FLORISSANT

SEISMOGRAPHIC STATION, ST. LOUIS UNIVERSITY, ST. LOUIS, MO., U. S. A.

Three Galitzin-Wilip, two Wood-Anderson short-period seismographs, Shortt synchronome clock

Bulletin for
January and February, 1938

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
	1	Clock not in operation			
1	2	G-W G-W	iP_{NZ} iS_N iS_Z F	$22^h32^m28^s$ 22 36 33 22 36 34 24 00 ±	Time doubtful Ø = 16°.7 N λ = 98°.3 W. H = $22^h27^m17^s$ Depth normal or near normal.
2	11	G-W G-W G-W G-W G-W	$eP?_Z$ i_N $iS?_N$ iZ eL_Z F	$15^h25^m47^s$ 15 36 14 15 38 17 15 38 31 16 01.5 17 14 ±	
		Clock not in operation January 22 to February 2.			
3	Feb. 4	G-W G-W G-W	e_Z eZ eL_Z F	$10^h33^m33^s$ 10 38 56 10 45.4 10 51 ±	Time uncertain
4	5	G-W G-W G-W G-W	iP_Z ipP_Z $i(S)_Z$ isS_Z F	$2^h30^m37^s$ 2 31 07 2 36 10 2 37 00 6 00 ±	Ø = 5°.1 N. λ = 75°.7 W. H = $2^h23^m38^s$ h = about 130 Km. by Brunner Depth Chart. Destructive in Colombia South America.
5	8	G-W G-W G-W	$(e)_Z$ $e(S)_Z$ e_N F	$5^h39^m09^s$ 5 45 06 5 47 35 Lost in following earthquake.	Time uncertain
6	8	G-W G-W G-W	e_Z eZ e_Z F	7 22 54 7 24 15 7 32 39 9 38 ±	Time uncertain

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
7	13	G-W	$(e)_N$	$8^h29^m27^s$	Time uncertain
		G-W	$e(S)_N$	8 30 15	
		G-W	$e(S)_Z$	8 31 49	
		G-W	eL_{NZ}	8 55.3	
		G-W	eM_N	8 59.7	
		G-W	eM_Z	9 00.3	
		G-W	F	10 52 ±	
8	14	G-W	$e(P)_Z$	$15^h07^m21^s$	Time uncertain
		G-W	iZ	15 07 25	
		G-W	$e(S)_N$	15 17 57	
		G-W	eL_Z	15 41.6	
		G-W	eL_N	15 42.6	
		G-W	eM_Z	15 46.6	
		G-W	eM_N	15 46.8	
			F	16 25 ±	

Minor Seismic Activity: Jan. 3, 22h04m to 23h11m; Jan. 7, 16h02m to 18h02m; Jan. 13, 23h00m to 23h30m; Jan. 18, 06h03m to 06h39m; Jan 22, 3h53m to 4h07m. Feb. 1, 23h00m to Feb. 2, 9h30m; Feb. 2, 16h00m to 21h43m; Feb. 4, 0h51m to 1h14m; 8h52m to 11h30m 17h23m to 24h00m; Feb. 6, 8h03m to 8h34m; Feb. 6-7, 14h00m to 3h30m; Feb. 8, 14h27m to 15h49m; Feb. 8-9, 21h10m to 5h43m; Feb. 9, 15h32m to 18h34m; Feb. 10, 21h09m to 21h42m; Feb. 11, 2h06m to 2h43m; 7h39m to 8h05m; Feb. 13-14 15h48m to 1h25m; Feb. 16, 19h00m to Feb. 17, 17h00m; Feb. 19-20, 18h00m to 12h55m; Feb. 21, 0h57m to 2h17m; Feb. 22, 7h50m to 8h26m; 22h00m to 23h 11m; Feb. 23, 5h06m to 17h48m; Feb. 23-24, 23h37m to 9h32m; Feb. 24-25, 18h10m to 18h59m; Feb. 25-26, 18h21m to 18h48m; Feb. 26-27, 18h00m to 23h00m.

* * * * * * * *

J. B. Macelwane, S.J.
Director

F. Robertson
Graduate Fellow

FLORISSANT

SEISMOGRAPHIC STATION, ST. LOUIS UNIVERSITY, ST. LOUIS, MO., U. S. A.

