23 01	09 11 48 06 17	33.2 42.1 37.6 28.4 47.3	37.52 N. 37.52 N. 37.53 N. 37.52 N. 37.53 N.	118.62 W. 118.63 W. 118.65 W. 118.60 W. 118.62 W.	8 9 10 9 6	...	...	3.2P 3.4P 3.2P 3.0P 4.4P	...	P P P P P	OCT. OCT. OCT. OCT. OCT.	4 4 4 4 4	12 12 12 03 05	P.M. P.M. P.M. P.M. P.M.	PST PST PST PST PST
OCT. OCT.	5 5	01 01	41 45	57.3 06.4	37.47 N. 37.50 N.	118.68 W. 118.58 W.	8 6	...	...	3.3P 3.3P	...	P P	OCT. OCT.	4 4	05 05	P.M. P.M.	PST PST

Table 1.—Summary of U.S. earthquakes for October–December 1978—Continued

Date (1978)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML or mblg			Date	Hour				
CALIFORNIA—Continued																	
OCT.	5	04	23	55.3	41.44 N.	121.87 W.	2	...	...	3.2B	...	B	OCT.	4	08	P.M.	PST
OCT.	5	06	41	30.1	37.48 N.	118.63 W.	8	...	...	4.5P	...	P	OCT.	4	10	P.M.	PST
OCT.	5	09	56	40.4	41.46 N.	121.88 W.	2	4.2	3.8	4.1B	IV	B	OCT.	5	01	A.M.	PST
OCT.	5	10	46	18.4	37.48 N.	118.65 W.	5	...	...	3.2P	...	P	OCT.	5	02	A.M.	PST
OCT.	5	12	04	29.9	37.50 N.	118.63 W.	9	...	...	3.0P	...	P	OCT.	5	04	A.M.	PST
OCT.	5	16	09	02.9	41.46 N.	121.87 W.	2	...	...	3.2B	...	B	OCT.	5	08	A.M.	PST
OCT.	5	22	54	13.3	37.55 N.	118.58 W.	12	...	...	3.5P	...	P	OCT.	5	02	P.M.	PST
OCT.	6	01	32	21.9	37.57 N.	118.55 W.	12	...	...	3.6P	...	P	OCT.	5	05	P.M.	PST
OCT.	6	02	11	04.1	37.52 N.	118.65 W.	9	...	...	3.0B	...	B	OCT.	5	06	P.M.	PST
OCT.	6	16	37	10.4	37.23 N.	118.20 W.	6	...	...	3.5B	...	B	OCT.	6	08	A.M.	PST
OCT.	6	21	04	37.2	41.44 N.	121.88 W.	2	...	...	4.0B	...	B	OCT.	6	01	P.M.	PST
OCT.	6	21	26	34.4	40.38 N.	124.27 W.	20	4.8	4.2	4.6B	V	B	OCT.	6	01	P.M.	PST
OCT.	6	21	43	00.9	40.38 N.	124.26 W.	23	...	...	3.3B	...	B	OCT.	6	01	P.M.	PST
OCT.	6	22	51	30.1	41.42 N.	121.90 W.	2	...	...	3.0B	...	B	OCT.	6	02	P.M.	PST
OCT.	7	02	49	16.9	37.52 N.	118.67 W.	9	...	...	3.2P	...	P	OCT.	6	06	P.M.	PST
OCT.	7	04	46	59.0	40.40 N.	124.60 W.	32	...	...	3.5B	...	B	OCT.	6	08	P.M.	PST
OCT.	7	12	30	40.7	37.24 N.	118.21 W.	8	...	...	3.1B	...	B	OCT.	7	04	A.M.	PST
OCT.	7	13	47	50.6	37.52 N.	118.65 W.	9	...	...	3.1P	...	P	OCT.	7	05	A.M.	PST
OCT.	8	13	29	18.6	37.52 N.	118.70 W.	10	...	...	3.2P	...	P	OCT.	8	05	A.M.	PST
OCT.	8	19	11	54.0	37.53 N.	118.60 W.	9	...	...	3.0P	...	P	OCT.	8	11	A.M.	PST
OCT.	8	23	59	11.3	36.55 N.	121.19 W.	4	...	...	3.0B	...	B	OCT.	8	03	P.M.	PST
OCT.	9	20	49	45.8	36.68 N.	121.37 W.	6	...	...	3.3B	III	B	OCT.	9	12	P.M.	PST
OCT.	10	01	38	36.9	36.61 N.	121.28 W.	8	...	...	3.8B	II	B	OCT.	9	05	P.M.	PST
OCT.	10	02	08	08.4	37.50 N.	118.60 W.	9	...	...	3.2P	...	P	OCT.	9	06	P.M.	PST
OCT.	10	04	28	51.8	38.80 N.	119.82 W.	10	...	...	3.1B	II	B	OCT.	9	08	P.M.	PST
OCT.	10	09	06	57.4	35.08 N.	117.50 W.	6	...	...	3.6P	II	P	OCT.	10	01	A.M.	PST
OCT.	11	02	51	22.3	35.51 N.	119.53 W.	12	...	...	3.0B	...	B	OCT.	10	06	P.M.	PST
OCT.	11	10	33	59.0	34.27 N.	117.05 W.	5	...	...	3.1P	...	P	OCT.	11	02	A.M.	PST
OCT.	11	12	36	07.9	34.53 N.	116.10 W.	5	...	...	3.2P	...	P	OCT.	11	04	A.M.	PST
OCT.	11	13	22	04.5	41.43 N.	121.88 W.	2	...	...	3.2B	...	B	OCT.	11	05	A.M.	PST
OCT.	13	18	47	07.7	41.41 N.	121.90 W.	2	...	...	3.9B	...	B	OCT.	13	10	A.M.	PST
OCT.	14	20	59	44.6	36.93 N.	121.46 W.	10	...	...	2.9B	...	B	OCT.	14	12	P.M.	PST
OCT.	14	23	38	41.8	37.48 N.	118.63 W.	9	...	...	3.0P	...	P	OCT.	14	03	P.M.	PST
OCT.	16	02	18	07.0	40.46 N.	124.30 W.	20	...	...	3.7B	III	B	OCT.	15	06	P.M.	PST
OCT.	16	04	22	44.1	40.67 N.	127.22 W.	5	4.5	4.1	4.2B	...	B	OCT.	15	08	P.M.	PST
OCT.	17	02	26	18.8	41.43 N.	121.90 W.	2	...	...	3.0B	...	B	OCT.	16	06	P.M.	PST
OCT.	19	09	10	24.5	33.83 N.	118.07 W.	5	...	...	1.9P	II	P	OCT.	19	01	A.M.	PST
OCT.	20	08	38	29.0	34.23 N.	116.18 W.	6	...	...	3.2P	...	P	OCT.	20	00	A.M.	PST
OCT.	20	21	25	14.4	38.06 N.	118.91 W.	6	...	...	3.8B	...	B	OCT.	20	01	P.M.	PST
OCT.	21	00	56	06.5	41.42 N.	121.91 W.	2	...	...	3.1B	...	B	OCT.	20	04	P.M.	PST
OCT.	21	02	06	27.4	33.90 N.	118.93 W.	5	...	...	3.6P	...	P	OCT.	20	06	P.M.	PST
OCT.	24	02	11	55.0	38.09 N.	118.90 W.	5	...	...	3.3B	...	B	OCT.	23	06	P.M.	PST
OCT.	24	06	57	05.0	38.06 N.	118.90 W.	5	...	...	3.4B	...	G	OCT.	23	10	P.M.	PST
OCT.	25	12	38	10.3	34.23 N.	116.18 W.	9	...	...	3.1P	...	P	OCT.	25	04	A.M.	PST
OCT.	26	19	00	41.3	37.52 N.	118.58 W.	9	...	...	3.9P	IV	P	OCT.	26	11	A.M.	PST
OCT.	27	12	00	22.2	37.26 N.	121.64 W.	4	...	...	3.1B	II	B	OCT.	27	04	A.M.	PST
OCT.	29	04	33	03.2	40.35 N.	124.45 W.	20	...	...	3.3B	...	B	OCT.	28	08	P.M.	PST
OCT.	29	06	50	49.1	40.30 N.	124.73 W.	20	...	...	3.8B	IV	B	OCT.	28	10	P.M.	PST
OCT.	29	08	09	59.5	33.92 N.	118.30 W.	5	...	...	2.9P	IV	P	OCT.	29	00	A.M.	PST
OCT.	29	22	16	09.0	34.32 N.	118.63 W.	3	...	...	3.6P	IV	P	OCT.	29	02	P.M.	PST
OCT.	30	16	05	04.6	36.67 N.	121.36 W.	6	...	...	3.2B	II	B	OCT.	30	08	A.M.	PST
NOV.	1	06	42	22.6	32.75 N.	115.52 W.	6	...	...	2.8P	II	P	NOV.	0	10	P.M.	PST
NOV.	3	04	24	53.0	37.52 N.	118.60 W.	9	...	...	3.3P	...	P	NOV.	2	08	P.M.	PST
NOV.	5	09	35	01.2	37.65 N.	118.05 W.	10	...	...	3.3B	...	B	NOV.	5	01	A.M.	PST
NOV.	6	16	22	25.0	37.53 N.	118.62 W.	9	...	...	3.5P	II	P	NOV.	6	08	A.M.	PST
NOV.	9	23	00	29.3	33.23 N.	116.07 W.	5	...	...	3.1P	...	P	NOV.	9	03	P.M.	PST
NOV.	11	04	24	04.6	33.63 N.	117.88 W.	3	...	...	2.7P	V	P	NOV.	10	08	P.M.	PST
NOV.	12	13	07	57.3	39.49 N.	122.95 W.	6	...	...	3.8B	IV	B	NOV.	12	05	A.M.	PST
NOV.	13	16	49	43.1	34.43 N.	119.70 W.	13	...	...	3.2P	II	P	NOV.	13	08	A.M.	PST
NOV.	13	16	50	58.3	34.43 N.	119.70 W.	15	...	...	3.3P	II	P	NOV.	13	08	A.M.	PST
NOV.	14	14	51	38.8	38.11 N.	119.16 W.	21	...	...	3.0B	...	B	NOV.	14	06	A.M.	PST
NOV.	16	13	28	46.7	34.15 N.	117.60 W.	6	...	...	3.2P	IV	P	NOV.	16	05	A.M.	PST
NOV.	19	02	12	10.5	35.62 N.	119.93 W.	5	...	...	3.2P	...	P	NOV.	18	06	P.M.	PST

