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The Location of Epicentres, 1919

BY

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LOCATION OF EPICENTRES, 1919

This publication brings the work of the Dominion Observatory on the Location of Epicentres up to the end of the year 1919—over two years in arrears. It is expected that these will hereafter be ready for the press about one year in arrears. Unfortunately many stations whose records are required in the work, send out their seismic bulletins after a lapse of months and even years, which, of necessity, delays the publication of this series. The effects of the war are still noticeable in the late receipt of bulletins for previous years. This condition will probably disappear soon and the publication of the locations be earlier.

Every earthquake registered in some manner or other at Ottawa during the year has been included—all others excluded. The general scheme of reporting the data in the tables following is the same as that followed in former years. Column 1 contains the date and the Ottawa serial number of the earthquake. Column 2 lists the stations used in the location work. In column 3 appear their values for O as computed at Ottawa on the basis of the Klotz tables, using their given P and S values. Column 4 gives the value of Δ as computed at Ottawa. Column 5 contains the values of the geographic coördinates of the epicentre and the value of O . The given O is usually the average of the O 's given by the stations whose data are used in the work, but sometimes a very discordant O is omitted. Column 6 gives the locations as reported in the press or given in the seismic bulletins of the other stations. In column 7 are given the stations whose data were not used. The values for Δ as given by those stations appear in column 8.

It is to be noted that the serial numbers run from 958 to 1054, ninety-seven in all. But there is one serial number added at 985 and called 985A. The Ottawa seismograph was not recording on the day of this earthquake owing to repairs being made. The earthquake was thus omitted from the series but as bulletins of the other stations indicated a large quake, it has been included in our list. Two of the earthquakes, namely, Nos. 1024 and 1027 appear to be double, and separate locations are given for them. Thus in all there are 100 earthquakes included in the year's list.

Of these 100 quakes, 25 were located with considerable accuracy, 17 were approximately located, 10 had doubtful locations assigned to them, and 48 were not located at all, owing to lack of data or to conflicting data.

The publication for 1917-18 drew attention to the active earthquake region in the Atlantic off the northeast coast of South America. In 1919, further earthquakes occurred here, namely, No. 985 A, April 21, and No. 1013, July 8.

DOMINION OBSERVATORY, March 14, 1922.

LOCATION OF EPICENTRES, 1919.

Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Jan. 18 964	Manila.....	5-52-40	3190	$\varphi = 2^\circ \text{ S}$ $\lambda = 98^\circ \text{ E}$ $O = 5-52-42$		Sydney 4440
	Zi-ka-wei.....	5-52-35	4380			
	Ekaterinburg	5-52-51	7430			
Jan. 27 965	Zi-ka-wei.....	21-38-34	5310	$\varphi = 3^\circ \cdot 5 \text{ S}$ $\lambda = 86^\circ \cdot 5 \text{ E}$ $O = 21-38-22$ O and Δ are doubtful.		
	Ekaterinburg	21-38-09	7060			
Feb. 1 966	No Location					Victoria 615 Harvard (2357)
Feb. 2 967	Hamburg.....	20-03-06	2120	Epicentre in Turkey in Asia. $\varphi = 39^\circ \cdot 5 \text{ N}$ $\lambda = 30^\circ \cdot 5 \text{ E}$ $O = 20-03$ approximate only.		Coimbra 2610
	Uccle.....	20-02-53	2390			
	Paris.....	20-03-12	2470			
Feb. 15 968	No Location					Uccle (2220)
Feb. 16 969	No Location				Felt near Los Angeles.	Lick 310
Feb. 22 970	No Location					Manila 3170 Zi-ka-wei 3070 Bidston 4210
Mar. 2 971	Ottawa.....	3-27-11	9260	$\varphi = 42^\circ \cdot 2 \text{ S}$ $\lambda = 73^\circ \cdot 5 \text{ W}$ $O = 3-27$ Probably a second quake in Kurile deep	Press gives Chiloe I. Chile. La Paz gives $\varphi = 42^\circ \cdot 2 \text{ S}$ $\lambda = 73^\circ \cdot 5 \text{ W}$	Victoria 6290
	Harvard.....	3-26-59	9150			Honolulu 5660
	Ithaca.....	3-26-54	9230			Coimbra (9350)
	Georgetown ..	3-26-50	9040			Algiers (5400)
	Cheltenham...	3-27-08	9010			Uccle (8920)
	La Paz.....	3-26-47	2880			Barcelona (8280)
Mar. 2 972	No Location					Ottawa 9520 Harvard 9230 Georgetown 9160 La Paz 2910 Toronto (6680) Victoria 5730 Honolulu 6440 Coimbra 9100 Firenze 8800 Algiers 8160 Uccle (8640)