Three Galitzin-Wilip, two Wood-Anderson short-period seismographs, Shortt synchronome clock

Bulletin for March, 1938

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
9	2	W-A	iP_N	$22^h04^m51^s$	Blast?
		W-A	iNE	22 04 53	
		W-A	iS_N	22 04 56	
		W-A	iS_E	22 04 58	
			F	22 07 ±	
10	4	W-A	i_{NE}	$2^h34^m54^s$	Not on Galitzin-Wilip
			F	Lost in microseisms	
11	7	G-W	$(e)_Z$	$5^h53^m39^s$	
		G-W	e_Z	5 54 53	
		G-W	e_Z	6 04 09	
		G-W	F	7 39 ±	
12	22	G-W	eP_Z	$15^h28^m47^s$	Time doubtful
		G-W	eS_Z	15 34 10	$\phi = 52.^\circ2$ N, $\lambda = 133.^\circ1$ W.
			F	20 02 ±	$H = 15^h22^m08^s$
					$\Delta S-P = 32.^\circ7$
13	22	G-W W-A	eP_NZ	$22^h34^m12^s$	Time doubtful
		G-W W-A	e_E	22 44.0	
			F	24 02 ±	
14	23	W-A	eP_N	$6^h44^m24^s$	
		W-A	e_N	6 44 39	
			F	Lost in microseisms	
15	25	G-W	eP_N	$8^h27^m46^s$	$\phi = 17.^\circ0$ N, $\lambda = 85.^\circ5$ W.
		G-W	iS_Z	8 31 48	$H = 8^h22^m50^s$
			F Lost	in microseisms	$\Delta S-P = 22.^\circ1$
16	31	W-A	eP_N	$10^h12^m20^s$	Near earthquake. New
		W-A	$e(S)_N$	10 13 15	Madrid region?
		W-A	i_E	10 13 35	Time doubtful
			F	10 20 ±	

Minor Seismic Activity: Mar. 4, 10h23m to 14h31m; 16h38m to Mar.5,16h38m Mar.6-7, 14h38m to 00h22m; Mar. 9, 2h23m to 4h33m;5h23m to 6h00m; 16h04m to 20h05m; Mar. 10, 13h27m to 18h07m;Mar. 11, 2h20m to 2h26 Mar. 13, 18h27m to 18h44m; Mar. 14, 1h52m to 2h30m;6h14m to 7h00m Mar. 16, 12h34m to Mar. 17, 11h36m;Mar. 18, 4h40m to 21h55m;Mar.21 2h00m to 3h00m; Mar. 21-23, 15h30m to 22h00m;Mar. 24-25, 14h30m to 14h00m; Mar. 25, 15h13m to 19h21m;Mar. 26, 6h03m to 10h07m; Mar.27 3h09m to 3h50m; 11h48m to 12h25m; Mar. 28, 14h00m to Mar. 29, 23h 15m; Mar. 30, 8h56m to 16h00m; 23h00m to Mar. 31,1h10m;4h30m-24h0

J. B. Macelwane, S.J.
Director

F. Robertson
Graduate Fellow

FLORISSANT

SEISMOGRAPHIC STATION, ST. LOUIS UNIVERSITY, ST. LOUIS, MO., U. S. A.

Three Galitzin-Wilip, two Wood-Anderson short-period seismographs, Shortt synchronome clock

Bulletin for April and May 1938

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
17	Apr 4	W-A W-A W-A	(e)P_{NE} eP_{NE} eS_N e$_E$ F	$21^h27^m41^s$ 21 27 42 21 30 03 21 30 23 21 53 ±	Not on G-W
18	Apr 5	G-W W-A G-W W-A	(e)Z eP_{NE} eN eS_E F	$11^h15^m31^s$ 11 15 45 11 22 03 11 22 05 11 35 ±	
19	Apr 10	W-A	eP_{NE} F	$19^h35^m03^s$ (Lost in microseisms)	
20	Apr 12	W-A G-W G-W G-W W-A	eP_{NE} iZ iS_N e$_E$ F	$11^h07^m52^s$ 11 07 56 11 11 51 11 12 15 12 06 ±	
21	Apr 13	W-A G-W W-A G-W	eP_N iP_{NZ} eS_N iS_N F	$2^h57^m09^s$ 2 57 11 3 06 30 3 06 31 3 30 ±	H = $2^h45^m54^s$ Epicenter: $\emptyset$ = 39°.4 N, λ = 15°.0 E. Depth by the Brunner Depth Chart about 300 Km. Δ_{P-H} = 77°.1
22	Apr 14	W-A G-W W-A G-W	eP_{EZ} eS_E i$_N$ F	$1^h35^m03^s$ 1 41 41 1 46 12 (Lost in microseisms)	
23	Apr 16	G-W W-A W-A G-W	(e)Z (e)N eP_E eN F	$20^h21.6$ 20 21 26 20 22 28 20 26 53 (Lost in microseisms)	

