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The Location of Epicentres, 1920

BY

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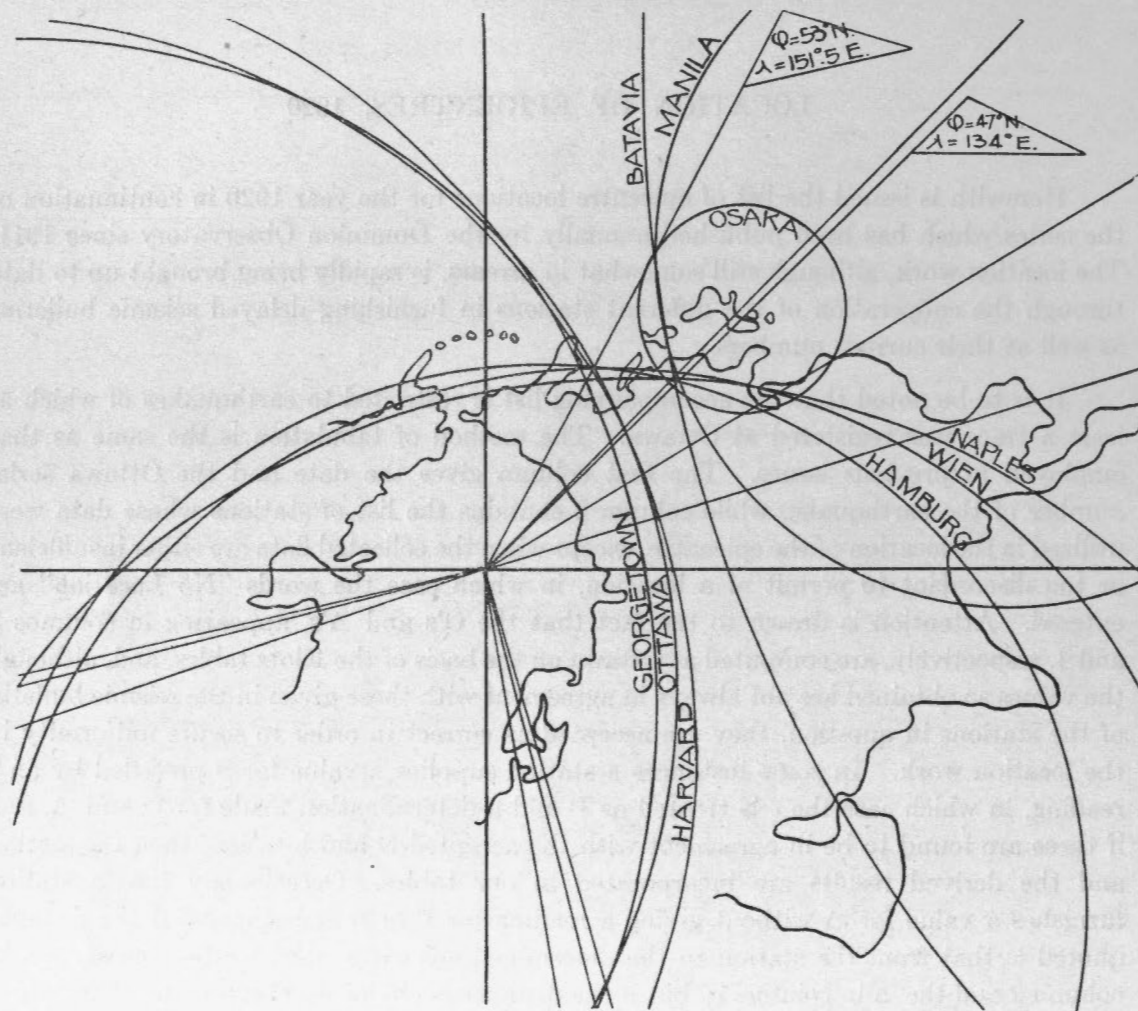
LOCATION OF EPICENTRES, 1920

Herewith is issued the list of epicentre locations for the year 1920 in continuation of the series which has been published annually by the Dominion Observatory since 1911. The location work, although still somewhat in arrears, is rapidly being brought up to date through the coöperation of the different stations in furnishing delayed seismic bulletins as well as their current numbers.

It is to be noted that the accompanying list is restricted to earthquakes of which at least a trace was registered at Ottawa. The method of tabulation is the same as that employed in previous issues. The first column gives the date and the Ottawa serial number of the earthquake, while column 2 contains the list of stations whose data were utilized in the location of the epicentre, except when the collected data are either insufficient or too discordant to permit of a location, in which case the words "No Location" are entered. Attention is drawn to the fact that the O's and Δ 's, appearing in columns 3 and 4, respectively, are computed at Ottawa on the basis of the Klotz tables, and, although the values so obtained are not always in agreement with those given in the seismic bulletin of the stations in question, they are accepted as correct in order to secure uniformity in the location work. In some instances a station supplies a value for S preceded by an *e* reading, in which case the *e* is treated as P and a determination made for O and Δ , and if these are found to be in agreement with the accepted O and location, then the station and the derived results are incorporated in our tables. Occasionally too, a station furnishes a value for Δ without giving a reading for P or S or both, and if the distance quoted is that from the station to the determined epicentre, then we list the station in column 2 and the Δ in column 4; but if the distance is obviously in error, then the entries are made in the last column, which contains data available but of no utility in the determination of an epicentre. The geographical coördinates of the epicentre are given in the fifth column along with the accepted value of O, which, generally speaking, is the average of the O's given by the stations. In those cases where an epicentre is located either by press report or by any one or number of stations, the same is noted in column 6.

One earthquake, viz. No. 1112, appears to be double, and as separate locations are given, this brings the total for the year up to 90. Of these 41 were located with considerable accuracy, while 11 others afforded approximate locations and 4 of those remaining were assigned doubtful locations.

