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Title of article Geological setting of some destructive earthquakes in  
Central America

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see GSA Bulletin v. 88, p. 151 - 156

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Destructive Earthquakes in Central America

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APPENDIX I - DESTRUCTIVE EARTHQUAKES IN CENTRAL AMERICA

(To accompany paper by Carr and Stoiber, Bulletin, Geological Society of America)

KEY

Type:

- V = shallow earthquake of volcanic belt
- U = shallow earthquake of underthrust zone
- T = shallow earthquake of transform fault zone
- I = intermediate depth earthquake
- v = related to volcanic eruption
- s = related to swarm

Ref.:

- MBD = Montessus de Ballore (1884)
- L = Leeds (1974)
  
- BSSA = Bulletin of the Seismological Society of America

<u>YR.-DATE</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>TYPE</u>	<u>REF.</u>
1528, May-Oct.	León Antigua, Nicaragua	Severe swarm.	Vs	MDB p. 13
1575, May 23	San Salvador, El Salvador	Complete ruin. Landslides in Sierra de Los Texacuangos.	V	MDB p. 19
1585, Jan. 16- 1586, Dec. 23	Antigua, Guatemala	A swarm almost two years long, accompanied by a six- month-long eruption of V. Fuego. Mainshock Dec. 23 causes complete destruction.	Vsv	MDB p. 21
1593	San Salvador, El Salvador	Total destruction.	V	MDB p. 23
1607	Antigua, Guatemala	Ruin of city. Swarm ended Nov. 9.	Vs	MDB p. 23
1609	León Antigua, Nicaragua	Eruption of Momotombo and ruin of León Antiguo. City then moved to present location.	Vsv	MDB p. 23
1648	Western Nicaragua	Large scale vertical movements?	U?	MDB p. 25
1651	Western Nicaragua	Vertical movements?	U?	MDB p. 25
1651, Feb. 13 or Feb. 18	V. Pacaya - Antigua, Guatemala	Three strong shocks during eruption of V. Pacaya. City destroyed Feb. 18, aftershocks till April 13.	Vsv	MDB p. 25

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<u>YR.-DATE</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>TYPE</u>	<u>REF.</u>
1656	San Salvador, El Salvador	Ruin of San Salvador.		MDB p. 25
1659, Sept. 30	San Salvador, El Salvador	Eruption of V. San Salvador and destruction of San Salvador.	Vv	MDB p. 27
1663	Lake Nicaragua area and León, Nicaragua	Large scale vertical movements?	U?	MDB p. 27
1681, July	Antigua, Guatemala	Swarm causes much damage.	Vs	MDB p. 29
1683, May	Antigua, Guatemala	Swarm causes much damage.	Vs	MDB p. 29
1684, August	Antigua, Guatemala	Swarm causes much damage.	Vs	MDB p. 29
1687, Sept.-Oct.	Antigua, Guatemala	Swarm causes much havoc.	Vs	MDB p. 29
1689, Feb.	Antigua, Guatemala	Swarm causes considerable damage to parrish of San Sebastian and much havoc in Antigua.	Vs	MDB p. 31
1702, Aug. 4	Guatemala	Much damage.		MDB p. 31
1707	San Salvador, El Salvador	Complete ruin, date not known.		MDB p. 33
1717, Aug. 18- Oct. 4	V. Fuego Antigua, Guatemala	Eruption of V. Fuego Earthquakes of 29 Sept. and 4 Oct. most damaging.	Vsv	MDB p. 33

<u>YR.-DATE</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>TYPE</u>	<u>REF.</u>
1719, May 6	San Salvador, El Salvador	A solitary shock. Ruins San Salvador.		MDB p. 35
1751, March 4	Antigua, Guatemala	Two strong earthquakes cause much damage.		MDB p. 35
1757, Oct. 4 or 10	Guatemala	Much damage.		MDB p. 35
1765, April	Near San Salvador El Salvador	Destruction of San Cristobal Ilopango, San Martín, San Pedro Perulapán, and San Bartolomé Perulapía, El Salvador.	V	MDB p. 37
1765, June 21	Guatemala	Widespread havoc in the province of Chiquimula.	T?	MDB p. 37
1765, Oct. 24	Guatemala	Widespread havoc in the province of Suchitepéquez and ruin of Antigua.	U?	MDB p. 37
1772, March 16	Masaya, Nicaragua	Great eruption of V. Masaya and destructive earthquakes.	Vs	MDB p. 41
1773, May to Dec.	Antigua, Guatemala	Swarm causes ruin of Antigua. Capital later relocated. Especially severe shocks June 11, July 29, Sept. 7, Dec. 14, Shocks stronger in Chimaltenango.	Vs	MDB p. 43
1774, July	Southwest of San Salvador, El Salvador	Huizúcar and Panchimalco destroyed.	V	MDB p. 45