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
24	Apr 17	W-A G-W G-W W-A G-W	i(P)$_{EZ}$ i$_N$ e(S)$_E$ i$_N$ F	$14^h50^m14^s$ 14 50 15 14 58 10 14 58 11 (Lost in microseisms)	H = $14^h39^m42^s$ Ø = 18°.5 S, λ = 69°.0 W. Depth by Brunner Depth Chart 50+ Km.
25	Apr 19	W-A G-W G-W W-A	(e)$_{NE}$ iP$_{NZ}$ iS$_N$ eS$_N$ F	$11^h12^m08^s$ 11 12 09 11 22 37 11 22 44 (Lost in changing records)	Destructive in central part of Turkey. Ø = 39°.0 N, λ = 33°.1 E. H = $10^h59^m23^s$
26	Apr 20	G-W W-A W-A W-A	eP$_N$ e$_E$ e(S)$_E$ e$_N$ F	$6^h46^m03^s$ 6 46 15 6 52 32 6 53 18 9 27 ±	
27	Apr 22	W-A W-A G-W G-W	(e)$_E$ e(P)$_N$ i$_Z$ i(S)$_N$ F	$4^h20^m49^s$ 4 20 50 4 20 51 4 25 49 6 07 ±	
		No records from April 24 to May 11			
28	May 11	G-W G-W	iP$_E$ iS$_E$ F	$14^h50^m46^s$ 14 55 00 15 19 ±	H = $14^h44^m45^s$ Ø = 16°.8 N, λ = 100°.7 W. Depth Normal. Δ$_{S-P}$ = 23°.4 Δ$_{meas}$ = 23°.6
29	May 12	G-W G-W	(e)PR$_1$Z iPR$_2$Z F	$15^h58^m10^s$ 16 00 34 16 46 ±	Epicenter region of 5°.0 S, 147°.5 E. H = $15^h39^m02^s$ Depth Normal. Δ$_{meas}$ = 111°.2
		No records from May 16 to May 21			

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
30	May 23	G–W G–W G–W	iPZ i(pP)Z i(SKS)Z F	$7^h31^m30^s$ 7 31 46 7 42 29 (Lost in changing records)	ϕ = 36°.9 N, λ = 141°.1 E. h = about 100Km by Brunner Depth Chart. H = $7^h18^m43^s$ Δ_{meas} = 90°.8 Felt throughout main island of Japan.
31	May 28	G–W G–W G–W	eP_N e(S)N iN F	$10^h19^m47^s$ 10 24 24 10 24 30 12 00 ±	ϕ = 43°.3 N, λ = 125°.0 W. H = $10^h14^m06^s$ Depth probably normal. Felt in Marshfield, Oregon. Δ_{meas} = 26°.5 Δ_{P-H} = 26°.5
32	May 28	G–W G–W	iN eN F	$17^h04^m56^s$ 17 20 36 22 ±	Time doubtful.
33	May 30	G–W G–W G–W	eE eE e_{NE} F	$14^h44^m36^s$ 14 49 04 14 58 30 (Lost in changing records)	Time doubtful. ϕ = 20°.4 S, λ = 169°.4 E. H = $14^h29^m48^s$ Depth Normal? Δ_{meas} = 94°.5