In preceding issues mention has been made of what appears to be a new seismic region in the Atlantic Ocean just off the northeast coast of South America. Nos. 1131 and 1136 of this series are further instances of continued seismic activity in this area. In connection with this appearance of new earthquake regions, special mention is made of No. 1132 which definitely yields an epicentre in the Arctic zone a locality which heretofore has not been considered as seismic.



LOCATION BY KLOTZ STEREOGRAPHIC METHOD
No. 1064
1920

Special attention is called to quake No. 1064 of Feb. 22. In the accompanying sketch it is readily seen that the three eastern stations, Manila, Batavia and Osaka, give an epicentre whose coördinates are 47° N and 134° E., while the western stations, Georgetown, Harvard and Ottawa, indicate an approximate location at 53° N. and $151^{\circ}.5$ E. The European or central stations, Hamburg, Wien and Naples, are in agreement with both of these determinations so that it would appear possible that a fault line extends between these two sets of coördinates, or that two simultaneous quakes occurred at the determined epicentres.

DOMINION OBSERVATORY, OTTAWA, September, 1922.

LOCATION OF EPICENTRES, 1920

Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Jan. 4 1055	Ottawa.....	4-22-03	3440	$\varphi = 19^\circ \text{ N}$ $\lambda = 96^\circ.5 \text{ W}$ $O = 4-21-49$	Harvard gives Vera Cruz, Mexico.	Victoria 3170
	Georgetown...	4-21-43	3140			
	Ithaca.....	4-22-06	3140			
	Denver.....	4-20-59	2440			
	Spring Hill...	(4-23-48)	(1390)			
	Cheltenham...	4-21-37	3040			
	Tucson.....	4-21-11	2080			
	Harvard.....	4-21-54	3530			
	La Paz.....	4-22-01	5040			
Toronto.....	4-20-48	3600				
Jan. 30 1056	No Location				La Paz gives Minas Geraes, Brazil.	Ottawa 3820 Stonyhurst 3700 Harvard (4790) Toronto 4560 La Paz 2650 Georgetown 4100
Jan. 30 1057	No Location					Sydney 3580 Honolulu 1620
Feb. 2 1058	Batavia.....	(11-21-48)	(5340)	$\varphi = 6^\circ \text{ S}$ $\lambda = 153^\circ.5 \text{ E}$ $O = 11-22-12$		Wien 11000 Lemberg 10180 Coimbra 10540 Algiers (8060) Hamburg 7320 Osaka 7840 Strasbourg 4800 Harvard (13400) Tokio 440 Toronto (11030) Georgetown 7320 Budapest 11980 Naples 10980 Cartuja 10780
	Melbourne....	11-23-02	3420			
	Zi-ka-wei	11-22-09	5140			
	Sydney.....	11-22-27	2970			
	Victoria.....	11-22-19	9790			
	Manila.....	11-21-26	4220			
Feb. 7 1059	Algiers.....	11-50-27	3450	$\varphi = 64^\circ \text{ N}$ $\lambda = 30^\circ \text{ W}$ $O = 11-50-25$		Coimbra (2250) Cartuja 2500
	Hamburg.....	11-50-41	2670			
	Strasbourg....	11-50-14	3000			
	Harvard.....		3720			
	DeBilt.....	11-50-29	2570			
	Besançon.....	11-50-14	2930			
Feb. 8 1060	No Location					Perth 1600 Sydney 3600 La Paz 10390
Feb. 10 1061	No Location					Melbourne 2980 Perth 6000 Honolulu 5000 Sydney 2770 Victoria 4180

LOCATION OF EPICENTRES, 1920

Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Feb. 10 1062	Ottawa.....	22-07-22	2900	$\varphi = 19^\circ \text{ N}$ $\lambda = 59^\circ \text{ W}$ $O = 22-07-22$		Marseilles 6640 Honolulu 7850 Barcelona (2260)
	Halifax.....	22-07-12	2740			
	Coimbra.....	22-07-19	5930			
	Ithaca.....	22-07-25	2720			
	Algiers.....	22-07-12	7150			
	Hamburg.....	22-07-40	7370			
	Spring Hill....	22-07-24	2570			
	Cheltenham...	22-07-50	2490			
	Tucson.....	22-07-03	4400			
	Harvard.....	22-07-32	2430			
	Toronto.....	22-07-22	2990			
	La Paz.....	22-07-00	3810			
	Georgetown...	22-07-03	2500			
	Dyce.....	(22-08-01)	(6400)			
	Victoria.....	22-06-26	5850			
DeBilt.....	22-07-52	6920				
Naples.....	22-07-39	7800				
Cartuja.....	22-07-14	6550				
Feb. 12 1063	No Location					Harvard 2760 La Paz 6540 Georgetown 2440
Feb. 22 1064	Ottawa.....	(17-35-58)	(8120)	$\varphi = 51^\circ \text{ N}$ $\lambda = 143^\circ.5 \text{ E}$ $O = 17-35-35$ Location doubtful	Osaka gives, "Off east coast of Yezo"	Algiers.... (1840) Honolulu (1120) Strasbourg 2470 La Paz 13400 Victoria 1690 Barcelona 10820 Cartuja 8850 Besançon 7050
Wien.....	(17-35-39)	(7920)				
Batavia.....	17-35-44	6520				
Hamburg.....	17-35-42	7600				
Osaka.....	(17-35-56)	(1490)				
Harvard.....	17-35-40	8580				
Sydney.....	17-34-04	9300				
Georgetown...	17-36-01	8580				
Manila.....	17-35-39	3780				
Naples.....	17-35-31	8600				
Feb. 28 1065	Coimbra.....	18-40-52	9050	$\varphi = 16^\circ \text{ S}$ $\lambda = 72^\circ.5 \text{ W}$ $O = 18-40-50$		Harvard (6150) Ottawa (5000)
La Paz.....	18-41-08	470				
Georgetown	18-40-29	6150				
Mar. 9 1066	No Location					No data.
Mar. 10 1067	No Location					No data
Mar. 15 1068	No Location					Ottawa 9860 Honolulu 2010 Harvard (11955) La Paz (8810) Sydney 2680 Toronto (8330) Victoria 7420
Mar. 19 1069	No Location					No data