<u>YR.-DATE</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>TYPE</u>	<u>REF.</u>
1793, Feb. 2	San Salvador, El Salvador	No foreshocks but many aftershocks. Epicenter at Cuscatlán? Complete ruin of city.	V	MDB p. 47
1815, Aug.	San Salvador, El Salvador	Lesser ruin of San Salvador.		MDB p. 47
1822, May 7	Costa Rica and Nicaragua	Cartago nearly destroyed. Felt as far north as Greytown, Nicaragua, on the Caribbean coast.	U?, I?	p. 29
1830, April 1- May 18	Guatemala City, Guatemala	Swarm topples many buildings. Major shock on April 23, as damaging as 1773.	Vs	MDB p. 53
1835	El Salvador	Ruins in San Salvador and San Miguel.		MDB p. 53
1835, Jan. 20-21	Gulf of Fonseca	Great eruption of Cosigüina with accompanying earthquakes.	Vv	MDB p. 53-55
1839, March 22	Near San Salvador,	Much havoc, principally in Quetzaltepeque and Nejapa.	V	MDB p. 57
1839, Oct. 1	San Salvador, El Salvador	Ruin of San Salvador. Some foreshocks and many aftershocks.	Vs	MDB p. 57
1841, Sept. 2	Cartago, Costa Rica	Several aftershocks. Cartago destroyed. Tres Ríos and San José suffer less.	Vs?	MDB p. 47
1844, May	Nicaragua & Costa Rica	Rivas destroyed. Seiches (?) in Lake Nicaragua during long swarm.		MDB p. 59

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<u>YR.-DATE</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>TYPE</u>	<u>REF.</u>
1847, June 22	Balsam Coast of El Salvador	Two large shocks cause damage on Balsam coast.	U?	MDB p. 61
1850, Oct. 27	Nicaragua	Great earthquake lasted 2 minutes, felt all over Nicaragua, Honduras and El Salvador.	U	MDB p. 63
1851, March 18	Costa Rica	Ruin of Cartago. Havoc in San José, Alajuela, Barba and Guanacaste provinces. Many aftershocks.	U?	MDB p. 63
1851, Nov. 14	Tegucigalpa, Honduras	Some houses destroyed.		MDB p. 63
1852, May 16	Quezaltenango, Guatemala	Havoc in Quezaltenango.		MDB p. 63
1853, Feb. 9	Guatemala	Major earthquake causes havoc in Antigua, Amatitlán and principally Quezaltenango.	U?	MDB p. 65
1853, April 4	San Salvador, El Salvador	Some ruins in San Salvador.		MDB p. 65
1853, Oct. 8	Costa Rica	Havoc in Cañas and Bagases.		MDB p. 67
1854, April 16	San Salvador, El Salvador	Complete ruin, felt foreshocks two days before. Cracks open in Candelaria and on the road to Montserrate.	Vs	MDB p. 67
1854, June 11	El Salvador	Havoc in San Vicente, Cojutepeque and Chinameca Texacuangos.		MDB p. 69

<u>YR.-DATE</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>TYPE</u>	<u>REF.</u>
1854, Aug. 4	Costa Rica	Most damage in Barba and Santo Domingo.		MDB p. 71
1855, Jan. 12	San Marcos, Guatemala	Cracks & fumaroles on slopes of V. Tacana.	Vv	MDB p. 73
1855, Jan. 1-26	Quezaltenango, Guatemala	Swarm with main-shocks on the 18th and 26th. Cantel and Zuñil suffer most.	Vs	MDB p. 73
1856, Aug. 4	Omoa, Honduras	Omoa destroyed. Cracks open in Castillo and in area between Río Trato and Río Ulua.	Ts	MDB p. 79
1857, Nov. 6	Cojutepeque, El Salvador	Houses destroyed in Cojutepeque, San Juan, Nonualco, Analco, and San Pedro Perulapán.	Vs	MDB p. 81
1858, April 25 and May	Masaya and Granada, Nicaragua	Eruption of V. Masaya. Swarm with beginning on April 25 and main-shocks April 25 and May 10.	Vsv	MDB p. 81
1859, Aug. 25-Sept. 3	La Union, El Salvador	Swarm with tsunami in La Union. Main shock Aug. 25. Damage also in Isla del Tigre, Amapala, El Viejo, and La Brea.	V? U?	MDB p. 87
1859, Dec. 8	El Salvador, Guatemala	Destruction in Sonsonate, Nahuizalco, San Silvestre, Armenia, Dolores Izalco, and Quezaltepeque, El Salvador and Esquintla and Amatitlán, Guatemala. Tsunami at Acajutla, El Salvador.	U	MDB p. 89