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Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Mar. 9 973	No Location				Sydney gives Chile. La Paz gives $\varphi = 42^{\circ} 30' S$ $\lambda = 73^{\circ} 30' W$ Chiloe Island	Ottawa 9380 Harvard 9230 La Paz 2960 Toronto 11920 Victoria 4720 Honolulu 6680 Coimbra 8680 Sydney (10200)
Mar. 16 974	Zi-ka-wei..... Manila..... Batavia.....	7-34-05 7-32-52 7-32-39	1940 1080 2960	$\varphi = 13^{\circ} N$ $\lambda = 128^{\circ} E$ O = 7-33-12 Location and O are only approx.	Manila reports quake felt in central and eastern Mindanao, also islands of Samar and Leyte.	Honolulu 8680 Osaka 3990
Mar. 17 975	No Location					No definite data
Mar. 21 976	Zi-ka-wei..... Perth..... Batavia..... Sydney.....	16-02-04 16-01-58 16-01-14 16-01-57	5240 4630 5500 2800	$\varphi = 7^{\circ} S$ $\lambda = 154^{\circ} 30' E$ O = 16-01-48 Location is approximate		Victoria 5190 Honolulu 1120 Bidston 5360
Mar. 22 977	No Location					No definite data
Mar. 25 978	No Location					No definite data
Mar. 26 979	No Location					La Paz 3150
April 2 980	Zi-ka-wei..... Osaka..... Batavia..... Sydney.....	0-34-57 0-34-51 300 0-35-00	4260 5530 300 5560	$\varphi = 4^{\circ} S$ $\lambda = 103^{\circ} 45' E$ O = 0-34-56 Location is approximate	Batavia gives Sumatra $\varphi = 5^{\circ} 35' S$ $\lambda = 103^{\circ} 56' E$	Melbourne 4340 Bidston 5320
April 16 981	No Location					La Paz 5520
April 17 982	Melbourne.... Perth..... Osaka..... Batavia..... Berkeley..... Sydney.....	11-21-54 11-22-04 11-22-03 11-22-17 11-22-12 11-22-00	3520 6110 8740 8120 9400 2860	$\varphi = 30^{\circ} S$ $\lambda = 178^{\circ} W$ O = 11-22-05		Ottawa (9760) Toronto (10600) Harvard (8050) Georgetown (9680) Victoria 7500 Zi-ka-wei 9080 Honolulu 4880 La Paz 9110 Dyce 6180 Manila 8560 Coimbra 8840 Algiers (8580) Uccle (8980) Bidston 11400

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Date	Station	O	Δ	Epicentre	Other Locations	Other Data
April 17 983	Ottawa.....	20-53-02	3590	$\varphi = 15^\circ \text{ N}$ $\lambda = 92^\circ 30' \text{ W}$ O = 20-52-59		Melbourne 3240
	Toronto.....	20-52-56	3810			
	Victoria.....	20-53-00	4530			
	Ithaca.....	20-52-19	3520			
	Harvard.....	20-53-13	3350			
	Georgetown..	20-52-52	3040			
	Spring Hill..	20-53-27	1750			
	Vieques.....	20-52-25	3240			
	Cheltenham..	20-52-51	3080			
	Tucson.....	20-52-40	2920			
	Honolulu....	20-53-19	7140			
	La Paz.....	20-52-50	4320			
	Coimbra.....	20-53-09	8400			
	Algiers.....	(20-53-24)	(9200)			
Berkeley.....	20-52-49	3920				
Uccle.....	(20-53-21)	(8860)				
April 18 984	Ottawa.....	21-01-02	3940	$\varphi = 18^\circ \text{ N}$ $\lambda = 105^\circ 30' \text{ W}$ O = 21-00-54		Victoria 1710 Ithaca 2890 Cheltenham 2880
	Harvard.....	21-01-00	4120			
	Tucson.....	21-01-11	1600			
	La Paz.....	21-01-10	5630			
	Berkeley.....	(21-00-21)	(2875)			
	Coimbra.....	(21-01-03)	(9400)			
	Georgetown..	21-00-34	3700			
April 19 985	No Location					Harvard 3100
April 21 985A	Ithaca.....	(11-25-53)	(5150)	$\varphi = 8^\circ \text{ N}$ $\lambda = 42^\circ \text{ W}$ O = 11-26-04		Vieques 2380 Barcelona 5510 Lemberg 7000
	Harvard.....	11-26-17	4700			
	Georgetown..	11-26-11	4920			
	La Paz.....	11-26-19	3900			
	Dyce.....	11-26-19	6340			
	Coimbra.....	11-26-03	4620			
	Algiers.....	11-26-00	5300			
	Uccle.....	11-25-47	6400			
	Zurich.....	11-25-50	6460			
	April 21 986	No Location				
April 22 987	Zi-ka-wei....	(2-43-46)	(4220)	$\varphi = 6^\circ \text{ S}$ $\lambda = 135^\circ \text{ E}$ O = 2-44 Location and O are approx.		Perth 324
	Manila.....	2-44-40	2650			
	Sydney.....	2-43-37	3500			
April 22 988	No Location					Bidston 2410