Table 1.--Summary of U.S. earthquakes for October-December 1978--Continued

Date (1978)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time					
	hr	min	s				mb	MS	ML or mbLg			Date	Hour				
CALIFORNIA--Continued																	
NOV.	19	03	55	31.6	34.02 N.	118.65 W.	12	...	...	3.0P	...	P	NOV.	18	07	P.M.	PST
NOV.	19	04	20	05.6	33.85 N.	118.17 W.	12	...	...	2.7P	II	P	NOV.	18	08	P.M.	PST
NOV.	19	17	40	56.9	33.85 N.	118.18 W.	5	...	...	3.1P	IV	P	NOV.	19	09	A.M.	PST
NOV.	19	18	00	16.4	33.85 N.	118.17 W.	12	...	...	2.8P	III	P	NOV.	19	10	A.M.	PST
NOV.	20	06	55	09.4	34.15 N.	116.97 W.	5	4.0	...	4.2P	VI	P	NOV.	19	10	P.M.	PST
NOV.	20	06	58	45.0	34.15 N.	116.97 W.	6	...	...	3.5P	III	P	NOV.	19	10	P.M.	PST
NOV.	20	21	21	49.1	34.15 N.	116.98 W.	5	...	...	3.1P	II	P	NOV.	20	01	P.M.	PST
NOV.	21	20	54	52.5	34.02 N.	116.43 W.	8	...	...	3.0P	...	P	NOV.	21	12	P.M.	PST
NOV.	22	19	09	42.8	35.32 N.	118.52 W.	5	...	...	3.0P	...	P	NOV.	22	11	A.M.	PST
NOV.	25	03	24	55.3	37.50 N.	118.70 W.	8	...	...	3.4P	II	P	NOV.	24	07	P.M.	PST
NOV.	25	04	06	41.4	37.53 N.	118.68 W.	9	...	...	3.5P	II	P	NOV.	24	08	P.M.	PST
NOV.	28	16	54	59.0	35.08 N.	117.52 W.	5	...	...	3.3P	...	P	NOV.	28	08	A.M.	PST
DEC.	1	02	29	41.3	33.48 N.	116.45 W.	5	...	...	3.1P	...	P	DEC.	0	06	P.M.	PST
DEC.	1	23	20	46.5	33.93 N.	116.68 W.	5	...	...	3.6P	II	P	DEC.	1	03	P.M.	PST
DEC.	6	10	03	49.3	34.38 N.	119.75 W.	5	...	...	3.2P	III	P	DEC.	6	02	A.M.	PST
DEC.	6	11	21	48.7	34.37 N.	119.75 W.	5	...	...	2.2P	II	P	DEC.	6	03	A.M.	PST
DEC.	8	15	44	44.4	36.54 N.	121.08 W.	9	...	...	3.1B	...	B	DEC.	8	07	A.M.	PST
DEC.	9	16	02	27.7	38.79 N.	122.78 W.	4	...	...	3.4B	...	B	DEC.	9	08	A.M.	PST
DEC.	13	03	03	00.0	37.52 N.	118.65 W.	5	...	...	3.2B	...	B	DEC.	12	07	P.M.	PST
DEC.	14	07	38	12.1	36.18 N.	120.79 W.	6	...	...	3.1B	...	B	DEC.	13	11	P.M.	PST
DEC.	14	08	55	20.4	34.40 N.	119.50 W.	5	...	...	3.1P	IV	P	DEC.	14	00	A.M.	PST
DEC.	15	03	01	19.0	38.84 N.	123.02 W.	1	3.6	...	3.0B	...	B	DEC.	14	07	P.M.	PST
DEC.	15	03	36	58.0	33.90 N.	116.17 W.	4	...	...	3.3P	...	P	DEC.	14	07	P.M.	PST
DEC.	15	12	27	57.8	33.90 N.	116.17 W.	4	...	...	3.3P	...	P	DEC.	15	04	A.M.	PST
DEC.	16	11	17	28.7	41.17 N.	124.07 W.	20	...	...	3.7B	...	B	DEC.	16	03	A.M.	PST
DEC.	18	20	05	48.7	36.26 N.	120.67 W.	5	...	...	3.0B	...	G	DEC.	18	12	P.M.	PST
DEC.	20	04	14	31.7	35.62 N.	117.53 W.	5	...	...	3.0P	...	P	DEC.	19	08	P.M.	PST
DEC.	25	10	25	32.8	35.47 N.	118.50 W.	5	...	...	3.0P	...	P	DEC.	25	02	A.M.	PST
DEC.	29	04	26	43.2	37.23 N.	118.30 W.	5	...	...	3.2P	...	P	DEC.	28	08	P.M.	PST
DEC.	29	06	30	30.4	33.93 N.	118.33 W.	3	...	...	2.3P	II	P	DEC.	28	10	P.M.	PST
DEC.	31	12	06	37.8	38.05 N.	118.89 W.	6	...	...	3.2B	...	B	DEC.	31	04	A.M.	PST
CALIFORNIA--OFF THE COAST																	
OCT.	15	15	36	31.7	40.62 N.	127.22 W.	5	4.8	4.0	4.1B	...	B	OCT.	15	07	A.M.	PST
OCT.	15	19	54	50.4	40.59 N.	127.24 W.	5	4.8	4.2	4.3B	...	B	OCT.	15	11	A.M.	PST
NOV.	11	09	35	31.1	40.54 N.	126.54 W.	5	4.3	4.1	4.2B	...	B	NOV.	11	01	A.M.	PST
NOV.	22	23	02	41.8	40.31 N.	125.22 W.	5	...	...	3.9B	...	B	NOV.	22	03	P.M.	PST
NOV.	30	16	38	39.3	40.43 N.	127.15 W.	5	...	...	4.0B	...	B	NOV.	30	08	A.M.	PST
DEC.	3	06	47	45.9	40.63 N.	127.70 W.	15	...	...	4.0B	...	G	DEC.	2	10	P.M.	PST
COLORADO																	
NOV.	30	18	50	15.8	40.47 N.	107.61 W.	5	...	...	2.8G	...	G	NOV.	30	11	A.M.	MST
FLORIDA																	
NOV.	6	23	00		NEAR LAKE CITY		.	...	...	...	IV	.	NOV.	6	06	P.M.	EST
HAWAII																	
OCT.	10	21	17	22.9	19.93 N.	155.81 W.	18	...	...	3.1H	...	H	OCT.	10	11	A.M.	HST
OCT.	11	17	34	58.2	19.22 N.	155.56 W.	1	...	...	3.2H	...	H	OCT.	11	07	A.M.	HST
OCT.	13	23	00	24.3	19.28 N.	156.25 W.	15	...	...	3.0H	...	H	OCT.	13	01	P.M.	HST
OCT.	13	23	10	21.0	19.30 N.	156.29 W.	12	...	...	3.0H	...	H	OCT.	13	01	P.M.	HST
OCT.	15	15	35	48.6	19.38 N.	155.07 W.	9	...	...	3.3H	IV	H	OCT.	15	05	A.M.	HST
OCT.	21	09	09	53.7	19.44 N.	155.40 W.	10	...	...	3.3H	...	H	OCT.	20	11	P.M.	HST
OCT.	28	22	37	33.2	21.56 N.	157.98 W.	5	...	...	4.2H	IV	H	OCT.	28	12	P.M.	HST
OCT.	29	02	44	13.7	19.21 N.	155.35 W.	45	...	...	3.1H	...	H	OCT.	28	04	P.M.	HST
NOV.	5	02	25	01.6	19.33 N.	155.18 W.	9	...	...	3.1H	...	H	NOV.	4	04	P.M.	HST
NOV.	7	22	56	57.8	19.80 N.	156.13 W.	12	...	...	3.0H	...	H	NOV.	7	12	P.M.	HST
NOV.	11	06	05	23.3	19.36 N.	155.08 W.	9	...	...	3.3H	...	H	NOV.	10	08	P.M.	HST
NOV.	13	01	08	02.5	19.37 N.	155.08 W.	0	...	...	3.2H	...	H	NOV.	12	03	P.M.	HST