Minor Seismic Activity for April: Apr. 1, 15h00m to Apr. 3, 00h23m; Apr. 3, 12h11m to Apr. 4, 01h58m; Apr. 5, 14h30m to Apr. 6, 13h30m; Apr. 6, 17h00m to Apr. 7, 12h30m; Apr. 7, 15h00m to Apr. 9, 12h30m; Apr. 10, 15h44m to Apr. 11, 14h00m; Apr. 13, 14h30m to Apr. 14, 10h30m; Apr. 14, 21h30m to Apr. 15, 00h36m; Apr. 15, 15h00m to Apr. 16, 24h00m; Apr. 17, 16h00m to 23h30m; Apr. 18, 14h29m to 23h00m; Apr. 19, 14h37m to Apr. 20, 04h45m; Apr. 21, 02h21m to 03h15m, Apr. 23, 01h51m to 02h32m; Apr. 23, 10h00m to 14h32m.

Minor Seismic Activity for May: May 22, 08h04m to 11h00m.

J. B. Macelwane
Director

F. Robertson
Graduate Fellow

FLORISSANT

SEISMOGRAPHIC STATION, ST. LOUIS UNIVERSITY, ST. LOUIS, MO., U. S. A.

Three Galitzin-Wilip, two Wood-Anderson short-period seismographs, Shortt synchronome clock

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
34	June 5	G–W	ePZ	$1^h24^m02^s$	$\Delta S-P = 25°.6$
		W–A	ePN	1 24 02.5	$H = 1^h18^m33^s$
		G–W	ePN	1 24 04	Depth by the
		G–W	$epPZ$	1 24 12	Brunner Depth
		G–W	$(e)E$	1 28 19	Chart about
		G–W	$eSEZ$	1 28 27	50 km.
		G–W	eSN	1 28 27.5	
		G–W	$e(sS)E$	1 28 50	
			F	(Lost in following quake)	
35	June 5	G–W	ePE	$2^h14^m53^s$	$\Delta S-P = 24°.8$
		G–W	ePE	2 14 54	$H = 2^h10^m38.2^s$
		W–A	ePN	2 14 54	Depth by the
		W–A	iPN	2 14 55	Brunner Depth
		G–W	$iPNEZ$	2 14 55	Chart about
		W–A	$ipPN$	2 15 00.6	50 km.
		G–W	$epPN$	2 15 04	
		W–A	iN	2 15 08	
		G–W	eSZ	2 19 13	
		G–W	eSE	2 19 13.6	
		G–W	iSN	2 19 17	
		G–W	$esSZ$	2 19 32.5	
		G–W	$esSN$	2 19 33.5	
			F	3 57 ±	
36	June 6	G–W	ePE	$2^h51^m50.5^s$	$\Delta S-P = 10°.9$
		G–W	eSE	2 54 00	$H = 2^h49^m15.5^s$
		G–W	eSZ	2 54 03.5	
		W–A	eSN	2 54 03.5	
		W–A	$e(S)N$	2 54 10	
		G–W	eGN	2 54 33	
		G–W	eLE	2 55 17	
			F	3 05 ±	
37	June 7	G–W	eN	$4^h03^m53.6^s$	
		G–W	eZ	4 03 54.6	
		G–W	eN	4 04 23.6	
		G–W	eZ	4 05 34.8	
		G–W	eN	4 05 38.6	
		G–W	eN	4 08 58.8	
		G–W	eN	4 11 36.6	
		G–W	eN	4 13 36.6	
			F	4 35	