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Date	Station	O	Δ	Epicentre	Other Locations	Other Data
April 23 989	No Location					Sydney 3410
April 27 990	Zi-ka-wei Batavia Osaka Sydney	0-22-16 0-22-07 0-22-12	1970 2440 2530 5730	$\varphi = 12^\circ$ N $\lambda = 123^\circ$ E O = 0-22-12 Location is approximate	Manila gives "Tablas Island," Philippines	Harvard (7480) Firenze 9050
April 28 991	Georgetown . . La Paz	(6-45-52) 6-46-19	(2960) 3810	$\varphi = 13^\circ$ N $\lambda = 88^\circ$ W O = 6-46-06 Location is approximate	Press reports San Salvador	Harvard (4420)
April 30 992	Zi-ka-wei Melbourne Osaka Sydney Manila Berkeley	7-17-07 7-17-04 7-17-16 7-16-57 7-17-05 7-17-12	9100 4440 8120 3850 8300 8260	$\varphi = 20^\circ$ S $\lambda = 172^\circ \cdot 5$ W O = 7-17-07	Sydney gives $\varphi = 17^\circ$ S $\lambda = 176^\circ$ W Osaka gives "Near Tongatabu Is"	Ottawa (12600) Toronto 8680 Victoria (6890) Ithaca 9980 Harvard 10390 Georgetown 10050 Vieques 9650 Cheltenham 6620 Sitka 10320 Honolulu 4660 La Paz 9520 Denver 4780 Apia 550 Batavia 9180 Coimbra 12570 Lick 8860
May 1 993	La Paz Hamburg Coimbra Uccle Paris	(5-05-54) 5-05-37 5-05-24 (5-05-46) 5-05-29	(11150) 7500 7320 (7340) 7500	$\varphi = 9^\circ$ S $\lambda = 38^\circ \cdot 5$ E O = 5-05-38 Location is doubtful		Harvard (7280) Batavia 8100 Bidston 8940
May 2 994	Honolulu Osaka Batavia	2-06-37 2-06-56 2-05-56	5100 8520 9660	$\varphi = 22^\circ$ S $\lambda = 170^\circ$ W O = 2-06-5 Location and O are approx.	Press reports quakes in San Salvador and also in Redding, California	Harvard (10700) Melbourne 1940
May 2 995	No Location					No data