<u>YR.-DATE</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>TYPE</u>	<u>REF.</u>
1860, July 21-23	Near San Vicente, El Salvador	Destruction of Santa María Ostuma. Damage to Tepetitán, and Guadalupe. Many aftershocks.	V	MDB p. 91
1860, Dec. 4	Quezaltepeque, El Salvador	Quezaltepeque destroyed. Damage to Panchimalco, Santiago, Texacuangos, Cuscatancingo, Comasagua, and Talnique.	Vv?	MDB p. 93
1862, Dec. 19	El Salvador, Guatemala	Felt from Chinandega, Nicaragua, to Quezaltenango, Guatemala. Very destructive in Ahuachapan and Metapan, El Salvador. Destructive from Tecpan, Guatemala to Quezaltepeque, El Salvador, and to the coast.	U? I?	MDB p. 97
1865, Dec. to Feb.	Nicaragua	Long swarm topographic changes at Río Tipitapa.		MDB p. 101 L. p. 31
1870, June 1-14	Chiquimulilla, Guatemala	Destruction of Chiquimulilla, Cuilapa, Izquatan, Los Esclavos, Cerro Redondo, and mainly Los Lagartos. Main shock on the 12th. Aftershocks till the 23rd.	V	MDB p. 113
1870, June 18	León, Nicaragua	Earthquakes cause destruction and injuries in León.		MDB p. 113 L. p. 31
1872, Dec. 29-31	San Vicente, El Salvador	Swarm causes damage and death, especially on the first day.	Vs	MDB p. 117

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<u>YR.-DATE</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>TYPE</u>	<u>REF.</u>
1873, Feb. 22- March 19	San Salvador, El Salvador	Large foreshock on the 4th. Mainshock on the 19th. San Salvador 80% destroyed. Destruction also in: San Jacinto, San Marcos, Santo Tomas, Santiago Texacuangos, Olocuitla, Mejicanos, Ayutustepeque, San Sebastian, Aculhuaca, Apopa, Cuscatancingo, Soyapango, Tonancatepeque, San Martín, Guayabal, and Santa Tecla.	Vs	MDB p. 117
1874, Sept. 3	Patzicia, Guatemala	Patzicia, Dueñas, and San Andres Iztapa destroyed. Damage to Antigua, Alotenango, Ciudad Vieja, Balanyá, Amatitlán.	V	MDB p. 123
1878, Oct. 2	Jucuapa, El Salvador	Ruin of Jucuapa. Damage in Chinameca Tecapa, El Triunfo, and Santiago de María.	V	MDB p. 125
1879, Dec. to Mar. 1880	Ilopango, El Salvador	Long series of earth- quakes accompany extrusion of dome in Lake Ilopango. Main- shocks on Dec. 27 and 31.	Vsv	MDB p. 127-165
1881, Apr. 15-30	Western Nicaragua	Swarm with mainshock on 28th. Destructive in San Juan del Sur, Corinto, and Chinandega.	U	MDB p. 171
1881, Aug. 13	Chinique, Guatemala	Swarm,	T	MDB p. 171
1882, Mar. 3	Costa Rica	Some havoc in Cartago, Alajuela, San José, Puntarenas, Grecia and San Ramón.		MDB p. 175
1884, Dec. 1	San Vicente, El Salvador	Considerable destruction.	Vs	MDB p. 199 Schultz (1963)