LOCATION OF EPICENTRES, 1920

Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Mar. 20 1070	No Location					Ottawa (4920) Tucson 1120
Mar. 20 1071	No Location Data discordant					Ottawa 9560 Coimbra 10220 Georgetown 9060 Ithaca 9090 Algiers (6920) Melbourne 6440 Porto Rico 7300 Cheltenham 8660 Harvard 10600 La Paz 4630 Sydney 8220 Toronto 11460 Victoria 8000 Barcelona 11990 Cartuja (12600)
Mar. 22 1072	Perth Sydney.....	1-38-43	3500 2940	$\varphi = 9^{\circ}.5$ S $\lambda = 139^{\circ}.5$ E O = 1-38ca. Rough approximation only		Honolulu 2660
Mar. 22 1073	No Location Data discordant					Coimbra (8600) Perth 5600 Honolulu 1800 Harvard (11370) Sydney 3410 Cartuja 10200
Mar. 23 1074	Ottawa..... Georgetown Algiers..... Hamburg.... Cheltenham... Honolulu..... La Paz.....	(15-21-53) 15-21-44 (15-22-20) 15-22-02 15-21-16 15-22-07 15-22-06	(3400) 3270 (9000) 9210 3410 7250 4130	$\varphi = 14^{\circ}$ N $\lambda = 89^{\circ}.5$ W O = 15-21-55		Coimbra 6710 Harvard (5760) Toronto (5440)
Mar. 29 1075	Ottawa..... Georgetown... Ithaca..... Algiers..... Hamburg.... Denver..... Tucson..... La Paz..... Victoria.....	5-07-50 5-07-53 5-07-43 (5-07-43) 5-07-43 5-06-59 5-07-46 5-07-50 630	3780 4050 4010 (9480) 7920 2440 2770 9610 630	$\varphi = 51^{\circ}$ N $\lambda = 130^{\circ}.5$ W O = 5-07-41		Coimbra (5200) Cheltenham 7480
April 6 1076	Ottawa..... Georgetown... La Paz.....	(16-43-22) 16-42-38 (16-42-13)	(3800) 3750 (5990)	$\varphi = 29^{\circ}$ N $\lambda = 38^{\circ}$ W O = 16-42-44		

LOCATION OF EPICENTRES, 1920

Date	Station	O	Δ	Epicentre	Other Locations	Other Data
April 11 1077	Georgetown...	(23-03-41)	(9120)	$\varphi = 48^\circ \text{ N}$ $\lambda = 154^\circ \text{ E}$ O = 23-03-43		Stonyhurst 2660
	Hamburg.....	23-03-45	8120			Honolulu 2290
	Tokio.....		1780			Zi-ka-wei 2290
	Besançon.....	23-03-45	8940			Sydney 8200 Batavia 6660 Manila 2410
April 16 1078	No Location					Harvard (8300)
April 18 1079	No Location					Cheltenham 1290
April 19 1080	Ottawa.....	21-06-26	3420	$\varphi = 19^\circ \text{ N}$ $\lambda = 97^\circ \text{ W}$ O = 21-06-33	DeBilt reports, "Felt in Mexico"	Stonyhurst 3240
	Coimbra	21-06-26	8640			Spring Hill (1280)
	Georgetown...	21-06-18	2980			Harvard 2520
	Ithaca.....	21-06-11	3190			Toronto 2590
	Algiers.....	21-06-43	9300			Victoria 2030
	Cheltenham	21-06-22	2930			
	Tucson.....	21-06-19	2170			
	Porto Rico...	21-06-47	3200			
	Honolulu....	21-07-05	6000			
	Hamburg.....	21-06-24	9510			
	La Paz.....	21-06-30	4820			
	DeBilt.....	21-06-43	9060			
	Naples.....	21-06-55	10050			
Cartuja.....	21-06-35	9120				
May 7 1081	Wien.....	(5-41-45)	(9600)	$\varphi = 35^\circ \cdot 5 \text{ N}$ $\lambda = 150^\circ \text{ E}$ O = 5-41-38	Batavia and Sydney record a shock at approx- imately one minute earlier, possibly in the southern Philippines. Manila reports epicentre at E. Mindanao	Coimbra (7520)
	Hamburg.....	(5-42-05)	(9350)			Stonyhurst 5320
	Zi-ka-wei....	5-40-47	2650			Honolulu 9020
	Budapest.....	5-41-57	9400			Tokio 2440 Victoria 7440 La Paz (15750) Perth 2300 Algiers (5530) Sydney 5080 Batavia 2600 DeBilt (7980) Cartuja (9500) Naples 4220
May 7 1082	Honolulu....	21-32-15	5540	$\varphi = 8^\circ \cdot 5 \text{ S}$ $\lambda = 158^\circ \text{ E}$ O = 21-31-12	Sydney gives, $\varphi = 8^\circ \cdot 5 \text{ S}$ $\lambda = 144^\circ \text{ E}$	Wien (13000)
	Osaka.....	21-31-21	5680			Strasbourg 2160
	Tokio.....	21-32-05	4740			Harvard (12300)
	Perth.....	21-30-24	5280			Victoria 5230
	Zi-ka-wei....	21-31-06	5860			Naples (1480)
	Sydney.....	21-30-42	2920			
	La Paz.....		14800			
	Batavia.....	(21-30-59)	(5550)			
	Melbourne...	21-31-0	3420			
	Berkeley.....	21-31-00	10020			