Table 1.--Summary of U.S. earthquakes for October-December 1978--Continued

Date (1978)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time			
	hr	min	s				mb	MS	ML or mbLg			Date	Hour		
HAWAII—Continued															
NOV. 15	13	27	17.7	19.42 N.	155.41 W.	10	...	...	3.2H	...	H	NOV. 15	03	A.M.	HST
NOV. 16	02	47	46.8	19.40 N.	155.42 W.	11	...	...	3.3H	...	H	NOV. 15	04	P.M.	HST
NOV. 17	09	32	45.9	20.42 N.	154.65 W.	13	...	...	3.3H	...	H	NOV. 16	11	P.M.	HST
NOV. 22	18	20	42.9	19.21 N.	155.46 W.	7	...	...	3.1H	...	H	NOV. 22	08	A.M.	HST
NOV. 22	23	23	14.8	19.35 N.	155.05 W.	6	...	...	3.3H	III	H	NOV. 22	01	P.M.	HST
NOV. 23	13	16	15.9	19.23 N.	155.55 W.	11	...	...	4.2H	IV	H	NOV. 23	03	A.M.	HST
NOV. 28	02	19	50.1	19.34 N.	155.20 W.	10	...	...	3.3H	...	H	NOV. 27	04	P.M.	HST
NOV. 28	11	31	36.7	19.31 N.	155.22 W.	10	...	...	3.6H	III	H	NOV. 28	01	A.M.	HST
NOV. 29	07	50	40.3	19.65 N.	156.01 W.	9	...	...	3.3H	III	H	NOV. 28	09	P.M.	HST
NOV. 29	08	42	59.6	19.37 N.	155.45 W.	11	...	...	3.5H	III	H	NOV. 28	10	P.M.	HST
NOV. 29	21	40	25.3	19.66 N.	156.02 W.	8	...	...	3.2H	...	H	NOV. 29	11	A.M.	HST
DEC. 1	01	22	39.4	19.35 N.	155.28 W.	29	...	...	3.4H	III	H	NOV. 30	03	P.M.	HST
DEC. 1	02	16	52.1	19.35 N.	155.01 W.	10	...	...	3.4H	...	H	NOV. 30	04	P.M.	HST
DEC. 5	21	36	39.7	19.33 N.	155.19 W.	10	...	...	3.8H	III	H	DEC. 5	11	A.M.	HST
DEC. 13	04	44	31.5	19.36 N.	155.08 W.	9	...	...	3.6H	IV	H	DEC. 12	06	P.M.	HST
DEC. 14	14	12	44.9	19.32 N.	155.22 W.	10	...	...	4.1H	IV	H	DEC. 14	04	A.M.	HST
DEC. 21	23	29	27.5	19.33 N.	155.22 W.	10	...	...	3.5H	...	H	DEC. 21	01	P.M.	HST
DEC. 22	02	25	15.5	19.46 N.	155.39 W.	9	...	...	3.3H	...	H	DEC. 21	04	P.M.	HST
DEC. 27	10	40	55.7	19.33 N.	155.22 W.	10	4.6	...	4.0H	IV	H	DEC. 27	00	A.M.	HST
DEC. 28	13	15	27.3	19.25 N.	155.10 W.	47	...	...	3.1H	...	H	DEC. 28	03	A.M.	HST
DEC. 28	18	51	01.7	19.26 N.	155.25 W.	10	...	...	3.0H	...	H	DEC. 28	08	A.M.	HST
DEC. 29	00	51	17.1	19.83 N.	156.30 W.	3	...	...	3.1H	...	H	DEC. 28	02	P.M.	HST
IDAHO															
OCT. 24	20	30	59.3	42.55 N.	111.84 W.	7	4.2	...	4.1U	VI	U	OCT. 24	01	P.M.	MST
OCT. 29	13	46	44.5	44.96 N.	114.27 W.	5	4.2	...	5.0G	V	G	OCT. 29	05	A.M.	PST
OCT. 29	17	20	19.4	44.92 N.	114.35 W.	5	...	...	3.3G	...	G	OCT. 29	09	A.M.	PST
NOV. 20	14	25	51.8	44.00 N.	114.41 W.	5	...	...	3.2G	IV	G	NOV. 20	06	A.M.	PST
NOV. 30	06	53	40.1	42.11 N.	112.49 W.	4	4.6	...	4.7U	V	U	NOV. 29	11	P.M.	MST
NOV. 30	11	55	09.3	42.11 N.	112.55 W.	4	...	...	3.5U	II	U	NOV. 30	04	A.M.	MST
DEC. 5	11	24	57.8	42.10 N.	112.48 W.	4	...	...	3.7U	...	U	DEC. 5	04	A.M.	MST
DEC. 5	11	56	27.6	42.10 N.	112.54 W.	3	...	...	3.0U	...	U	DEC. 5	04	A.M.	MST
DEC. 12	08	24	58.2	43.99 N.	114.41 W.	5	...	...	3.5G	...	G	DEC. 12	00	A.M.	PST
DEC. 20	13	46	22.6	42.12 N.	112.49 W.	6	...	...	3.9U	IV	U	DEC. 20	06	A.M.	MST
ILLINOIS															
DEC. 5	01	48	01.3	38.62 N.	88.36 W.	25	...	...	3.5S	V	S	DEC. 4	07	P.M.	CST
MISSISSIPPI															
DEC. 11	02	06	48.2	31.95 N.	88.48 W.	5	...	...	3.5G	V	G	DEC. 10	08	P.M.	CST
MONTANA															
OCT. 7	12	35	55.3	46.62 N.	112.13 W.	5	...	...	2.7G	IV	G	OCT. 7	05	A.M.	MST
OCT. 16	01	15	35.3	47.09 N.	113.16 W.	5	...	...	3.4G	II	G	OCT. 15	06	P.M.	MST
OCT. 21	12	28	15.3	46.97 N.	113.25 W.	5	...	...	3.5G	III	G	OCT. 21	05	A.M.	MST
NOV. 4	15	49	43.8	44.75 N.	111.23 W.	5	...	...	3.5G	IV	G	NOV. 4	08	A.M.	MST
NOV. 10	09	53	45.6	47.01 N.	113.33 W.	5	...	...	4.3G	IV	G	NOV. 10	02	A.M.	MST
NOV. 12	00	29	12.5	46.50 N.	112.70 W.	5	...	...	3.4G	...	G	NOV. 11	05	P.M.	MST
NEVADA															
OCT. 10	06	13	53.8	39.43 N.	119.64 W.	5	...	...	3.0B	...	G	OCT. 9	10	P.M.	PST
NOV. 2	15	25	00.2	37.29 N.	116.30 W.	0	4.2	...	4.3B	...	E	NOV. 2	07	A.M.	PST
NOV. 18	19	00	00.0	37.13 N.	116.08 W.	0	5.1	...	5.2B	...	E	NOV. 18	11	A.M.	PST
NOV. 29	08	34	06.9	37.28 N.	116.51 W.	4	...	...	3.3G	...	G	NOV. 29	00	A.M.	PST
DEC. 1	17	07	29.8	37.03 N.	116.03 W.	2	...	...	3.8B	...	G	DEC. 1	09	A.M.	PST
DEC. 16	15	30	00.2	37.27 N.	116.41 W.	0	5.5	...	5.5B	...	E	DEC. 16	07	A.M.	PST

Table 1.—Summary of U.S. earthquakes for October-December 1978—Continued

Date (1978)	Origin time (UTC)			Lat	Long	Depth (km)	Magnitude			Maximum intensity	Hypocenter source	Local time		
	hr	min	s				mb	MS	ML or mbLg			Date	Hour	
OREGON--OFF THE COAST														
OCT.	5	00	12 07.5	43.45 N.	126.71 W.	15	...	...	...	...	G	OCT.	4	04 P.M. PST
OCT.	18	01	25 38.9	44.11 N.	128.54 W.	15	4.3	...	...	...	G	OCT.	17	05 P.M. PST
DEC.	18	12	10 35.5	44.56 N.	129.59 W.	15	4.4	...	...	...	G	DEC.	18	04 A.M. PST
PENNSYLVANIA														
OCT.	6	19	25 41.6	39.97 N.	76.51 W.	5	...	...	3.0L	V	G	OCT.	6	02 P.M. EST
UTAH														
OCT.	14	07	58 09.4	38.19 N.	112.35 W.	7	...	...	2.9U	...	U	OCT.	14	00 A.M. MST
DEC.	9	14	59 48.3	38.66 N.	112.53 W.	4	...	...	3.3U	...	U	DEC.	9	07 A.M. MST
DEC.	9	23	49 08.0	38.65 N.	112.52 W.	5	...	...	3.3U	...	U	DEC.	9	04 P.M. MST
DEC.	10	14	59 07.2	40.81 N.	111.57 W.	7	...	...	2.8U	...	U	DEC.	10	07 A.M. MST
WASHINGTON														
DEC.	31	03	23 46.7	47.58 N.	121.85 W.	20	...	...	4.0G	V	W	DEC.	30	07 P.M. PST
WYOMING														
OCT.	2	13	59 10.7	44.74 N.	110.78 W.	5	...	...	3.5G	III	G	OCT.	2	06 A.M. MST
OCT.	2	23	55 42.6	44.71 N.	110.80 W.	5	...	...	3.6G	IV	G	OCT.	2	04 P.M. MST
OCT.	12	13	52	YELLOWSTONE NAT. PARK		.	...	...	...	IV	.	OCT.	12	06 A.M. MST
NOV.	11	20	46 20.8	44.39 N.	110.25 W.	6	...	...	3.2G	II	G	NOV.	11	01 P.M. MST

Table 2.—Summary of macroseismic data for U.S. earthquakes, October-December 1978

[Sources of the hypocenters and magnitudes: (B) University of California, Berkeley; (D) University of Montana, Missoula; (E) U.S. Department of Energy, Las Vegas, Nevada; (G) U.S. Geological Survey, National Earthquake Information Service; (H) U.S. Geological Survey, Hawaiian Volcano Observatory; (L) Lamont-Doherty Geological Observatory, Palisades, N.Y.; (M) National Oceanic and Atmospheric Administration, Alaska Tsunami Warning Center, Palmer; (P) California Institute of Technology, Pasadena; (S) St. Louis University, St. Louis, Missouri; (U) University of Utah, Salt Lake City; (W) University of Washington, Seattle. Dates and origin times are listed in Universal Coordinated Time (UTC) giving the hour, minute, and second. Epicenters are shown in decimal degrees. Only earthquakes with intensity data and explosions are listed]

Alabama

11 December (G) Alabama-Mississippi border area
Origin time: 02 06 48.2
See Mississippi listing.

Alaska

4 October (G) Andreanof Islands, Aleutian Islands
Origin time: 18 53 00.1
Epicenter: 51.81 N., 177.05 W.
Depth: 58 km
Magnitude: 4.5 mb
Intensity IV: Adak Island (M).

Table 2.—Summary of macroseismic data for U.S. earthquakes, October-December 1978—Continued

Alaska—Continued

4 October (G) Near Islands, Aleutian Islands
Origin time: 19 55 17.5
Epicenter: 50.93 N., 173.53 E.
Depth: Normal.
Magnitude: 5.3 mb, 5.0 MS
Intensity III: Shemya Island (M).

6 October (G) Southern Alaska
Origin time: 05 54 05.2
Epicenter: 61.93 N., 150.67 W.
Depth: 6 km
Magnitude: 4.6 ML(M)
Intensity III: Willow-Hatcher Pass area (M).
Intensity II: Palmer (M), Wasilla (M).