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<u>YR.-DATE</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>TYPE</u>	<u>REF.</u>
1885, Oct. 11	Nicaragua	Damage over wide area; León, Chinandega, and Managua; six deaths.	U	L. p. 32
1885, Dec. 18 to Jan. 18	Amatitlán	Swarm.	Vs	Milne (1911)
1890, Aug. 31 to Sept. 3	Granada, Nicaragua	Swarm causes some damage.	V	Crawford (1898)
1898, April 29 to May 12	Nicaragua	Felt from Lake Nicaragua to El Salvador. Very destructive in Chinandega and León.	U	L. p. 32 Crawford (1902)
1902, Feb. 26	Western Coast of El Salvador	Tsunami along 120 km of El Salvador & Guatemala Coast.	U	Sapper (1937)
1902, April 19	Ocos, Guatemala	Great earthquake devastates western Guatemala. For map see Rockstroh. Fore-shock Jan. 16.	U	Rockstroh (1902)
1902, Mar. 24	Momotombo, Nicaragua	Several houses and railroad station destroyed or damaged. Precedes eruption of V. Momotombo.	V	Crawford (1902)
1910	Cartago, Costa Rica			Sapper (1937)
1911	Guatusco, Costa Rica			Sapper (1937)
1911, July 28	Toro Amarillo, Costa Rica			Sapper (1937)
1912, June 16	Sarchi, Costa Rica	Serious in Grecia, Sarchi, Naranjo. Epicenter 5 km west of V. Poas summit. Large landslides cause flood.	V	Tristan and others (1912)
1915, Sept. 7	Jutiapa, Guatemala	Jutiapa ruined. (M 7.2, Richter, 1958).	I	BSSA v. 5, p. 158
1915, Oct. 15	Ahuachapan, El Salvador	Ruin of Ahuachapan Ataco and Apaneca.	V	Schultz (1963)

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1915, Dec. 27-29	Gracias, Honduras	Ruin of Gracias, Talqua, Las Flores, San Sebastian.		BSSA v. 6, p. 4-8
1916, Feb. 27	Coast of western Costa Rica	Destruction at Guanacaste, Limón, Coco, and Sardinal (M 7.5, Gutenberg and Richter, 1954).	U	Tristan (1916)
1916, May 1	Costa Rica	Damage at San José.		BSSA v. 6, p. 185
1917, June 7	V. San Salvador, El Salvador	San Salvador, Apopa, Nejapa, Quetaltepeque, and Opico destroyed. Large eruption of V. San Salvador.	Vv	Schultz (1963)
1917, Dec. 25- Jan. 26	Amatitlán, Guatemala	Guatemala City 40% destroyed. Mainshock Dec. 31.	Vs	BSSA v. 7, p. 142
1919, Apr. 28- May 1	San Salvador, El Salvador	Destruction of San Salvador.	V	BSSA v. 9, p. 45; Lomnitz and Schultz (1966)
1924, Mar. 4	Costa Rica	Damage in San José Port Limon (M = 7, Gutenberg and Richter, 1954).	U? I?	BSSA v. 14, p. 70
1926, Nov. 5	Nicaragua	León 80% destroyed 50% of houses in Managua damaged (M = 7, Gutenberg and Richter, 1954).	I	BSSA v. 16, p. 275
1929, Jan. 17	Puerto Barrios, Guatemala	Damage at Puerto Barrios.	T	BSSA v. 19, p. 55
1930, July 17	Ahuachapan, El Salvador	Swarm.	Vs	BSSA v. 20, p. 238
1931, Mar. 31	Managua, Nicaragua	Destroys much of Managua.	V	BSSA v. 21, p. 172-174

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<u>YR.-DATE</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>TYPE</u>	<u>REF.</u>
1932, May 21	Zacatecoluca, El Salvador	Destruction of Zacatecoluca, San Juan Nonualco, and San Nicolas Lempa.	V	BSSA v. 22, p. 176 Schultz (1963)
1933, July 4	Teguicigalpa, Honduras	Three dead.		BSSA v. 23, p. 137
1934, Dec. 3	Ocotepeque, Dept., Honduras	Damage at San Jorge La Encarnación, San Fernandez, Santa Rita, Gracias, La Esperanza, Naranjito, Llama, Comayagua.	V	BSSA v. 25, p. 109
1936, Dec.	San Vicente, El Salvador	For map see Levin. Main shock Dec. 20.	Vs	Levin (1940) Schultz (1963)
1937, Jan. 12	Western Nicaragua	Damage at Port Corinto and Chinandega.		BSSA v. 27, p. 52
1937, Dec. 26	Ahuachapan, El Salvador	Destruction of Ahuachapan Atiquizaya, Turín, La Puerta, Junquillo, Palo Pique, Las Chinamas.	V	Schultz (1963)
1938, Mar. 8	Western El Salvador	Swarm destroys hospital and houses.	Vs	BSSA v. 28, p. 134
1938, May 6	Telica, Nicaragua	Telica destroyed, León damaged.	V	L. p. 34
1940, Feb. 20	Western Nicaragua	Damage at Corinto and Chinandega.		L. p. 34
1942, Aug. 6	Guatemala	Considerable damage in Guatemala. (M 7.9, Gutenberg and Richter, 1952).	U	BSSA v. 32, p. 334 Kelleher and others (1973)
1945, Aug. 10	Quiriguá, Guatemala		T	BSSA v. 35, p. 194
1947, Jan. 26	La Unión, El Salvador	Large intermediate- depth earthquake (M 7.2)	I	Schultz (1963)