LOCATION OF EPICENTRES, 1920

Date	Station	O	Δ	Epicentre	Other Locations	Other Data
May 8 1083	No Location					No data
May 8 1084	No Location					No data
May 26 1085	La Paz..... Sydney..... Batavia.....	12-22-15 12-21-41 12-24-09	10680 4050 7580	These three stations indicate an epicentre in a vicinity just east of the Fiji Is. O = 12-22ca.		Coimbra (11550) Honolulu 1120 Strasbourg (1070) Harvard (8900)
June 2 1086	Denver..... Georgetown Victoria..... Harvard..... Berkeley.....	22-06-51 (22-13-58) 22-06-48 (22-12-35)	270 (2320) 1710 (2733) (1900)	$\varphi = 41^{\circ}.5$ N $\lambda = 104^{\circ}$ W O = 22-07ca.		
June 5 1087	Athens..... Berkeley..... Lick..... Cartuja..... Naples..... Besançon..... Honolulu..... Osaka..... Zi-ka-wei.....	4-21-05 4-22-08 4-22-15 4-22-34 4-20-48 4-22-07 4-22-13 2040 4-21-27	9250 9540 9520 10120 9340 9380 8850 2040 860	$\varphi = 32^{\circ}$ N $\lambda = 117^{\circ}.5$ E O = 4-22ca. Location approximate		Ottawa (8800)
June 9 1088	Honolulu..... Zi-ka-wei..... Sydney..... Batavia..... Melbourne.... Manila.....	11-30-40 11-30-35 11-30-15 11-30-32 11-29-58 11-31-17	8440 2880 3940 2510 4020 1890	$\varphi = 4^{\circ}$ S $\lambda = 129^{\circ}$ E O = 11-30-33	Sydney and Batavia report quake felt on I. of Amboyna	Coimbra 10850 Wien (10400) Strasbourg 7780 Victoria (3980) Tokio 1060 Perth 4820 Harvard 13000 La Paz 16040 Hamburg 10000 Lemberg 6450
June 18 1089	Victoria..... Berkeley.....	10-08-06	1740 545	$\varphi = 33^{\circ}$ N $\lambda = 120^{\circ}$ W O = 10-08 ca.	Victoria reports quake felt at Los Angeles	Georgetown (1810) Harvard 1560
June 22 1090	Georgetown... Harvard..... Berkeley.....	2-48-03	(3940) (3866) 560	$\varphi = 41^{\circ}.5$ N $\lambda = 124^{\circ}.5$ W Location approximate O = 2-48-03		

LOCATION OF EPICENTRES, 1920

Date	Station	O	Δ	Epicentre	Other Locations	Other Data.
July 2 1091	Honolulu..... Perth..... Batavia..... Berkeley.....	18-40-46 18-41-01 (18-40-10) 18-40-09	6220 4520 (5160) 9750	$\varphi = 2^{\circ} 5$ S $\lambda = 151^{\circ}$ E O = 18-40-5 Location approximate		Ottawa (7000) Strasbourg 1980 Victoria 4120 Algiers 2650 La Paz 13130 Sydney 4380
July 2 1092	Honolulu..... La Paz..... Sydney..... Melbourne.... Batavia.....	21-36-45 21-35-36 21-36-36 21-37-40 21-37-13	9280 17800 4170 4020 2230	$\varphi = 9^{\circ}$ S $\lambda = 125^{\circ}$ E O = 21-36-45 Location and O approximate		Strasbourg 2000 Georgetown (7600) Coimbra (6820) Naples 8740 Perth 2380
July 7 1093	Ottawa..... Strasbourg.... Victoria..... Hamburg..... Georgetown... DeBilt.....	(18-41-34) 18-41-28 18-41-23 (18-41-15) 18-41-28	(4160) 7580 1320 7130 (4960) 7130	$\varphi = 58^{\circ} 5$ N $\lambda = 135^{\circ} 15'$ W O = 18-41-25		Wien (6650) Coimbra 4960
July 7 1094	No Location					No data.
July 8 1095	No Location					No data.
July 11 1096	No Location..					No data.
July 16 1097	Ottawa..... La Paz..... Stonyhurst....	(17-15-9) 17-14-03	(3800) 3590 6220	$\varphi = 14^{\circ} 5$ N $\lambda = 58^{\circ}$ W O = 17-14ca. Location approximate		
July 26 1098	La Paz..... Georgetown	5-12-53 (5-12-38)	1800 (7980)	$\varphi = 33^{\circ}$ S $\lambda = 70^{\circ} 15'$ W O = 5-12-45	Press reports quake at Santiago, Chile	Coimbra 5040
Aug. 3 1099	Manila..... Batavia..... Zi-ka-wei.....	3-02-35 3-02-36 3-02-05	910 2280 2660	$\varphi = 7^{\circ}$ N $\lambda = 123^{\circ} 5$ E O = 3-02-25 Location doubtful	Manila reports quake in Central Mindanao	Strasbourg 4780 Hamburg 9400 Victoria (6300) La Paz 10300 Sydney 4850 Wien 9280 Coimbra (5550) Naples 5320