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May 3 996	Ottawa.....	0-52-10	9460	$\varphi = 40^\circ \text{ N}$ $\lambda = 144^\circ 30' \text{ E}$ O = 0-52-05	Osaka gives, "Off NE. coast main island of Japan" Paris gives $\varphi = 40^\circ \text{ N}$ $\lambda = 138^\circ \text{ E}$	Victoria 7530
	Toronto.....	0-52-39	9520			Ithaca 8720
	Harvard.....	(0-51-33)	(10525)			Vieques 8550
	Georgetown..	0-51-46	10340			La Paz 15300
	Cheltenham..	0-52-09	10050			Firenze 8800
	Sitka.....	0-51-53	5740			Barcelona 9490
	Osaka.....		1320			Algiers (9820)
	Dyce.....	0-52-15	8720			
	Manila.....	0-51-56	3550			
	Batavia.....	0-51-56	6580			
	Hamburg.....	0-52-05	8730			
	Coimbra.....	0-51-29	10500			
	Lemberg.....	0-52-12	8420			
	Zi-ka-wei....	0-52-02	2360			
	Berkeley.....	0-52-02	7530			
	Uccle.....	0-52-10	9060			
	Paris.....	0-52-15	9250			
	Zurich.....	0-52-07	9280			
	Bidston.....	0-52-55	8850			
May 6 997	Ottawa.....	19-48-19	9700	Data very discordant but an epicentre is indicated in the region of the Kurile deep. O = 19-48ca probably.		Vieques 1600
	Toronto.....	19-48-45	9520		Osaka 5080	
	Victoria.....	19-46-31	6860		La Paz 14100	
	Harvard.....	19-47-15	10640		Perth 7250	
	Georgetown..	19-46-56	11080		Hamburg (12000)	
	Honolulu.....	19-41-47	4780		Algiers (8220)	
	Coimbra.....	19-47-38	10350		Wien (12000)	
	Dyce.....	19-51-37	7850		Berkeley 10980	
Batavia.....	19-35-49	6220	Bidston 11600			
May 7 998	Honolulu.....	(5-24-23)	4340	Epicentre in Kurile deep O = 5-22.5 approximately. Data very discordant		Victoria 4690
	Ottawa.....	5-21-58	9020		Osaka 6820	
	Batavia.....		5800			
	Coimbra.....	5-22-40	11270			
	Bidston.....	5-22-58	10060			
May 8 999	No Location					Honolulu 2290 Melbourne (3700)
	No Location					No data
May 8 1000	No Location					No data
	No Location				Felt at Arequipa, Peru	Ottawa 3980 Victoria 550 Harvard 2805 La Paz 380
May 22 1002	Ottawa.....	11-52-48	6760	$\varphi = 48^\circ \text{ N}$ $\lambda = 175^\circ \text{ W}$ O = 11-52-25		
	Harvard.....	11-52-00	7790			
	Wien.....	11-52-05	(9620)			
	Georgetown..	(11-52-35)	(7280)			
	Uccle.....	(11-52-40)	(8680)			

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Date	Station	O	Δ	Epicentre	Other Locations	Other Data
May 23 1003	No Location					La Paz 1490 Coimbra 9280 Bidston 6420
May 29 1004	No Location					Manila 3500 Lemberg (1100) Zi-ka-wei 1990
June 29 1005	No Location					No data
June 29 1006	Ottawa..... Hamburg..... Coimbra..... Barcelona... Algiers..... Wien..... Lemberg..... Uccle..... Paris..... Marseilles...	15-06-05 15-06-23 15-05-58 (15-05-51) 15-06-12 (15-06-35) (15-06-38) (15-06-22) 15-06-18 15-06-07	6600 1020 1750 (950) 1080 (440) (940) (850) 830 550	$\varphi = 45^\circ \text{ N}$ $\lambda = 12^\circ 45' \text{ E}$ O = 15-06-15	Press reports quake in Tuscany	Budapest 2400 Bidston 1070
June 29 1007	Ottawa..... Cheltenham .. Vieques..... Victoria..... Ithaca..... Coimbra	23-14-14 23-14-21 23-14-05 23-14-15 23-13-49 23-14-12	3590 2960 2640 4650 3280 8160	$\varphi = 15^\circ \cdot 5 \text{ N}$ $\lambda = 90^\circ 45' \text{ W}$ O = 23-14-09		Tucson 3150 Honolulu 3600 Toronto (2830) La Paz 3620 Hamburg 8510 Algiers 8320 Wien 9230 Uccle (8440) Paris 8320 Bidston 5200
June 30 1008	No Location					Batavia 8000 La Paz (12000) Coimbra 8130
July 1 1009	No Location					No data
July 2 1010	No Location					No data
July 6 1011	Ottawa..... Ithaca..... Cheltenham .. Tucson..... La Paz..... Hamburg..... Uccle.....	7-04-17 7-04-36 7-04-15 7-04-06 7-04-25 7-04-41 (7-04-26)	3460 3440 3030 2580 4340 9080 (9050)	$\varphi = 15^\circ \cdot 5 \text{ N}$ $\lambda = 91^\circ \cdot 5 \text{ W}$ O = 7-04-24		Toronto (2900) Victoria (1940) Honolulu 6680 Georgetown 3550 Algiers (9780)
July 7 1012	No Location					Honolulu 4340 Melbourne 2660