17 October (G) Andreanof Islands, Aleutian Islands
Origin time: 20 50 48.7
Epicenter: 51.72 N., 176.94 W.
Depth: 61 km
Magnitude: 5.0 mb

Eighty-six questionnaires were completed for this earthquake from the Naval Air

Table 2.--Summary of macroseismic data for U.S. earthquakes,
October-December 1978--Continued

Alaska--Continued	
Station, Adak Island. The evaluated intensities from the information on these questionnaires ranged from intensity IV to VI.	
27 October (G) Southern Alaska	
Origin time:	04 29 31.5
Epicenter:	62.20 N., 151.05 W.
Depth:	102 km
Magnitude:	None computed.
<u>Intensity II:</u>	Talkeetna.
30 October (G) Southern Alaska	
Origin time:	11 11 38.4
Epicenter:	60.96 N., 150.32 W.
Depth:	48 km
Magnitude:	3.3 mb
<u>Intensity III:</u>	Anchorage area (M).
31 October (G) Southern Alaska	
Origin time:	12 28 30.1
Epicenter:	61.91 N., 149.57 W.
Depth:	Normal.
Magnitude:	3.5 mb, 3.4 ML(M)
<u>Intensity II:</u>	Palmer area (M).
14 November (G) Central Alaska	
Origin time:	22 27 45.7
Epicenter:	64.54 N., 147.03 W.
Depth:	25 km
Magnitude:	3.7 ML
<u>Intensity II:</u>	Fairbanks area (M).
19 November (G) Near Islands, Aleutian Islands	
Origin time:	19 42 35.7
Epicenter:	52.70 N., 172.48 E.
Depth:	47 km
Magnitude:	5.3 mb(G), 5.2 MS(G)
<u>Intensity V:</u>	Shemya Island.
24 November (G) Southern Alaska	
Origin time:	00 28 12.8
Epicenter:	62.03 N., 150.52 W.
Depth:	74 km
Magnitude:	4.5 mb
<u>Intensity II:</u>	Palmer (M), Talkeetna (M).
24 November (G) Southern Alaska	
Origin time:	08 50 45.4
Epicenter:	61.99 N., 150.51 W.
Depth:	77 km
Magnitude:	3.2 mb
<u>Intensity II:</u>	Willow (M).
2 December (G) Kenai Peninsula	
Origin time:	21 57 20.0
Epicenter:	59.69 N., 151.66 W.
Depth:	13 km
Magnitude:	3.7 ML(M)
<u>Intensity V:</u>	Homer.

Table 2.--Summary of macroseismic data for U.S. earthquakes,
October-December 1978--Continued

Alaska--Continued	
3 December (G) Central Alaska	
Origin time:	19 39 31.2
Epicenter:	62.31 N., 149.75 W.
Depth:	74 km
Magnitude:	4.7 mb
<u>Intensity IV:</u>	Chugiak, Talkeetna (M).
<u>Intensity III:</u>	Anchorage (M), Palmer (M), Willow (M).
<u>Intensity II:</u>	Wasilla.
4 December (G) Central Alaska	
Origin time:	12 11 06.4
Epicenter:	65.04 N., 147.51 W.
Depth:	24 km
Magnitude:	3.3 ML (M)
<u>Intensity II:</u>	Fairbanks (M).
8 December (G) Northern Alaska	
Origin time:	10 01 51.5
Epicenter:	68.33 N., 145.17 W.
Depth:	Normal.
Magnitude:	4.0 ML(M)
<u>Intensity II:</u>	Fairbanks (M).
15 December (G) Rat Islands, Aleutian Islands	
Origin time:	08 30 34.7
Epicenter:	52.11 N., 175.23 E.
Depth:	47 km
Magnitude:	5.6 mb, 5.6 MS, 5.4 MS(B)
<u>Intensity V:</u>	Shemya AFB (light furniture and small objects shifted).
<u>Intensity IV:</u>	Attu.
17 December (G) Central Alaska	
Origin time:	13 15 26.0
Epicenter:	63.95 N., 147.42 W.
Depth:	22 km
Magnitude:	4.8 mb, 4.6 ML(M)
<u>Intensity IV:</u>	Clear AFB (M), Ester, Fairbanks.
22 December (G) Alaska Peninsula	
Origin time:	03 25 29.9
Epicenter:	55.57 N., 160.37 W.
Depth:	12 km
Magnitude:	4.5 mb, 4.2 ML(M)
<u>Intensity IV:</u>	Sand Point (M).
24 December (G) Central Alaska	
Origin time:	13 13 08.1
Epicenter:	63.56 N., 157.59 W.
Depth:	Normal.
Magnitude:	5.0 mb(G), 4.4 MS(G), 5.3 ML(M)
<u>Intensity IV:</u>	Galena Airport (people were awakened and the control tower was evacuated).

Table 2.--Summary of macroseismic data for U.S. earthquakes,
October-December 1978--Continued

Arkansas	
<hr/>	
21 November (S) Northeastern Arkansas	
Origin time:	23 31 22.1
Epicenter:	35.97 N., 89.92 W.
Depth:	10 km
Magnitude:	2.4 ML
<u>Intensity II:</u>	Blytheville.

California	
<hr/>	
4 October (P) Owens Valley area	
Origin time:	16 42 48.6
Epicenter:	37.53 N., 118.63 W.
Depth:	9 km
Magnitude:	5.4 mb(G), 5.1 MS(G), 5.8 ML(B), 5.8 ML

The press reported that in grocery stores throughout the Bishop area considerable amounts of canned and bottled goods were shaken from shelves and pictures were knocked from walls; and there was a report of a policeman being swayed back and forth and finding it difficult to stand. Boulders rolled onto roads and minor landslides occurred in the canyon areas near Bishop. Landslides were also reported near Mammoth Lakes and in Yosemite National Park. At the Union Carbide Corporation Pine Creek Mine near Bishop about 130 miners were underground at the time of the earthquake, but none were hurt. The earthquake shook rock slides loose throughout the vicinity of the mine causing some road obstructions. A pickup truck was jiggled over the edge on one of the high mine roads. The University of California at Berkeley reported 30 aftershocks in the following 24 hours.

Porcella (1979) reported that eight accelerographs at Pine Flat and Buchanan Dams northeast of Fresno, California were triggered by this earthquake. The maximum recorded acceleration was less than 0.05 g. This earthquake was felt over an area of approximately 105,000 sq km of California and Nevada (fig. 10).

All of the aftershocks listed in Table 1 were felt in the epicentral region including the town of Bishop; however, not enough specific information is available to assign intensities at individual locations for any of the aftershocks.

Table 2.--Summary of macroseismic data for U.S. earthquakes,
October-December 1978--Continued

California--Continued	
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Intensity VI:

California--

Benton (plaster cracked, small objects broken, hanging objects swung violently, hanging pictures fell, felt by all)

Bishop (Safeway Supermarket just north of Bishop had a window broken and merchandise knocked from shelves. Grocery stores throughout the area reported considerable amounts of canned and bottled goods shaken from shelves, pictures knocked from walls--press report. Reports of other effects included windows broken, plaster cracked, small objects broken, and felt by all)

Easton (cracked plaster and cracks in exterior walls, small objects overturned, felt by many)

Friant (cracked plaster, cracked interior wall, light furniture shifted, small objects and hanging pictures fell, water in small containers spilled, felt by all)

Mammoth Lakes-Timber Ridge (a swimming pool was cracked to such an extent that it had to be drained--press report)

Paradise Camp--24 km northwest of Bishop (most of the bar stock and glasses were broken and stucco walls were cracked. In Paradise Estates, items were shaken from walls, a mounted deer head fell from a wall, a mirror was broken, and fluorescent light panels fell--press report).

Intensity V:

California--Columbia (press report), Crowley Lake, Crowley Lake Dam, John-sondale, June Lake, Lakeshore, Lee Vining, Mono Hot Springs, Mountain Ranch, Pumpkin Center, Riverdale, Shaver Lake, Strawberry, Toms Place.

Intensity IV:

California--Ahwahnee, Altaville, Arnold, Auberry, Avenal, Badger, Bak-ersfield, Bass Lake, Big Bear City, Big Creek, Big Pine, Biola, Bridgeport, Burrel, California Hot Springs, Camp Connell, Cantua Creek, Cartago, Caruthers, Castle AFB, Cathays Valley, Chinese Camp, Chowchilla, Clovis, Coarsegold, Corcoran, Coulterville, Cutler, Cuyama, Del Rey, Dos Palos, Dunlap, El Nido,