LOCATION OF EPICENTRES, 1920

Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Aug. 3 1100	Ottawa.....	19-57-20	8140	$\varphi = 27^{\circ}.5 S$ $\lambda = 65^{\circ} W$ $O = 19-57-13$		Strasbourg (5000) Tucson 6840 Toronto (12400) Victoria (3620) Marseilles 10050 Sydney 7860 Wien (4850) Berkeley (4020)
	La Paz.....	19-57-12	1240			
	Rio de Janeiro	19-56-57	2400			
	Cheltenham...	19-57-21	7300			
	Algiers.....	19-57-46	9650			
	Dyce.....	(19-56-10)	(11220)			
	Coimbra.....	19-57-34	9440			
	Harvard.....	19-57-15	7770			
Cartuja.....	19-57-25	9700				
Aug. 13 1101	Algiers.....	2-03-22	9150	$\varphi = 12^{\circ}.5 S$ $\lambda = 69^{\circ}.5 W$ $O = 2-03-14$		Strasbourg 2330 Hamburg (5380) Cartuja 3400
	La Paz.....	2-03-01	430			
	Uccle.....	2-02-53	9850			
	Coimbra.....	2-03-42	8520			
Aug. 15 1102	Osaka.....	8-16-17	6040	$\varphi = 11^{\circ} S$ $\lambda = 167^{\circ} E$ $O = 8-16-23$	Sydney gives, $\varphi = 1^{\circ} S$ $\lambda = 163^{\circ}.5 E$	Ottawa 10000 Dyce 6520 La Paz 10020 Marseilles 120 Tokio 2080 Manila 2820 Wien 7000 Coimbra 7660 Zi-ka-wei 7760 Cartuja 10650 Naples 5520 Besançon 1840
	Honolulu.....	8-16-44	5100			
	Tucson.....	8-16-38	9740			
	Sydney.....	8-15-39	2990			
	Melbourne....	8-16-6	3520			
Aug. 20 1103	Ottawa.....	(16-15-43)	(9140)	$\varphi = 37^{\circ}.5 S$ $\lambda = 76^{\circ}.5 W$ $O = 16-15-29$	La Paz gives, $\varphi = 38^{\circ} S$ $\lambda = 73^{\circ}.5 W$ Sentido, Chile	Strasbourg 9540 Hamburg 8820 Victoria 6860 Algiers 8020 Uccle (9380) Sydney 5880 Coimbra 12950 Stonyhurst 7960 Harvard... (9315) Melbourne 6450 Cartuja (10500) Naples 8800
	Cheltenham...	16-15-40	8540			
	Ithaca.....	16-15-06	8840			
	La Paz.....	16-15-27	2520			
	Berkeley.....		9600			
Aug. 21 1104	No Location					No data

LOCATION OF EPICENTRES, 1920

Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Aug. 26 1105	Ottawa.....	23-00-04	6200	$\varphi = 52^\circ \text{ N}$ $\lambda = 167^\circ.5 \text{ W}$ $O = 23-00-00$	DeBilt gives, "Near Fox Islands"	Honolulu 2590
	Strasbourg....	23-00-01	8840			Toronto 6780
	Cheltenham...	22-59-54	6880			Victoria 3170
	Hamburg.....	23-00-04	8250			Algiers (11500)
	Georgetown...	22-59-57	6780			Tokio 820
	Uccle.....	23-00-02	8540			
	DeBilt.....	23-00-10	8340			
	Barcelona.....	23-00-18	9320			
	Manila.....	(22-59-41)	(7960)			
	Wien.....	23-00-01	8850			
	Coimbra.....	22-59-58	9550			
	Harvard.....	(22-59-37)	(7240)			
	Zi-ka-wei.....	22-59-50	5960			
	Berkeley.....		3700			
	Cartuja.....	23-00-11	9780			
Naples.....	23-00-01	9400				
Aug. 29 1106	No Location					Sydney 2600
Sept. 4 1107	No Location					Ottawa (8780) Toronto 5100 La Paz 7250 Harvard 10600 Stonyhurst 5100 Coimbra 9200 Cartuja 9820 Athens 10560
Sept. 7 1108	Ottawa.....	5-55-44	6450	$\varphi = 44^\circ \text{ N}$ $\lambda = 10^\circ.5 \text{ E}$ $O = 5-55-46$	Uccle gives, $\varphi = 43^\circ.9 \text{ N}$ $\lambda = 10^\circ.5 \text{ E}$	Stonyhurst 1120
	Cartuja.....	5-55-32	1540			
	Hamburg.....	5-55-33	1170			
	Strasbourg....	5-55-52	480			
	Algiers.....	5-55-36	1100			
	Dyce.....	5-55-33	1770			
	La Paz.....	(5-55-34)	(10620)			
	Marseilles....	5-55-49	460			
	Uccle.....	5-55-40	900			
	Lemberg.....	5-55-43	1330			
	DeBilt.....	5-55-50	970			
	Jugenheim....		620			
	Göttingen....	5-55-55	730			
	Heidelberg....	5-55-45	580			
	Hohenheim....	5-55-42	500			
	Jena.....		752			
	Karlsruhe....	5-55-57	490			
	München.....	5-55-45	450			
	Taunus.....	5-55-49	640			
	Wien.....		670			
	Barcelona.....	5-55-30	840			
	Harvard.....	5-55-44	6215			
	Coimbra.....	5-55-46	1560			
Athens.....	5-56-05	1150				
Besançon.....	5-56-20	230				