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
38	June 9	G-W	eP'_Z	$19^h34^m16^s$	$\Delta_{P'-H} = 131°.9$
		G-W	$(e)P'_N$	19 34 19	$\Delta_{meas} = 132°$
		G-W	iP'_Z	19 34 21	$H = 19^h15^m09^s$
		G-W	eP'_N	19 34 22	Epicenter: 3°.1 S,
		G-W	iPR_1Z	19 36 34	125°.7 E.
		G-W	ePR_1NE	19 36 34.5	Depth normal.
		G-W	e_E	19 37 45.5	Time doubtful.
		G-W	i_N	19 37 48.4	
		G-W	i_E	19 37 49.7	
		G-W	i_{NE}	19 38 10	
		G-W	$e(PSKS)_N$	19 46 31	
		G-W	$i(PPS)_N$	19 48 28	
		G-W	i_Z	19 49 03	
			F	00 30 ± (On June 10)	
39	June 10	G-W	eP_Z	$10^h08^m03^s$	$\Delta_{P-H} = 108°.1$
		G-W	epP_Z	10 08 11	$\Delta_{S-P} = 108°.4$
		G-W	epP_Z	10 08 18.5	$\Delta_{SP-P} = 108°.5$
		G-W	ePR_1Z	10 12 28	$\Delta_{meas} = 108°.3$
		G-W	ePR_1NE	10 12 32	$H = 09^h53^m42^s$
		G-W	$ipPR_1NEZ$	10 12 47	Epicenter: 25°.3 N,
		G-W	$iSKSN$	10 18 50.3	124°.6 E.
		G-W	$iSKS_E$	10 18 51	Depth by the
		G-W	iS_E	10 20 12	Brunner Depth
		G-W	$iSPNE$	10 21 46	Chart about 50 km.
		G-W	$ePPS_N$	10 22 49	Time doubtful.
		G-W	eSR_1E	10 27 52	
			F	(Lost in change of records)	
40	June 10	G-W	$ePNEZ$	$18^h11^m07^s$	$\Delta_{P-H} = 23°.1$
		G-W	eS_Z	18 15 14	$\Delta_{meas} = 23°.2$
		G-W	iS_N	18 15 18.4	$H = 18^h06^m01^s$
		G-W	eS_E	18 15 19	Epicenter: 16°.5 N,
		G-W	iS_Z	18 15 21	97°.9 W.
		G-W	iS_N	18 15 27	Depth normal
		G-W	i_E	18 22 11	Time doubtful.
		G-W	i_Z	18 23 12	
			F	00 00	
41	June 15	G-W	$iPNEZ$	$7^h55^m18^s$	$\Delta_{P-H} = 71°.2$
		G-W	ipP_{NE}	7 55 34	$\Delta_{S-P} = 71°.6$
		G-W	ipP_Z	7 55 36	$\Delta_{meas} = 71°.7$
		G-W	eS_Z	8 04 31	$H = 7^h44^m10^s$
		G-W	eS_Z	8 04 34	Epicenter: 31°.3 S,
		G-W	iS_{NE}	8 04 36	74°.1 W.
		G-W	iS_Z	8 04 39	Depth by the
		G-W	esS_E	8 05 04	Brunner Depth
		G-W	isS_E	8 05 06	Chart about 75 km.
			F	8 08 35	

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
42	June 16	G–Z	eP_Z	$2^h29^m18^s$	$\Delta_{P-H} = 103°.1$
		G–N	eP_Z	2 29 30	$\Delta_{meas.} = 103°.3$
		G–E	eP_E	2 29 31	$H = 2^h15^m18^s$
		G–Z	e_Z	2 33 28	Epicenter:
		G–W	iPR_{1E}	2 33 36	29°.2 N, 127°.7 E.
		G–N	iPR_{1Z}	2 33 37	Depth normal.
		G–E	iSP_E	2 42 53	
		G–W	i_E	2 48 34	
			F	5 55 ±	
Clock not in operation June 20, 19h to June 21, 15h.					
43	June 22	G–N	eP_Z	$3^h31^m15^s$	
		G–W	eP_E	3 31 16	
		G–E	eP_N	3 31 19	
		G–N	i_N	3 31 33	
		G–W	i_E	3 32 32	
		G–N	e_Z	3 34 30	
		G–W	e_Z	3 35 28	
			F	3 37 ±	
44	June 23	G–E	iP_N	$1^h15^m13^s$	$\Delta_{P-H} = 68°$
		W–A	eP_Z	1 15 13.5	$H = 1^h04^m25^s$
		W–A	ipP_N	1 15 32	Depth by Brunner
		G–W	ipP_{NZ}	1 15 32	Depth Chart
		G–W	eS_E	1 24 17	about 75 km.
		G–W	$i(sS)_E$	1 24 45	
		G–W	$e(sS)_N$	1 24 48	
		G–W	e_E	1 32 53	
			F	2 04 ±	
45	June 23	G–W	eP_{EZ}	$13^h10^m10^s$	$\Delta_{P-H} = 110°.2$
		G–W	e_E	13 13 24	$\Delta_{PR_1-P} = 110°.1$
		G–W	ePR_{1Z}	13 14 37	$\Delta_{meas} = 110°$
		G–W	$eSKKS_E$	13 21 39	$H = 12^h55^m36^s$
		G–W	$e(SP)_E$	13 24 12	Epicenter: 19°.1 S,
		G–W	$e(SP)_Z$	13 24 16	168°.9 E.
			F	(Lost in change of records)	
46	June 25	G–W	eZ	$22^h45^m08^s$	
		G–W	eN	22 47 45	
		G–W	eNZ	22 49 21	
			F	(Lost in following quake)	