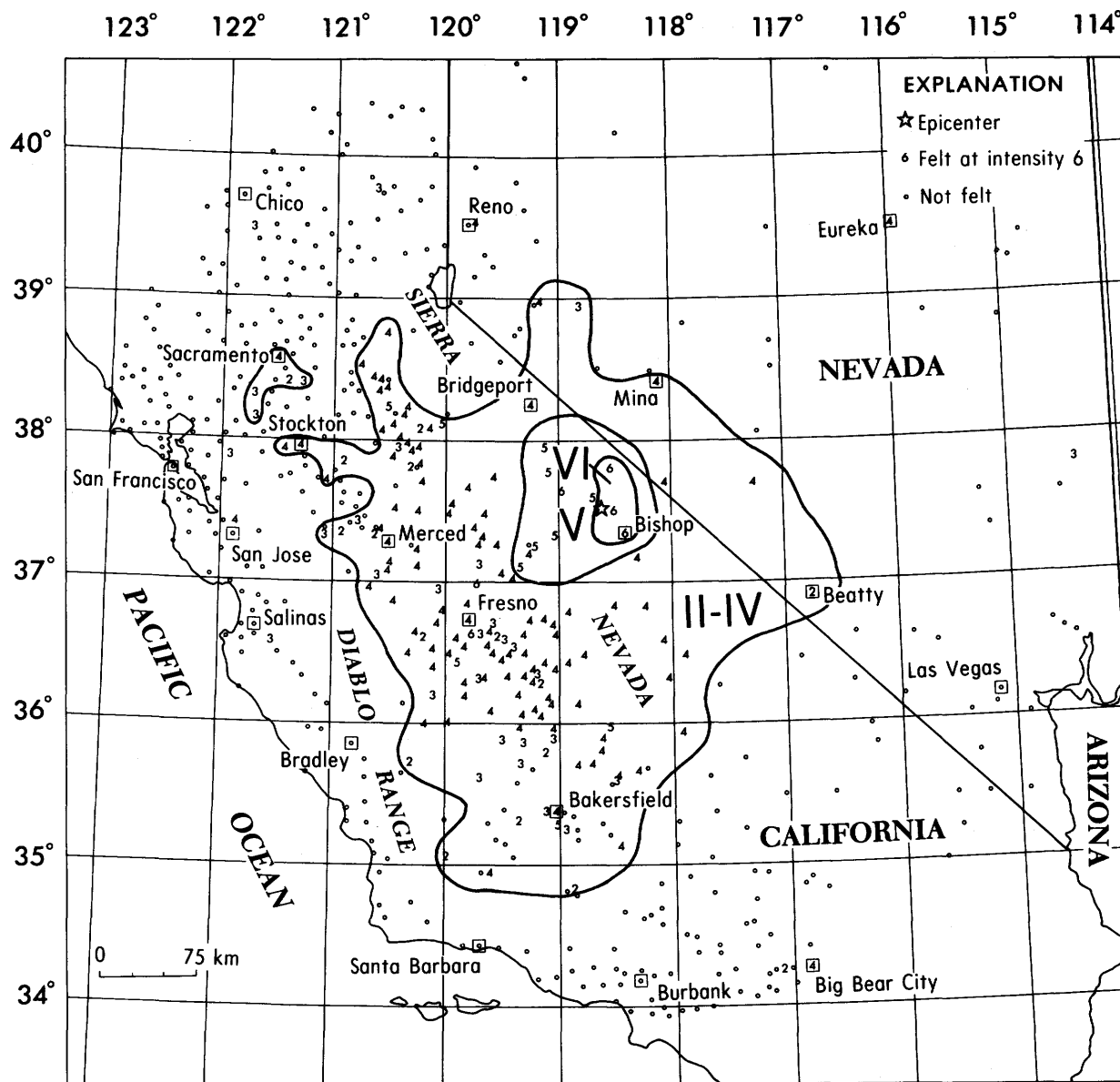


FIGURE 10.—Isoseismal map for the Owens Valley earthquake of 4 October 1978, 16 42 48.6 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.—Summary of macroseismic data for U.S. earthquakes, October-December 1978—Continued

California--Continued
El Portal, Farmersville, Farmington, Firebaugh, Fish Camp, Five Points, Fresno, Glencoe, Glennville, Goshen, Groveland, Hanford, Hathaway Pines, Helm, Holt, Hornitos, Hume, Independence, Ivanhoe, Keeler, Kerman, Kettleman City, Kingsburg, Kings Canyon,

Table 2.—Summary of macroseismic data for U.S. earthquakes, October-December 1978--Continued

California--Continued
Lake Isabella, Le Grand, Lemoncove, Lemoore, Lindsay, Little Lake, London, Lone Pine, Long Barn, Mariposa, Merced, Midpines, Miramonte, Murphys, North Fork, Oakhurst, Olancho, Orange Cove, Orosi, Pacific House, Piedra, Pinedale, Pine Grove, Pioneer, Pix-

Table 2.--Summary of macroseismic data for U.S. earthquakes,
October-December 1978--Continued

California--Continued	
<p>ley, Poplar, Porterville, Posey, Prather, Rail Road Flat, Raisin, Red- top, River Pines, Sacramento, Salida, Selma, Sequoia National Park, Snel- ling, Soulsbyville, South Dos Palos, Springville, Squaw Valley, Standard, Stockton, Stratford, Strathmore, Tehachapi (press report), Terra Bella, Three Rivers, Tipton, Toll- house, Tranquillity, Traver, Tulare, Tuolumne, Twain Harte, Vallecito, Visalia, Volcano, Wawona, Weldon, Wilseyville, Wishon, Woodlake, Wood- ville, Woody, Yosemite Lodge, Yosem- ite National Park.</p> <p>Nevada--Dyer, Eureka, Goldfield, Mina, Sparks, Yerington.</p> <p><u>Intensity III:</u> California--Alpaugh, Armona, Avery, Blairsden, Bodfish, Calwa, Chualar, Delhi, Diablo, Dinuba, Ducor, Ear- limart, Fowler, Huron, Jamestown, Lamont, Laton, Liberty Farms, Lost Hills, Madera, Newman, O'Neals, Pol- lock Pines, Pond, Reedley, Richvale, Rio Vista, Sanger, Santa Rita Park, Wilton.</p> <p>Nevada--Panaca, Schurz.</p> <p><u>Intensity II:</u> California--Arcata (press report), Atwater, Cholame, Coalinga (press report), Deep Springs (press report), Elk Grove, Exeter, Green Valley Lake, Lebec, Mi-Wuk Village, Moccasin, Mono (press report), Parlier, Richgrove, San Joaquin, Stevinson, Tupman, Val- ley Home.</p> <p>Nevada--Beatty.</p>	
5 October (B) Northern California	
Origin time:	09 56 40.4
Epicenter:	41.46 N., 121.88 W.
Depth:	2 km
Magnitude:	4.2 mb(G), 3.8 MS(G), 4.1 ML(B)
<u>Intensity IV:</u>	McCloud.
6 October (B) Northern California	
Origin time:	21 26 34.4
Epicenter:	40.38 N., 124.27 W.
Depth:	20 km
Magnitude:	4.8 mb(G), 4.2 MS(G), 4.6 ML
Felt in the coastal areas from Arcata to Cape Mendocino (B).	
<u>Intensity V:</u>	Miranda.
<u>Intensity IV:</u>	Bayside, Bridgeville,

Table 2.--Summary of macroseismic data for U.S. earthquakes,
October-December 1978--Continued

California--Continued	
<p>Eureka, Fortuna, Rio Dell, Weott. <u>Intensity III:</u> Garberville (press report), Redway (press report).</p>	
9 October (B) Central California	
Origin time:	20 49 45.8
Epicenter:	36.68 N., 121.37 W.
Depth:	6 km
Magnitude:	3.3 ML
<u>Intensity III:</u>	Chualar and San Benito County (B).
10 October (B) Central California	
Origin time:	01 38 36.9
Epicenter:	36.61 N., 121.28 W.
Depth:	8 km
Magnitude:	3.8 ML
<u>Intensity II:</u>	San Benito County (B).
10 October (B) California	
Origin time:	04 28 51.8
Epicenter:	38.80 N., 119.82 W.
Depth:	10 km
Magnitude:	3.1 ML(B)
<u>Intensity II:</u>	Markleeville area (B).
10 October (P) Central California	
Origin time:	09 06 57.4
Epicenter:	35.08 N., 117.50 W.
Depth:	6 km
Magnitude:	3.6 ML
<u>Intensity II:</u>	Edwards AFB (P).
16 October (B) Northern California	
Origin time:	02 18 07.0
Epicenter:	40.46 N., 124.30 W.
Depth:	20 km
Magnitude:	3.7 ML(B)
<u>Intensity III:</u>	Rio Dell.
19 October (P) Southern California	
Origin time:	09 10 24.5
Epicenter:	33.83 N., 118.07 W.
Depth:	5 km
Magnitude:	1.9 ML
<u>Intensity II:</u>	Lakewood (P).
26 October (P) Owens Valley area	
Origin time:	19 00 41.3
Epicenter:	37.52 N., 118.58 W.
Depth:	9 km
Magnitude:	4.0 ML(B), 3.9 ML(P)
<u>Intensity IV:</u>	Mariposa.
<u>Intensity II:</u>	Yosemite (B).
27 October (B) Central California	
Origin time:	12 00 22.2
Epicenter:	37.26 N., 121.64 W.
Depth:	4 km

Table 2.--Summary of macroseismic data for U.S. earthquakes,
October-December 1978--Continued

California--Continued	
Magnitude:	3.1 ML
<u>Intensity II:</u>	San Jose (B).
29 October (B) Northern California	
Origin time:	06 50 49.1
Epicenter:	40.30 N., 124.73 W.
Depth:	20 km
Magnitude:	3.8 ML
<u>Intensity IV:</u>	Rio Dell.
29 October (P) Southern California	
Origin time:	08 09 59.5
Epicenter:	33.92 N., 118.30 W.
Depth:	5 km
Magnitude:	2.9 ML
Felt in the southwest Los Angeles Basin (P).	
<u>Intensity IV:</u>	El Segundo (press report), Hawthorne, Inglewood (press report), Los Angeles, Manhattan Beach (press report), Torrance (press report).
29 October (P) Southern California	
Origin time:	22 16 09.0
Epicenter:	34.32 N., 118.63 W.
Depth:	3 km
Magnitude:	3.6 ML(P)
<u>Intensity IV:</u>	Tarzana.
<u>Intensity II:</u>	Canoga Park, Malibu (P).
30 October (B) Central California	
Origin time:	16 05 04.6
Epicenter:	36.67 N., 121.36 W.
Depth:	6 km
Magnitude:	3.2 ML
<u>Intensity II:</u>	Hollister (B).
1 November (P) Imperial Valley	
Origin time:	06 42 22.6
Epicenter:	32.75 N., 115.52 W.
Depth:	6 km
Magnitude:	2.8 ML
<u>Intensity II:</u>	El Centro (P).
6 November (P) Owens Valley area	
Origin time:	16 22 25.0
Epicenter:	37.53 N., 118.62 W.
Depth:	9 km
Magnitude:	3.4 ML(B), 3.5 ML
<u>Intensity II:</u>	Bishop (B).
11 November (P) Southern California	
Origin time:	04 24 04.6
Epicenter:	33.63 N., 117.88 W.
Depth:	3 km
Magnitude:	2.7 ML

Table 2.--Summary of macroseismic data for U.S. earthquakes,
October-December 1978--Continued