LOCATION OF EPICENTRES, 1920

Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Sept. 8 1109	No Location				Osaka gives Tuscany	Ottawa (10000) Hamburg (11380) Osaka 8750 Algiers 3400 La Paz 9000 Tucson 9120 Honolulu 4450 Tokio 2140 Wien (11700) Harvard 10540 Zi-ka-wei 9780 Coimbra (11220) Lick 3900 Berkeley (3900)
Sept. 9 1110	No Location					Toronto (8680) Victoria 8600 Honolulu 5880 Sydney 3150 Harvard 13750 Zi-ka-wei 6980 Coimbra 7530 Berkeley (10400) Melbourne 3700
Sept. 18 1111	No Location					No data
Sept. 20 1112	Ottawa..... Strasbourg.... Toronto..... Georgetown... Besançon..... Osaka..... Honolulu..... Tokio..... Sydney..... Harvard..... Zi-ka-wei..... Manila..... Berkeley..... Lick..... Athens..... Melbourne....	14-45-12 14-46-08 14-44-51 14-44-27 14-45-57 14-38-52 14-39-0 14-38-15 14-38-54 (14-38-36) 14-37-36 14-38-28 14-39-20 14-39-20 14-39-05 14-38-5	9660 9440 9780 10550 9750 7100 6110 7680 2320 (13780) 8380 7020 9280 9300 18000 2980	$\varphi = 38^\circ \text{ N}$ $\lambda = 146^\circ \cdot 5 \text{ E}$ $O = 14-45-20$ $\varphi = 26^\circ \text{ S}$ $\lambda = 173^\circ \cdot 5 \text{ E}$ $O = 14-38-43$ $\varphi = 18^\circ \text{ S}$ $\lambda = 172^\circ \text{ E}$ $O = 2-33-38$ Location and O approximate only	Osaka gives, "Near Tongatabu Island" Sydney gives, $\varphi = 18^\circ \cdot 5 \text{ S}$ $\lambda = 167^\circ \text{ E}$	Denver 8800 Ithaca (11380) Dyce 11880 Victoria 2620 Marseilles 2440 La Paz 9550 Stonyhurst 12580 Tucson 9350 La Paz (13560)
Sept. 21 1113	Sydney..... Batavia.....	2-33-26 (2-33-49)	2700 (7120)	$\varphi = 18^\circ \text{ S}$ $\lambda = 172^\circ \text{ E}$ $O = 2-33-38$ Location and O approximate only	Sydney gives, $\varphi = 17^\circ \text{ S}$ $\lambda = 169^\circ \text{ E}$	La Paz (13560)

LOCATION OF EPICENTRES, 1920

Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Sept. 21 1114	Hamburg.....	17-42-16	8550	$\varphi = 45^\circ \text{ N}$ $\lambda = 153^\circ \cdot 5 \text{ E}$ $O = 17-42-17$		Honolulu 2510
	Strasbourg....	17-42-16	9060			
	Uccle.....	17-42-15	8950			
	DeBilt.....	17-42-23	8750			
	Tokio.....	17-42-46	1220			
	Wien.....	17-42-11	8920			
	Batavia.....	(17-42-10)	(7380)			
	Zi-ka-wei....	17-42-05	3050			
	Coimbra.....	17-42-16	9350			
Besançon.....	17-42-08	9400				
Sept. 24 1115	Ottawa.....	21-54-54	4340	$\varphi = 6^\circ \cdot 5 \text{ N}$ $\lambda = 82^\circ 30' \text{ W}$ $O = 21-55-03$		Coimbra 8750
	Ithaca.....	21-54-56	3950			
	Hamburg.....	(21-55-27)	(9280)			
	Strasbourg....	(21-55-13)	(9450)			
	Georgetown...	21-54-58	3560			
	Uccle.....	21-55-02	9320			
	Porto Rico....	21-54-45	2420			
	Tucson.....	21-54-46	4150			
	La Paz.....	21-54-51	2980			
	Harvard.....	21-55-21	3880			
Cartuja.....	21-55-17	8580				
Sept. 27 1116	No Location					Ottawa (4220) Victoria 1400
	No Location					No data
Sept. 28 1117	No Location					No data
Oct. 1 1118	No Location					La Paz 7020
Oct. 5 1119	No Location				Berkeley and Lick report quake felt at San Jose, Cal.	Lick 90
Oct. 7 1120	Ottawa.....	20 55-18	5700	$\varphi = 10^\circ \text{ S}$ $\lambda = 72^\circ \cdot 5 \text{ W}$ Location is rough approx- imation only. $O = 20-54 \cdot 3$		
	Ithaca.....	20-54-51	5650			
	Uccle.....	20-53-45	10140			
	Victoria.....	(20-54-41)	(8300)			
	Georgetown...	20-53-33	6300			
	La Paz.....	20-54-05	530			
	Wien.....	20-54-43	9800			
	Coimbra.....	20-54-41	8250			
	Cartuja.....	20-53-44	9380			
Oct. 8 1121	Ottawa.....	(16-50-28)	(3600)	$\varphi = 15^\circ \text{ N}$ $\lambda = 90^\circ 30' \text{ W}$ $O = 16-50-56$		
	Strasbourg....	16-51-01	9120			
	Uccle.....	16-50-51	9010			
	DeBilt.....	16-50-53	9020			
	Cheltenham...	16-51-26	2640			
	Tucson.....	16-51-36	2230			
	Georgetown...	16-50-36	3150			
	Spring Hill...	16-50-23	1550			
	La Paz.....	16-50-50	4300			
	Wien.....	16-51-17	9340			
	Hamburg.....	16-50-56	9160			