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Date	Station	O	Δ	Epicentre	Other Locations	Other Data
July 8 1013	Hamburg..... Barcelona..... Algiers.....	21-06-09 21-06-11 21-06-10	7230 6220 5740	$\varphi = 8^\circ \text{ N}$ $\lambda = 48^\circ \cdot 5 \text{ W}$ O = 21-06-10 Location and O are doubtful		Ottawa (8080) Melbourne 1680 La Paz 9460 Georgetown (7400) Coimbra 6750 Batavia 8260 Wien 6760 Lemberg 6900 Bidston 7700
July 9 1014	Tucson..... Georgetown ..	19-18-13 19-18-51	2440 3880	$\varphi = 12^\circ \text{ N}$ $\lambda = 101^\circ \cdot 5 \text{ W}$ O = 19-18-32 Location and O are only approx.		Victoria (1410) La Paz 6040
July 10 1015	No Location					No data
July 11 1016	La Paz..... Georgetown... Hamburg.....	0-30-38 (0-30-26) (0-30-38)	2640 (3420) (8880)	$\varphi = 7^\circ \cdot 5 \text{ N}$ $\lambda = 68^\circ \text{ W}$ O = (0-30-34)		Vieques 610 Bidston 6400
July 12 1017	Hamburg..... Coimbra..... Uccle.....	22-27-56 22-28-13 22-28-06	2920 2690 2630	$\varphi = 55^\circ \cdot 5 \text{ N}$ $\lambda = 35^\circ \cdot 5 \text{ W}$ O = 22-28-05 Location is doubtful.		
July 14 1018	Osaka..... Zi-ka-wei..... Uccle.....	13-44-48 13-44-58	3390 5180 8800	$\varphi = 50^\circ \text{ N}$ $\lambda = 178^\circ \cdot 5 \text{ E}$ O = 13-44-53 Location and O are approx.		Bidston 2510
July 17 1019	No Location					Osaka 2470 Zi-ka-wei 680 Bidston (11580)
July 17 1020	Ottawa..... Ithaca..... La Paz..... Georgetown ..	16-19-32 16-19-28 16-19-50 16-19-32	4020 3650 3900 3330	$\varphi = 11^\circ \cdot 5 \text{ N}$ $\lambda = 89^\circ 30' \text{ W}$ O = 16-19-35		Toronto 5780
July 22 1021	Ottawa..... Ithaca..... Cheltenham .. La Paz..... Georgetown .. Uccle.....	22-01-25 22-01-42 22-01-34 22-01-24 22-01-25 22-01-35	3500 3190 2900 3500 2900 8680	$\varphi = 12^\circ \text{ N}$ $\lambda = 81^\circ \text{ W}$ O = 22-01-31 Location is doubtful	Press reports quake near St. Marc, Haiti. Island appeared in Fonseca Bay	Toronto 4120 Hamburg 8280 Bidston 2480