California--Continued	
<u>Intensity V:</u>	Costa Mesa (dishes, pots, and pans crashed to the floor when cupboard doors flew open--press report), Santa Ana Heights (press reports of breakage of stored items when they were knocked loose from their "moorings").
<u>Intensity IV:</u>	Huntington (press report), Newport Beach (press report).
12 November (B) Northern California	
Origin time:	13 07 57.3
Epicenter:	39.49 N., 122.95 W.
Depth:	16 km
Magnitude:	3.8 ML
<u>Intensity IV:</u>	Potter Valley, Willits.
13 November (P) Southern California	
Origin time:	16 49 43.1
Epicenter:	34.43 N., 119.70 W.
Depth:	13 km
Magnitude:	3.2 ML
<u>Intensity II:</u>	Goleta, Santa Barbara.
13 November (P) Southern California	
Origin time:	16 50 58.3
Epicenter:	34.43 N., 119.70 W.
Depth:	15 km
Magnitude:	3.3 ML
<u>Intensity II:</u>	Goleta, Santa Barbara.
16 November (P) Southern California	
Origin time:	13 28 46.7
Epicenter:	34.15 N., 117.60 W.
Depth:	6 km
Magnitude:	3.2 ML
<u>Intensity IV:</u>	Etiwanda.
<u>Intensity II:</u>	Claremont (P), Pomona (P).
19 November (P) Southern California	
Origin time:	04 20 05.6
Epicenter:	33.85 N., 118.17 W.
Depth:	12 km
Magnitude:	2.7 ML
<u>Intensity II:</u>	Lakewood (P), Long Beach (P).
19 November (P) Southern California	
Origin time:	17 40 56.9
Epicenter:	33.85 N., 118.18 W.
Depth:	5 km
Magnitude:	3.1 ML(P)
Felt in the Los Angeles area (press report).	
<u>Intensity IV:</u>	Bellflower, Harbor City,

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1978—Continued

California—Continued	
Lakewood, Long Beach, Los Alamitos, Maywood.	
<u>Intensity III:</u>	Cypress, Montebello.
<u>Intensity II:</u>	Downey (P), Hawthorne, Watts (P).
19 November (P) Southern California	
Origin time:	18 00 16.4
Epicenter:	33.85 N., 118.17 W.
Depth:	12 km
Magnitude:	2.8 ML(P)
Felt in the Los Angeles area (press report).	
<u>Intensity III:</u>	North Long Beach, Watts.
20 November (P) Southern California	
Origin time:	06 55 09.4
Epicenter:	34.15 N., 116.97 W.
Depth:	5 km
Magnitude:	4.0 mb(G), 4.2 ML
Felt in Los Angeles, Orange, Riverside, San Bernardino, and San Diego counties.	
<u>Intensity VI:</u>	Redlands (interior plas- ter walls cracked and split, hairline cracks in exterior walls, light furni- ture and small objects shifted, windows cracked).
<u>Intensity V:</u>	Auga Caliente Springs (small objects fell), Highland (pic- tures knocked off walls—press report).
<u>Intensity IV:</u>	Beaumont, Cathedral City, El Cajon, Hemet, Landers, Mead Valley, Morongo Valley, Palm Springs, Rancho Mirage, Rialto, Riverside, Running Springs, Sunnymead, Yucaipa.
<u>Intensity III:</u>	Cypress, Long Beach, San Bernardino.
<u>Intensity II:</u>	Anaheim (P), Downey (P), Newport Beach (P), Pasadena (P), Twen- tynine Palms.
20 November (P) Southern California	
Origin time:	06 58 45.0
Epicenter:	34.15 N., 116.97 W.
Depth:	6 km
Magnitude:	3.5 ML(P)
<u>Intensity III:</u>	Cathedral City, Running Springs.
20 November (P) Southern California	
Origin time:	21 21 49.1
Epicenter:	34.15 N., 116.98 W.
Depth:	5 km
Magnitude:	3.1 ML
<u>Intensity II:</u>	Big Bear Lake (P).

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1978—Continued

California—Continued	
25 November (P) Owens Valley area	
Origin time:	03 24 55.3
Epicenter:	37.50 N., 118.70 W.
Depth:	8 km
Magnitude:	3.4 ML, 3.5 ML(B)
<u>Intensity II:</u>	Bishop (B).
25 November (P) Owens Valley area	
Origin time:	04 06 41.4
Epicenter:	37.53 N., 118.68 W.
Depth:	9 km
Magnitude:	3.5 ML, 3.3 ML(B)
<u>Intensity II:</u>	Bishop (B).
1 December (P) Southern California	
Origin time:	23 20 46.5
Epicenter:	33.93 N., 116.68 W.
Depth:	5 km
Magnitude:	3.6 ML
<u>Intensity II:</u>	Palm Springs (press report).
6 December (P) Southern California	
Origin time:	10 03 49.3
Epicenter:	34.38 N., 119.75 W.
Depth:	5 km
Magnitude:	3.2 ML
<u>Intensity III:</u>	Santa Barbara (press report).
6 December (P) Southern California	
Origin time:	11 21 48.7
Epicenter:	34.37 N., 119.75 W.
Depth:	5 km
Magnitude:	2.2 ML
<u>Intensity II:</u>	Santa Barbara (press report).
14 December (P) Southern California	
Origin time:	08 55 20.4
Epicenter:	34.40 N., 119.50 W.
Depth:	5 km
Magnitude:	3.1 ML
<u>Intensity IV:</u>	Carpenteria (press report).
<u>Intensity III:</u>	Santa Barbara (press report).
29 December (P) Southern California	
Origin time:	06 30 30.4
Epicenter:	33.93 N., 118.33 W.
Depth:	3 km
Magnitude:	2.3 ML
<u>Intensity II:</u>	Hawthorne (P), Inglewood (P).

Table 2.--Summary of macroseismic data for U.S. earthquakes,
October-December 1978--Continued

Florida	
6 November	Northern Florida
Origin time:	23 00
Epicenter:	30.20 N., 82.65 W.
Depth:	None computed.
Magnitude:	None computed.
<p>The epicenter given is a macroseismic location taken from the felt information. The magnitude is estimated to be less than 2.0. There were reports of two events, on November 14 at 20 14 UTC and on November 16 at 19 00 UTC; both were reported felt, but neither were recorded on the nearest seismographs and may not have been seismic.</p>	
<p><u>Intensity IV:</u> Lake City (press reported doors rattled and houses shook).</p>	
Hawaii	
<p>The places shown below followed by (H) designate intensity values assigned by the Hawaiian Volcano Observatory.</p>	
15 October (H) Island of Hawaii	
Origin time:	15 35 48.6
Epicenter:	19.38 N., 155.07 W.
Depth:	9 km
Magnitude:	3.3 ML
<u>Intensity IV:</u>	Hawaiian Paradise Park (H), Kalapana (H).
<u>Intensity III:</u>	Hilo (H), Kaimu (H).
<u>Intensity II:</u>	Volcano (H), Hawaii Volcanoes National Park (H).
28 October (H) Island of Hawaii	
Origin time:	22 37 33.2
Epicenter:	21.56 N., 157.98 W.
Depth:	5 km
Magnitude:	4.2 ML
<u>Intensity IV:</u>	Honolulu, Kaaawa, Kapalama, Kunia, Pearl City, Waipahu.
<u>Intensity III:</u>	Kaneohe (H).
<u>Intensity II:</u>	Waikiki.
22 November (H) Island of Hawaii	
Origin time:	23 23 14.8
Epicenter:	19.35 N., 155.05 W.
Depth:	6 km
Magnitude:	3.3 ML
<u>Intensity III:</u>	Wahaula Visitors Center (H).
<u>Intensity II:</u>	Blacksand Subdivision (H), Hawaii Volcanoes National Park (H).

Table 2.--Summary of macroseismic data for U.S. earthquakes,
October-December 1978--Continued

Hawaii--Continued	
23 November (H) Island of Hawaii	
Origin time:	13 16 15.9
Epicenter:	19.23 N., 155.54 W.
Depth:	11 km
Magnitude:	4.2 ML
<u>Intensity IV:</u>	Hawaiian Ocean View Estates (H), Naalehu (H), Pahala (H).
<u>Intensity III:</u>	Honaunau (H), Keokea (H).
<u>Intensity II:</u>	Ahualo (H), Hilo (H), Kailua-Kona (H), Kainaliu (H), Keauhou (H), Mauna Loa Observatory (H), Papaikou (H).
28 November (H) Island of Hawaii	
Origin time:	11 31 36.7
Epicenter:	19.31 N., 156.22 W.
Depth:	10 km
Magnitude:	3.6 ML
<u>Intensity III:</u>	Ainahu Ranch (H).
<u>Intensity II:</u>	Volcano (H).
29 November (H) Island of Hawaii	
Origin time:	07 50 40.3
Epicenter:	19.65 N., 156.01 W.
Depth:	9 km
Magnitude:	3.3 ML
<u>Intensity III:</u>	Kona (H).
29 November (H) Island of Hawaii	
Origin time:	08 42 59.6
Epicenter:	19.37 N., 155.45 W.
Depth:	11 km
Magnitude:	3.5 ML
<u>Intensity III:</u>	Kailua-Kona (H), Pahala (H).
<u>Intensity II:</u>	Volcano Golf Course (H).
1 December (H) Island of Hawaii	
Origin time:	01 22 39.4
Epicenter:	19.35 N., 155.28 W.
Depth:	29 km
Magnitude:	3.4 ML
<u>Intensity III:</u>	Ainaloa (H).
5 December (H) Island of Hawaii	
Origin time:	21 36 39.7
Epicenter:	19.33 N., 155.19 W.
Depth:	10 km
Magnitude:	3.8 ML
<u>Intensity III:</u>	Ainaloa (H), Hilo (H), Kalapana (H), Nanawale (H), Volcano (H).
13 December (H) Island of Hawaii	
Origin time:	04 44 31.5
Epicenter:	19.36 N., 155.08 W.
Depth:	9 km
Magnitude:	3.6 ML
<u>Intensity IV:</u>	Glenwood (H), Kalapana