LOCATION OF EPICENTRES, 1920

Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Oct. 18 1122	Ottawa.....	8-11-49	8780	$\varphi = 47^\circ \text{ N}$ $\lambda = 150^\circ \text{ E}$ O = 8-11-52	Kurile Is.	Victoria 329C Toronto (678C)
	Halifax.....	8-11-52	9100			
	Ithaca.....	8-11-52	9000			
	Strasbourg....	8-11-48	8720			
	Uccle.....	8-11-45	8680			
	DeBilt.....	8-11-46	8540			
	Marseilles....	8-12-07	9100			
	Algiers.....	8-12-21	9250			
	Honolulu.....	8-11-5	5320			
	Tucson.....	8-11-47	8050			
	Cheltenham...	8-11-54	9280			
	Georgetown...	8-10-56	9100			
	Wien.....	8-11-47	8500			
	Dyce.....	8-11-57	8120			
	Batavia.....	8-11-50	6950			
	Manila.....	8-11-33	4150			
	Zi-ka-wei.....	8-12-00	2480			
	Göttingen....	8-11-46	8420			
	Hamburg.....	8-11-46	8250			
	Hohenheim...	8-11-48	8720			
	Durlach.....		8680			
	München.....	8-11-44	8720			
	Coimbra.....	8-12-15	9300			
Athens.....	8-11-51	9000				
Sydney.....	8-11-42	8650				
Tokio.....	8-13-25	510				
Barcelona.....	8-12-08	9160				
Besançon.....	8-11-47	8940				
Berkeley.....	(8-11-35)	(6960)				
Oct. 20 1123	Uccle.....	(10-02-29)	(9400)	$\varphi = 23^\circ \text{ N}$ $\lambda = 117^\circ \text{ E}$ O = 10-02-06		Manila 2070 Coimbra (8850) Cartuja 10600 Sydney 6200 Tokio 660
	DeBilt.....	(10-02-28)	(9470)			
	Honolulu.....	10-01-5	8680			
	Zi-ka-wei.....	10-01-57	930			
Oct. 22 1124	Ottawa.....	12-09-51	7390	$\varphi = 21^\circ \cdot 5 \text{ S}$ $\lambda = 70^\circ \cdot 5 \text{ W}$ O = 12-09-47		Algiers 8950 Honolulu 10180 Georgetown 7780 Wien 8250 Hamburg 9500 Uccle 9420 Sydney (7600) Berkeley 3860
	Ithaca.....	12-10-03	7050			
	Strasbourg....	(12-08 48)	(10740)			
	Tucson.....	12-09-58	7390			
	Cheltenham...	12-09-48	6750			
	La Paz.....	12-10-03	610			
	Coimbra.....	12-09-58	9100			
Oct. 24 1125	Honolulu.....	1-38-8	4780	$\varphi = 13^\circ \text{ S}$ $\lambda = 168^\circ \text{ E}$ Location is only rough approximation O = 1-38-5		
	Batavia.....	(1-38-28)	(6460)			
	Sydney.....	1-38-30	2420			

LOCATION OF EPICENTRES, 1920

Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Oct. 28 1126	Strasbourg..... DeBilt..... Zi-ka-wei..... Hamburg..... Uccle.....	7-23-49 (7-23-45) 7-23-44 7-23-51 (7-23-44)	8940 (8620) 5150 8380 (8750)	$\varphi = 50^{\circ}.5$ N $\lambda = 178^{\circ} 45'$ E O = 7-23-46		La Paz (15200)
Oct. 28 1127	Ottawa..... Ithaca..... Cheltenham... Tucson..... La Paz..... Coimbra..... Besançon.....	12-50-11 12-50-22 12-49-47 12-50-08 12-50-13 12-50-33 (12-49-53)	8080 7600 7760 7860 1320 9230 (11180)	$\varphi = 28^{\circ}$ S $\lambda = 72^{\circ}$ W O = 12-50-10	La Paz reports destructive quake at Vallenar, Chile $\varphi = 28^{\circ}.2$ S $\lambda = 70^{\circ}.5$ W	Georgetown 9100 Strasbourg 9150 Toronto 8560 Victoria (6300) Algiers 8900 Honolulu 9650 Wien (7380) Uccle 9550 Cartuja 8940 Athens (11980)
Nov. 4 1128	No Location				Location probably in West Indies	Ithaca 2440 La Paz 4220 Georgetown (2500)
Nov. 6 1129	No Location					La Paz 4750
Nov. 8 1130	No Location				Quake reported from Joliette, Quebec	
Nov. 12 1131	Strasbourg.... Algiers..... La Paz..... Wien..... DeBilt..... Hamburg..... Coimbra..... Cartuja..... Uccle..... Barcelona..... Besançon.....	5-41-53 5-41-43 5-41-53 5-41-52 5-41-55 5-42-11 5-41-46 5-42-04 5-41-53 5-4-45 5-41-48	6370 5200 4740 6900 6550 6750 4830 4780 6380 5480 6220	$\varphi = 4^{\circ}$ N $\lambda = 35^{\circ}$ W O = 5-41-53		Victoria (5200) Stonyhurst 2590
Nov. 16 1132	Ottawa..... Saskatoon... Ithaca..... Victoria..... Sitka..... Coimbra..... Uccle..... Cartuja..... Barcelona.....	8-30-54 8-30-00 (8-31-10) 8-30-53 (8-30-39) 8-31-03 8-30-47 8-31-03 8-31-03	3960 2510 (3960) 2690 (1830) 6640 5920 7200 (7400)	$\varphi = 72^{\circ}$ N $\lambda = 126^{\circ}.5$ W O = 8-30-55	An unusual epicentre: First location of an epicentre in Arctic Region which apparently is not seismic	La Paz (9000)