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Date	Station	O	Δ	Epicentre	Other Locations	Other Data
July 24 1022	Ottawa.....	(2-04-01)	(9480)	$\varphi = 44^\circ \text{ N}$		Manila 6640
	Hamburg.....	2-03-21	5050	$\lambda = 79^\circ \text{ E}$		Coimbra 5400
	Barcelona....	2-03-22	6050	O = 2-03-30		Osaka 7300
	Zi-ka-wei....	2-03-30	4010	Location is		Lemberg (5620)
	Uccle.....	2-03-17	5550	doubtful		Firenze 6550 Budapest 7600
July 31 1023	No Location					No data
Aug. 18 1024	Honolulu.....	16-56-23	4010	$\varphi = 51^\circ \text{ N}$		Berkeley 8100
	Osaka.....		4140	$\lambda = 176^\circ \cdot 5 \text{ W}$		
	Batavia.....	16-55-33	7660	O = 16-55-8		
	Zi-ka-wei....	16-55-31	8000	Location and O are doubtful.	Appears to be two quakes	
	La Paz.....	17-05-49	4040	A rough approximation in both cases.		
	Hamburg.....	17-02-44	8500	$\varphi = 17^\circ \cdot 5 \text{ N}$		Ithaca 3850
	Wien.....	(17-02-35)	(8800)	$\lambda = 78^\circ \cdot 5 \text{ W}$		Coimbra 7140
	Lemberg.....	17-02-40	8440	O = 17-03 ca.		Barcelona (8900)
Uccle.....	17-02-49	8600	Location and O are doubtful.			
Aug. 24 1025	No Location					No data
Aug. 27 1026	No Location					Honolulu 6220 La Paz 17000 Victoria 2770 Osaka 2090
Aug. 29 1027	Honolulu.....	5-53-04	3700	$\varphi = 52^\circ \cdot 5 \text{ N}$		
	Victoria.....	5-53-58	4660	$\lambda = 175^\circ \cdot 5 \text{ E}$		
	Coimbra.....	(5-53-42)	(9200)	O = 5-54 ca.		
	Wien.....	(5-51-05)	(8080)	Location and O are doubtful	Appears to be two quakes	
	Bidston.....	5-57-00	7660			
	Perth.....	5-45-04	2640	$\varphi = 1^\circ \cdot 5 \text{ S}$		
	La Paz.....		18000	$\lambda = 127^\circ \text{ E}$		
	Osaka.....	5-43-44	4260	O = 5-44 ca.		
Batavia.....	5-43-39	2480	Location and O are doubtful			
Zi-ka-wei....	5-44-00	3600				
Aug. 31 1028	Tucson.....	17-20-56	10050	$\varphi = 15^\circ \text{ S}$		Ottawa (8540)
	Melbourne....	17-20-59	3240	$\lambda = 167^\circ \text{ E}$		Cheltenham 8400
	Osaka.....	17-20-46	6300	O = 17-20-52		Georgetown 9560
	Zi-ka-wei....	17-20-48	6860			Victoria 4120
						La Paz 10070 Coimbra (3270) Manila 2890 Wien (2110) Lemberg 1770 Firenze 9500 Barcelona (5320) Berkeley 10340

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Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Sept. 1 1029	No Location					La Paz 6400
Sept. 6 1030	Ithaca..... Cheltenham .. Georgetown .. Hamburg..... Coimbra..... Uccle.....	9-30-18 9-29-41 9-29-36 9-29-53 (9-28-47) 9-29-44	2680 2470 2500 7250 (5750) 6900	$\varphi = 19^\circ \text{ N}$ $\lambda = 64^\circ \cdot 5 \text{ W}$ O = 9-29-40		La Paz 6470
Sept. 13 1031	Ottawa..... Ithaca..... Georgetown .. La Paz..... Uccle.....	(12-19-18) (12-20-16) (12-19-14) 12-18-58 12-20-03	(6900) (6480) (6220) 824 9560	$\varphi = 15^\circ \text{ S}$ $\lambda = 60^\circ \cdot 5 \text{ W}$ O = 12-19-5		Victoria 7420 Hamburg 9020 Coimbra 9350 Barcelona (8180)
Sept. 15 1032	No Location					Georgetown (9450) Victoria 540 La Paz 8030 Uccle (9400)
Sept. 19 1033	No Location					La Paz 8690
Sept. 26 1034	Hamburg..... Osaka..... Wien..... Zi-ka-wei.....	9-07-05 (9-06-59) 9-06-40	9440 2350 (9450) 1640	$\varphi = 19^\circ \text{ N}$ $\lambda = 120^\circ \text{ E}$ O = 9-07 ca. Location is approximate	Manila reports quake felt at NW. Luzon	Uccle (7480) Bidston 6400
Sept. 26 1035	Melbourne.... Osaka..... Perth..... Batavia.....	19-39-15 19-39-07 19-39-19	5550 3420 4400 2500	$\varphi = 6^\circ \text{ N}$ $\lambda = 125^\circ \text{ E}$ O = 19-39-14	Manila reports quake felt in Mindanao	Zi-ka-wei 3600 Coimbra (9980)
Sept. 27 1036	Ottawa..... La Paz.....	(3-34-32) 3-34-02	(4080) 2960	$\varphi = 9^\circ \text{ N}$ $\lambda = 77^\circ \text{ W}$ O = 3-34-17 Location and O are approx.		
Oct. 1 1037	No Location					No data
Oct. 3 1038	No Location					Coimbra 6820 Bidston 4210
Oct. 8 1039	Honolulu..... Perth..... Zi-ka-wei..... Manila.....	4-40-08 4-40-20 4-40-38 4-40-36	6680 4320 4250 3040	$\varphi = 3^\circ \text{ S}$ $\lambda = 144^\circ \cdot 5 \text{ E}$ O = 4-40-25		Melbourne 2750
Oct. 10 1040	No Location					Ottawa 2560 La Paz 10100 Bidston 2410