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<u>YR.-DATE</u>	<u>LOCATION</u>	<u>NOTES</u>	<u>TYPE</u>	<u>REF.</u>
1950, Oct. 23	Western Guatemala	Heavy damage at San Marcos (M 7.1).	U	BSSA v. 41, p. 71 Kelleher and others (1973)
1951, May 6	Jucuapa, El Salvador	For map see Meyer-Abich.	Vs	Meyer-Abich (1952) Schultz (1963)
1951, Aug. 3 & 4	V. Cosigüina, Nicaragua	Destruction at Jinotega and Potosí. A flood poured out of the crater lake of V. Cosigüina.	I	BSSA v. 41, p. 399
1952, Oct. 30	Patillos, Costa Rica	Landslides 10 mi. N of V. Irazú.	V	BSSA v. 43, p. 181
1953, Jan. 7	Limón, Costa Rica	Buildings damaged and fire.	I	BSSA v. 43, p. 182
1955, April 4	Nicaragua	Damage at Managua.		L. p. 34
1955, Sept. 1	Toro Amarillo, Costa Rica	Several dead.	V	BSSA v. 45, p. 345
1965, May 3	San Salvador, El Salvador	For map see Lomnitz and Schultz. For focal mechanism see Molnar and Sykes.	Vs	Lomnitz and Schultz (1966) Molnar and Sykes (1969)
1972, Dec. 23	Managua, Nicaragua	Destruction of Central Managua; map and focal mechanism given by Brown and others.	Vs	Brown and others (1973)
1973, April 14	Tilarán, Costa Rica	Several dead. For description see Plafker.	V	Plafker (1973)

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LARGE EARTHQUAKES IN CENTRAL AMERICA

<u>DATE</u>	<u>TIME</u>	<u>LAT (N)</u>	<u>LON (W)</u>	<u>M</u>	<u>DEPTH *</u>	<u>SOURCE**</u>
1898 April 29	16:48	12.	86.	7.9	S	R
1902 Feb. 26	Tsunami along 120 km of Guatemalan and Salvadoranean coast					Sapper (1937)
1902 April 19	00:23	14.5+	92.+	8.3	S	Rockstroh (1902) R
1915 Sept. 7	1:20:48	14.+	90.+	7.9	80km	R
1916 Feb. 27	20:20:48	10.7+	85.7+	7.5	S	Tristan (1916), G & R
1916 April 24	08:02:12	11.	85.	7.3	S	G & R
1916 April 26	02:21:30	10.	85.	7.3	S	G & R
1919 April 16	20:53:03	14.5	91.75	7.0	S	G & R
1921 March 28	07:49:22	12.5	87.5	7.3	S	G & R
1924 March 4	10:07:42	9.75	84.	7.0	S	G & R
1926 Feb. 8	15:17:49	13.	89.	7.1	S	G & R
1926 Nov. 5	07:55:38	12.3	85.8	7.0	135km	G & R
1935 Dec. 14	22:05:18.7	14.78	92.48	7.3	S	K
1939 Dec. 21	20:54:47.2	10.14	84.63	7.3	S	K
1941 Dec. 5	20:46:57.6	8.67	83.16	7.5	S	K
1942 Aug. 6	23:36:54.2	13.90	90.93	8.3	S	K
1944 June 28	07:58:49.4	14.26	92.65	7.0	S	K
1947 Jan. 26	10:06:46	12.50	86.25	7.2	170km	HDF
1948 Nov. 19	1:04:24	10.0	83.5	7.0	80km	HDF
1950 Oct. 5	16:09:27.1	10.35	85.20	7.7	S	K
1950 Oct. 23	16:13:17.3	14.34	91.82	7.1	S	K
1953 Nov. 17	13:29:50.9	13.63	92.16	7.1	S	K
1956 Oct. 24	14:42:17.5	11.74	86.47	7.1	S	K
1970 April 29	14:01:32.8	14.5	92.6	7.3	S	HDF

\*S = Shallow.

\*\*R = Richter (1958); G&R = Gutenberg & Richter (1954); K = Kelleher and others (1973);  
HDF = Hypocenter Data File of the U.S. Geological Survey.

+ = Location estimated from field data.

C. G. ...