LOCATION OF EPICENTRES, 1920

Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Nov. 26 1133	Algiers.....	8-51-05	1520	$\varphi = 39^\circ \text{ N}$ $\lambda = 19^\circ.4 \text{ E}$ $O = 8-50-58$	DeBilt gives Albania	Strasbourg 2360 Besançon 2410
	Wien.....	8-50-52	1030			
	Dyoe.....	8-50-49	2590			
	Stonyhurst....	8-50-50	2360			
	DeBilt.....	8-51-10	1750			
	Hamburg.....	8-50-59	1680			
	Coimbra.....	8-51-01	2420			
	Cartuja.....	8-50-50	2220			
	Uccle.....	8-50-57	1720			
Athens.....	8-51-04	420		Uccle gives, $\varphi = 39^\circ.5 \text{ N}$ $\lambda = 19^\circ.4 \text{ E}$		
Nov. 28 1134	No Location				Quake felt in State of Washington	Victoria 260 Georgetown (4630)
Nov. 29 1135	Victoria.....	8-02-42	2320	$\varphi = 60^\circ.5 \text{ N}$ $\lambda = 152^\circ.5 \text{ W}$ $O = 8-02-54$		Ottawa 3740 Ithaca (3920) Toronto 3450 La Paz (9400)
	Algiers.....	(8-03-10)	(8720)			
	Georgetown...	8-02-53	5350			
	Hamburg.....	(8-02-51)	(7320)			
	Uccle.....	8-02-56	7480			
Dec. 5 1136	Wien.....	10-01-01	6400	$\varphi = 3^\circ.5 \text{ N}$ $\lambda = 25^\circ.5 \text{ W}$ $O = 10-01-12$		Coimbra 2980
	Algiers.....	10-01-15	4480			
	Strasbourg....	10-00-58	6050			
	La Paz.....	10-02-22	4910			
	Athens.....	(10-00-30)	(6350)			
	Uccle.....	(10-01.1)	(6050)			
	Cartuja.....	10-01-14	4340			
Dec. 7 1137	No Location					Sydney 2750
Dec. 10 1138	Ottawa.....	4-26-19	9020	$\varphi = 38^\circ \text{ S}$ $\lambda = 60^\circ.5 \text{ W}$ $O = 4-26-02$ Location approximate		Victoria 3620 Stonyhurst 5000 Porto Rico 4740 Sydney (5880) Melbourne 7720
	Georgetown...	(4-26-14)	(8480)			
	La Paz.....	4-25-42	2560			
	Coimbra.....	4-25-55	10200			
Dec. 11 1139	Honolulu.....	21-23.7	7020	$\varphi = 13^\circ \text{ N}$ $\lambda = 91^\circ.5 \text{ W}$ $O = 21-23\text{ca.}$ Location doubtful		Ottawa (2470) Georgetown (4830) Tucson (3750)
	La Paz.....	21-22-22	4200			
Dec. 13 1140	Honolulu.....	3-42.3	6110	$\varphi = 6^\circ.5 \text{ S}$ $\lambda = 153^\circ \text{ E}$ $O = 3-42-28$ Location approximate		Victoria 4700 La Paz 10620 Melbourne 2220
	Sydney.....	3-42-27	3030			
	Wellington....	3-42-38	4220			

LOCATION OF EPICENTRES, 1920

Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Dec. 16 1141	Saskatoon.....	12-05-56	9600	$\varphi = 38^\circ \text{ N}$ $\lambda = 108^\circ \text{ E}$ $O = 12-05-55$	Uccle gives, $\varphi = 38^\circ \text{ N}$ $\lambda = 110^\circ \text{ E}$ Zi-ka-wei gives Pinglang, centre of Provinces of Kansu and Shensi	Ottawa 9590
	Spring Hill....		(12000)			Toronto (9625)
	Dyce.....	12-06-03	7500			Victoria (9940)
	Wien.....	12-05-36	7220			Georgetown 4620
	Marseilles.....	12-06-07	8050			Berkeley 9500
	Honolulu.....	12-06-1	9150			La Paz 15900
	Sitka.....	(12-05-59)	(8200)			Balboa 6550
	DeBilt.....	12-05-56	7550			Tokio 1100
	Algiers.....	12-05-52	8650			Melbourne 3330
	Strasbourg....	12-05-52	7550			Wellington 9400
	Hamburg.....	12-05-50	7200			
	Zi-ka-wei.....	12-06-12	1420			
	Coimbra.....	12-05-53	9120			
	Cartuja.....	12-06-06	9020			
	Uccle.....	12-05-44	7780			
	Lemberg.....	12-05-7	6450			
	Manila.....	12-06-13	2580			
	Batavia.....	12-05-33	4820			
	Athens.....	12-05-38	7120			
	Sydney.....	12-06-00	9050			
Barcelona.....	12-05-59	8360				
Göttingen.....	12-06-02	7050				
Hohenheim....	12-05-44	7580				
München.....	12-05-57	7350				
Besançon.....	12-05-49	7880				
Apia.....	12-06-13	10050				
Dec. 17 1142	Georgetown...	18-59-56	8060	$\varphi = 33^\circ \text{ S}$ $\lambda = 68^\circ \cdot 5 \text{ W}$ $O = 18-59-55$	Press dispatch gives LaValle, Province of Mendoza, Argentine $\varphi = 33^\circ \text{ S}$ $\lambda = 68^\circ \cdot 6 \text{ W}$	Uccle (8200)
	La Paz.....	18-59-54	1850			
Dec. 25 1143	Wien.....	(11-33-09)	(7120)	$\varphi = 36^\circ \text{ N}$ $\lambda = 106^\circ \text{ E}$ $O = 11-33-15$	Sydney gives Kansu, China	Stonyhurst 2150
	Osaka.....	11-33-16	2650			La Paz 14680
	Algiers.....	11-33-19	8610			Barcelona (10100)
	Hamburg.....	11-33-13	7220			Besançon (4820)
	Zi-ka-wei.....	11-33-05	1760			
	Coimbra.....	11-33-20	9120			
	DeBilt.....	11-33-21	7530			
	Cartuja.....	11-33-13	9020			
	Uccle.....	11-33-21	7620			
	Manila.....	(11-33-57)	(2460)			
	Batavia.....	11-33-13	4700			
	Sydney.....	11-33-19	9160			
	Tokio.....	11-32-28	3150			