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1978—Continued

Hawaii--Continued	
(H), Mountain View (H), Pahoa (H). <u>Intensity III:</u> Hilo (H).	
14 December (H) Island of Hawaii	
Origin time:	14 12 44.9
Epicenter:	19.32 N., 155.22 W.
Depth:	10 km
Magnitude:	4.1 ML
<u>Intensity IV:</u> Glenwood (H), Hilo (H), Kurtistown (H), Mountain View (H).	
<u>Intensity III:</u> Ainaloa (H), Volcano (H).	
<u>Intensity II:</u> Blacksand Subdivision (H), Hawaii Volcanoes National Park (H).	
27 December (H) Island of Hawaii	
Origin time:	10 40 55.7
Epicenter:	19.33 N., 155.22 W.
Depth:	10 km
Magnitude:	4.0 ML
<u>Intensity IV:</u> Ainaloa (H), Glenwood (H), Hilo (H), Kurtistown (H), Mountain View (H), Papaikou (H), Volcano (H).	
<u>Intensity III:</u> Ahualoa (H), Hawaii Vol- canoes National Park (H), Hawaiian Beaches (H), Hawaiian Ocean View Estates (H), Honokaa (H), Kau (H), Kona (H).	
Idaho	
24 October (U) Southeastern Idaho	
Origin time:	20 30 59.3
Epicenter:	42.55 N., 111.84 W.
Depth:	7 km
Magnitude:	4.2 mb(G), 4.3 ML(G), 4.1 ML
<u>Intensity VI:</u> Idaho--Thatcher (cracked plaster, cracked cement foundation).	
<u>Intensity V:</u> Idaho--Lava Hot Springs (furniture shifted; windows, doors, and dishes rattled; felt by many).	
<u>Intensity IV:</u> Idaho--Aberdeen, Arimo, Bancroft, Dow- ney, Grace, Inkorn, McCammon, Pocatello, Swanlake.	
<u>Intensity II:</u> Idaho--Franklin. Utah--Plymouth.	
29 October (G) Central Idaho	
Origin time:	13 46 44.5
Epicenter:	44.96 N., 114.27 W.
Depth:	5 km
Magnitude:	4.2 mb, 5.0 ML, 5.0 ML(D)

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1978—Continued

Idaho--Continued	
This earthquake was felt over an area of approximately 25,000 sq km of Idaho and Montana (fig. 11).	
<u>Intensity V:</u> Idaho-- Ellis (light furniture and small objects shifted, hanging pictures knocked out of place, felt by all), Lowman (light furniture shifted; small objects fell; windows, doors, and dishes rattled; awakened and felt by many).	
<u>Intensity IV:</u> Idaho--Carmen, Challis, Clayton, Cobalt, Hailey, Lemhi, Northfork, Salmon, Shoup, Sweet, Tendoy.	
<u>Intensity III:</u> Idaho--Golden. Montana--Jackson.	
<u>Intensity II:</u> Idaho--Garden Valley, Leadore.	
20 November (G) Central Idaho	
Origin time:	14 25 51.8
Epicenter:	44.00 N., 114.41 W.
Depth:	5 km
Magnitude:	3.2 ML, 3.7 ML(D)
<u>Intensity IV:</u> Clayton.	
30 November (U) Southeastern Idaho	
Origin time:	06 53 40.1
Epicenter:	42.11 N., 112.49 W.
Depth:	4 km
Magnitude:	4.6 mb(G), 4.7 ML
This earthquake is located in the Pocatello Valley of Idaho in the same area as the March 27, 1975 intensity VIII event of magnitudes 6.1 mb(G), 6.0 MS(G), and 6.1 ML(G). It was felt over an area of approximately 18,000 sq km of Idaho and Utah (fig. 12).	
<u>Intensity V:</u> Utah--Snowville (water in small con- tainers spilled; small objects shifted; windows, doors, and dishes rattled; felt by all).	
<u>Intensity IV:</u> Idaho--Arimo, Clifton, Dayton, Elba, Franklin, Holbrook, Malad City, Malta, Naf, Pocatello, Stone, Swan- lake, Weston. Utah--Bear River City, Cache Junction, Clarkston, Corinne, Cornish, Field- ing, Garland (press report), Honey- ville, Howell, Huntsville, Lewiston, Newton, Plymouth, Providence, Rich-	

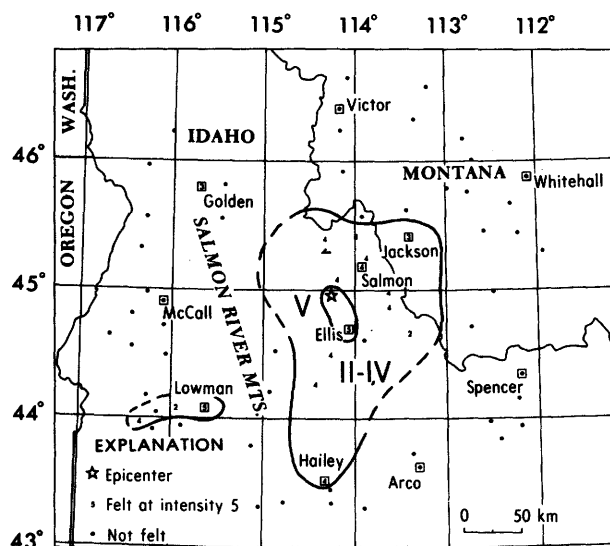


FIGURE 11.--Isoseismal map for the central Idaho earthquake of 29 October 1978, 13 46 44.5 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.--Summary of macroseismic data for U.S. earthquakes, October-December 1978--Continued

Idaho--Continued	
mond, Riverside, Tremonton.	
<u>Intensity III:</u>	
Utah--Kelton.	
<u>Intensity II:</u>	
Idaho--American Falls, Inkom.	
Utah--Wellsville.	
30 November (U) Southeastern Idaho	
Origin time: 11 55 09.3	
Epicenter: 42.11 N., 112.55 W.	
Depth: 4 km	
Magnitude: 3.5 ML	
<u>Intensity II:</u>	Stone.
20 December (U) Southeastern Idaho	
Origin time: 13 46 22.6	
Epicenter: 42.12 N., 112.49 W.	
Depth: 6 km	
Magnitude: 3.9 ML	
<u>Intensity IV:</u>	
Idaho--Holbrook, Malad City, Stone, Swanlake.	
Utah--Clarkston, Lewiston, North Ogden, Portage, Riverside, Snowville.	
<u>Intensity III:</u>	
Utah--Garland.	
<u>Intensity II:</u>	
Idaho--Inkom.	
Utah--Fielding, Trenton.	

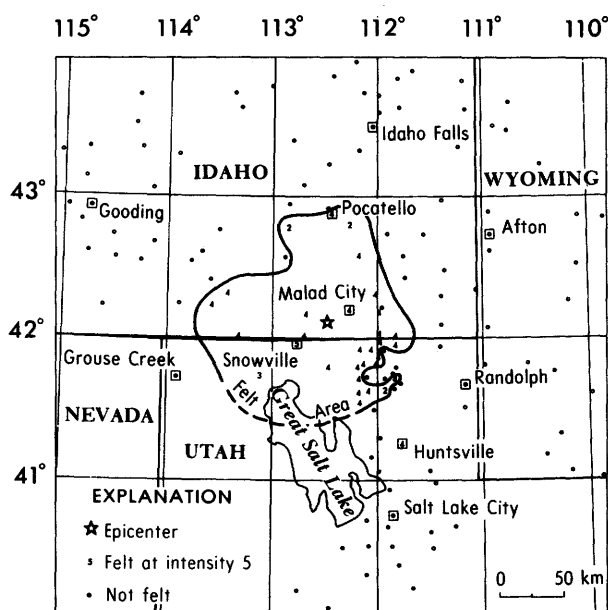


FIGURE 12.--Isoseismal map for the southeastern Idaho earthquake of 30 November 1978, 06 53 40.1 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.--Summary of macroseismic data for U.S. earthquakes, October-December 1978--Continued

Illinois	
5 December (S) Southern Illinois	
Origin time: 01 48 01.3	
Epicenter: 38.62 N., 88.36 W.	
Depth: 25 km	
Magnitude: 3.5 mbLg	
This earthquake was felt over an area of approximately 11,5000 sq km of Illinois and Indiana (fig. 13).	
<u>Intensity V:</u>	
Illinois--	
Barnhill (one report of cracked plaster; hanging pictures swung; buildings creaked and trembled; windows, doors, and dishes rattled; felt by many)	
Newton (light furniture and small objects shifted; hanging pictures swung; windows, doors, and dishes rattled; felt by all)	
West Liberty (light furniture shifted; small objects fell; windows, doors, and dishes rattled; felt by many)	
Willow Hill (few windows cracked;	

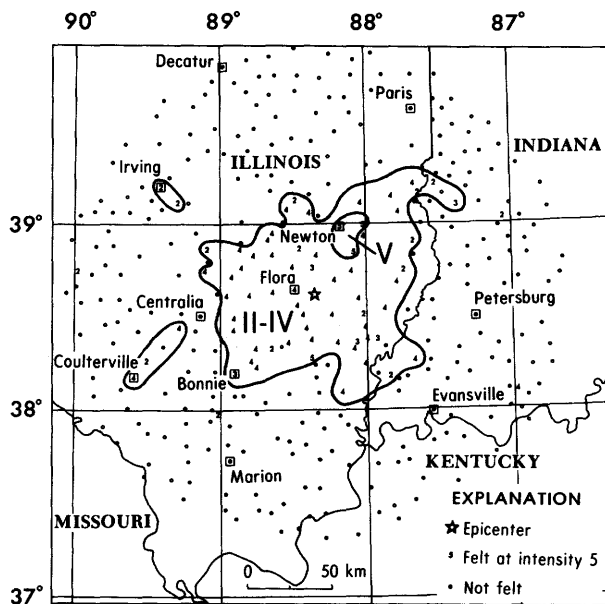


FIGURE 13.--Isoseismal map for the southern Illinois earthquake of 5 December 1978, 01 48 01.3 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.--Summary of macroseismic data for U.S. earthquakes, October-December 1978--Continued

Illinois--Continued

small objects shifted; hanging pictures swung; windows, doors, and dishes rattled; felt by many).