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Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Oct. 12 1041	Osaka..... Batavia..... Zi-ka-wei..... Budapest.....	21-48-17 21-48-25 21-48-17 21-48-23	5580 620 4340 9820	$\varphi = 4^\circ \text{ S}$ $\lambda = 101^\circ 5 \text{ E}$ O = 21-48-20		Georgetown (1970) Coimbra 9250 Melbourne 5320 Hamburg 9450 Perth 2840 Wien (8800) Manila 2340 Uccle (4780) Bidston 6480
Oct. 14 1042	No Location					No data
Oct. 21 1043	No Location					Bidston 3150
Oct. 27 1044	No Location				Stations badly situated for triangulation purposes	Ottawa 6560 Ithaca 6340 Toronto (6680) Osaka 360 Bidston 11450
Oct. 28 1045	No Location					No data
Nov. 6 1046	La Paz..... Coimbra..... Georgetown.. Uccle.....	7-13-10 7-13-11 7-12-11 7-13-11	3400 5320 4060 6840	$\varphi = 10^\circ \text{ N}$ $\lambda = 52^\circ \text{ W}$ O = 7-13-11		Porto Rico 760
Nov. 18 1047	No Location					Victoria 6860 Melbourne 3070 Osaka 3060 Manila 1960 Zi-ka-wei 4700 Batavia 2700 Bidston 8840
Nov. 18 1048	Strasbourg... Marseilles... Dyce..... Hamburg..... Algiers..... Wien..... Lemberg..... Firenze..... Batavia..... Barcelona... Uccle..... Budapest.... Zurich.....	21-54-31 21-54-46 (21-54-48) 21-55-03 21-54-36 (21-55-08) 21-54-48 21-55-09 (21-54-20) 21-54-36 21-54-36 21-55-00 21-54-31	1980 1932 (2770) 1930 2200 (1150) 1250 1320 (9380) 2150 2230 1000 1860	$\varphi = 40^\circ \text{ N}$ $\lambda = 27^\circ 30 \text{ E}$ O = 21-54-46		Victoria (3170) La Paz 11860 Bidston 2400

LOCATION OF EPICENTRES, 1919

Date	Station	O	Δ	Epicentre	Other Locations	Other Data
Nov. 20 1049	No Location					Honolulu 5880 Victoria 2160 Coimbra (11460) Osaka 3660 La Paz 10070 Algiers (2450) Firenze 1420 Manila 2980 Zi-ka-wei 7750 Batavia 6340 Bidston 4080
Nov. 23 1050	No Location					Honolulu 4340 Victoria (5200) Perth 4040 Bidston 3270
Nov. 28 1051	Strasbourg.... Dyce..... Hamburg..... Uccle.....	(14-08-29) (14-08-10) 14-08-06 14-08-14	(2830) (2030) 2800 2540	Exact location impossible, probably in vicinity of Iceland		Coimbra 3880 Bidston 3200
Dec. 5 1052	Georgetown... Porto Rico ... La Paz.....	0-15-34 0-16-24 0-15-30	2920 2200 3760	$\phi = 13^\circ \text{ N}$ $\lambda = 85^\circ \text{ W}$ O = 0-15-49 Location and O are approx.		Ottawa (4400) Spring Hill (640) Victoria 2890
Dec. 14 1053	No Location					Honolulu 5890 Victoria 5740 La Paz (10400) Batavia 8480 Bidston 6460
Dec. 20 1054	Osaka..... Zi-ka-wei.... Batavia..... Manila..... Uccle.....	20-37-56 20-37-13 20-37-31 20-37-37	1920 790 3540 970 9750	$\phi = 23^\circ.5 \text{ N}$ $\lambda = 120^\circ \text{ E}$ O = 20-37-34		Coimbra 9660 Melbourne 5000 Toronto (9280) Victoria 3670 Wien (11080) Bidston 10100 La Paz 7890