Intensity IV:

Illinois--Alma, Annapolis, Belle Rive, Bluford, Bone Gap, Bridgeport, Browns, Carmi, Cisne, Coulterville, Dieterich, Dundas, Edgewood, Effingham, Fairfield, Farina, Flora, Geff, Golden Gate, Grayville, Hoyleton, Ingraham, Iola, Iuka, Johnsonville, Kell, Kinmundy, Lancaster, Louisville, Mason, Mount Erie, Noble, Olney, Opdyke, Parkersburg, Patoka, Rinard, Saint Peter, Sainte Marie, Salem, Sims, Robinson, Texico, West Union, Xenia, Yale.

Indiana--Buffaloville, Owensville.

Intensity III:

Illinois--Albion, Belmont, Bonnie, Sailor Springs, Sullivan.

Intensity II:

Illinois--Bible Grove, Buckner, Fillmore, Flat Rock, Glen Carbon, Irving, Keenes, Lawrenceville, Oakdale, Shobonier, Teutopolis, West Salem, West York.

Indiana--Fairbanks, Stewartsville, Switz City.

Table 2.--Summary of macroseismic data for U.S. earthquakes, October-December 1978--Continued

Indiana

5 December (S) Southern Illinois

Origin time: 01 48 01.3

See Illinois listing.

Mississippi

11 December (G) Alabama-Mississippi border area

Origin time: 02 06 48.2

Epicenter: 31.95 N., 88.48 W.

Depth: 5 km

Magnitude: 3.5 mbLg

Intensity V:

Alabama--

Gilbertown (light furniture shifted, small objects fell),

Melvin (small objects broken).

Intensity II:

Mississippi--Carmichael.

Montana

7 October (G) Western Montana

Origin time: 12 35 55.3

Epicenter: 46.62 N., 112.13 W.

Depth: 5 km

Magnitude: 2.7 ML(G), 2.9 ML(D)

Intensity IV: East Helena, Helena.

16 October (G) Western Montana

Origin time: 01 15 35.3

Epicenter: 47.09 N., 113.16 W.

Depth: 5 km

Magnitude: 2.9 ML(D), 3.4 ML

Intensity II: Missoula, Potomac (telephone report).

21 October (G) Western Montana

Origin time: 12 28 15.3

Epicenter: 46.97 N., 113.25 W.

Depth: 5 km

Magnitude: 3.5 ML

Intensity III: Ovando.

29 October (G) Central Idaho

Origin time: 13 46 44.5

See Idaho listing.

4 November (G) Hebgen Lake region

Origin time: 15 49 43.8

Epicenter: 44.75 N., 111.23 W.

Depth: 5 km

Magnitude: 3.5 ML(G)

Intensity III:

Wyoming--Old Faithful, Yellowstone National Park.

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1978—Continued

Montana--Continued	
10 November (G) Western Montana	
Origin time:	09 53 45.6
Epicenter:	47.01 N., 113.33 W.
Depth:	5 km
Magnitude:	4.3 ML
Intensity IV:	Seeley Lake
Intensity III:	Ovando.
Nevada	
4 October (P) Owens Valley area	
Origin time:	16 42 48.6
See California listing.	
2 November (E) Southern Nevada	
Origin time:	15 25 00.169
Epicenter:	37.29 N., 116.30 W.
Depth:	0 km
Magnitude:	4.2 mb(G), 4.3 ML(B)
Nevada Test Site explosion "EMMENTHAL" at 37°17'16.60" N., 116°17'50.98" W., surface elevation 2131 m, depth of burial 576 m.	
18 November (E) Southern Nevada	
Origin time:	19 00 00.166
Epicenter:	37.13 N., 116.08 W.
Depth:	0 km
Magnitude:	5.1 mb(G), 5.2 ML(B)
Nevada Test Site explosion "QUARGEL" at 37°07'36.73" N., 116°05'01.94" W., surface elevation 1302 m, depth of burial 542 m.	
16 December (E) Southern Nevada	
Origin time:	15 30 00.158
Epicenter:	37.27 N., 116.41 W.
Depth:	0 km
Magnitude:	5.5 mb(B), 5.5 ML(B)
Nevada Test Site explosion "FARM" at 37°16'24.22" N., 116°24'36.99" W., surface elevation 2006 m, depth of burial 689 m.	
Pennsylvania	
6 October (G) Western Pennsylvania	
Origin time:	19 25 41.6
Epicenter:	39.97 N., 76.51 W.
Depth:	5 km
Magnitude:	2.8 mbLg, 3.0 mbLg(L)

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1978—Continued

Pennsylvania--Continued	
According to the press, this earthquake shook buildings throughout Lancaster and its suburbs. Buildings trembled briefly, a loud noise (described variously as a boom, roar, or vehicle collision) could be heard, and some startled people ran outside.	
Intensity V:	Brunnerville (few cracked windows), Mount Joy (unconfirmed report of cracked plaster).
Intensity IV:	Akron, Bausman, Bird in Hand, Brogue, Brownstown, Conestoga, Delta, East Petersburg, Lancaster, Landisville, Leola, Mountville, New Holland, Peach Bottom, Penryn, Quarryville, Refton, Ronks, Smoketown, Talmage, Washington Boro, Willow Street, Wrightsville.
Intensity III:	Intercourse, Millersville, Pequea, Strasburg.
Intensity II:	Ephrata (press report), Manheim, Marticville (press report), Millersville (press report).
Utah	
24 October (U) Southeastern Idaho	
Origin time:	20 30 59.3
See Idaho listing.	
30 November (U) Southeastern Idaho	
Origin time:	06 53 40.1
See Idaho listing.	
20 December (U) Southeastern Idaho	
Origin time:	13 46 22.6
See Idaho listing.	
Washington	
31 December (W) Seattle area	
Origin time:	03 23 46.7
Epicenter:	47.58 N., 121.85 W.
Depth:	20 km
Magnitude:	4.0 ML(G)
This earthquake was felt over an area of approximately 8,500 sq km of Washington and British Columbia (fig. 14).	

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1978—Continued

Washington—Continued

Intensity V:

Washington—

Granite Falls (light furniture and small objects shifted, felt by many),
North Seattle (press reported small cracks in walls and ceiling of one home).

Intensity IV:

Washington—Rothell, Clinton, Fall City, Freeland, Gold Bar, Grotto, Hobart, Index, Kenmore (press report), Kingston, Lake City (press report), Lake Forest Park (press report), Lake Stevens, Magnolia (press report), Monroe, Mukilteo, Northbend, Port Orchard, Preston, Ravensdale, Renton, Seattle, Seattle-Tacoma Airport (furniture shifted on the fifth floor), Snoqualmie, Sultan, Woodinville.

Intensity III:

Washington—Belfair, Conway, Darrington, Everett, Kirkland, Medina, Mountlake Terrace, Port Townsend, Shaw Island, Startup.

Intensity II:

British Columbia—Victoria (press report).
Washington—Black Diamond, Coupeville, Edmonds, North Bend, Retsil, Skykomish, Tacoma.

Wyoming

2 October (G) Yellowstone National Park

Origin time: 13 59 10.7
Epicenter: 44.74 N., 110.78 W.
Depth: 5 km
Magnitude: 3.5 ML, 3.5 ML(D)

This earthquake and the one at 23 55 42.6 are two of nine which were felt in the park area on October 2 in a 12-hour period from 11 59 to 23 55 UTC. The intensity data are from R. A. Hutchinson, Park Geologist (written commun., 1979).

Intensity III: Madison Junction.

Intensity II: Old Faithful.

2 October (G) Yellowstone National Park

Origin time: 23 55 42.6
Epicenter: 44.71 N., 110.80 W.
Depth: 5 km
Magnitude: 3.6 ML, 3.7 ML(D)

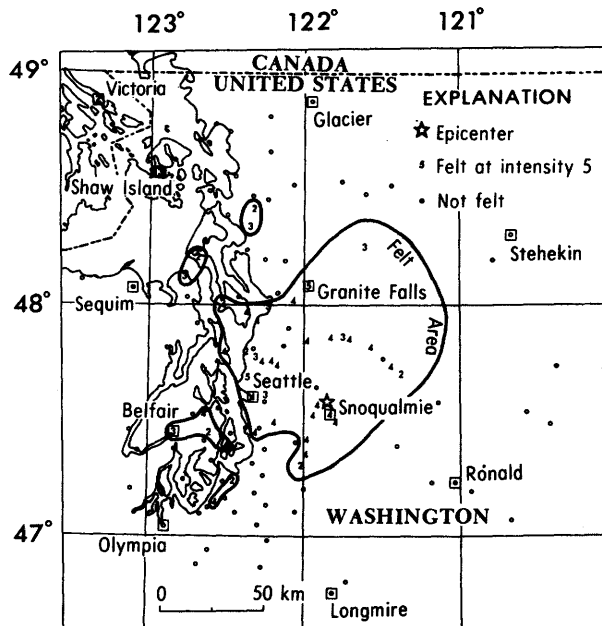


FIGURE 14.—Isoseismal map for the Seattle earthquake of 31 December 1978, 03 23 46.7 UTC. Roman numerals represent Modified Mercalli intensities between isoseismals; Arabic numerals are used to represent these intensities at specific sites.

Table 2.—Summary of macroseismic data for U.S. earthquakes,
October-December 1978—Continued

Wyoming—Continued

Intensity IV: Madison Junction, Norris.

Intensity III: Canyon Village.

Intensity II: Old Faithful.

12 October Yellowstone National Park

Origin time: 13 52
Epicenter: Not located.
Depth: None computed.
Magnitude: None computed.

This is the first of about 35 earthquakes occurring in a 90-minute period which were felt at Grant Village (R. A. Hutchinson, written commun., 1979).

Intensity IV: Grant Village.

4 November (G) Hebgen Lake region
Origin time: 15 49 43.8

See Montana listing.

11 November (G) Yellowstone National Park

Origin time: 20 46 20.8
Epicenter: 44.39 N., 110.25 W.

Table 2.--Summary of macroseismic data for U.S. earthquakes,
October-December 1978--Continued

Wyoming--Continued

Depth: 6 km
Magnitude: 3.2 ML, 3.9 ML(D)
Intensity II: Lake.

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