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
47	June 25	G–W	e_{NZ}	$23^h54^m48^s$	
		G–W	e_N	23 55 54	
		G–W	e_{NE}	24 02 21	
		G–W	e_N	24 15 05	
		G–W	e_E	24 16 04	
		G–W	e_N	24 17 08	
			F	01 35 ±	
48	June 27	G–W	e_E	$22^h15^m29^s$	
		G–W	e_E	22 17 39	
		G–W	e_N	22 17 47	
		G–W	e_N	22 18 47	
		G–W	e_Z	22 18 49	
			F	04 20 ±	
49	June 28	G–W	iP_{NE}	$19^h22^m33^s$	Δ_{P-H} = 22°0 Δ_{meas} = 22°0 H = $19^h17^m48^s$ Depth by the Brunner Depth Chart about 100 km. Epicenter: 18°0 N, 99°3 W. Reported felt in Mexico City.
		W–A	iP_N	19 22 33	
		G–W	ipP_{NEZ}	19 22 50	
		W–A	ipP_N	19 22 50	
		G–W	i_N	19 23 20	
		G–W	iS_N	19 26 33	
		G–W	iS_Z	19 26 35	
		W–A	iS_N	19 26 35	
		G–W	$iPcP_E$	19 26 41	
		G–W	isS_E	19 27 00	
		G–W	isS_Z	19 27 01	
		G–W	iL_N	19 30 23	
		G–W	iL_Z	19 30 25	
			F	20 40 ±	

Minor Seismic Activity: June 1, 15h03m to 22h44m; June 6, 12h30m to 21h10m; June 8, 11h13m to 14h20m; June 11, 00h19m to 00h26m; June 12, 8h38m to 8h57m; June 13, 3h45m to 5h52m; June 13, 15h06m to 23h46m; June 14 3h23m to 3h28m; June 14, 11h59m to 14h31m; June 14, 15h00m to 02h01m; June 15, 13h06m – lost in change of records; June 15, 20h06m to 23h05m; June 18, 01h07m to 01h55m; June 18, 04h40m to 05h00m; June 18, 17h22m to 18h47m; June 18, 22h23m to 22h51m; June 24, 16h52m to 00h15m; June 25, 13h04m to 14h33m; June 29, 22h43m to 04h00m; June 30, 16h10m to 24h.

J.B. Macelwane, S.J.
Director

Ed. J. Walter
Graduate Fellow

FLORISSANT

SEISMOGRAPHIC STATION, ST. LOUIS UNIVERSITY, ST. LOUIS, MO., U. S. A.

Three Galitzin-Wilip, two Wood-Anderson short-period seismographs, Shratt synchronome clock

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
50	July 2	G–W	eP_Z	$21^h11^m13^s$	$\Delta_{P-H} = 32°.5$
		G–W	eP_Z	21 11 17	$H = 21^h04^m42^s$
		G–W	eP_N	21 11 19	Time doubtful
		G–W	iP_Z	21 11 20	
		G–W	$i(PR_1)_N$	21 12 27	
		G–W	$i(PR_2)_Z$	21 12 40	
		G–W	eS_{NE}	21 16 40	
		G–W	eS_Z	21 16 41	
		G–W	eL_E	21 19 50	
		G–W	iL_E	21 19 57	
		G–W	F	22 48 ±	
51	July 4	G–W	iP_Z	$21^h31^m41^s$	$\Delta_{P-H} = 72°.7$
		G–W	eP_E	21 31 42	$H = 21^h20^m12^s$
		G–W	ePR_{1Z}	21 34 29	
		G–W	iS_E	21 41 11	
		G–W	iS_Z	21 41 19	
		G–W	F	00 04 ±	
52	July 5	G–W	e_Z	$2^h18^m12^s$	
		G–W	e_Z	2 22 50	
		G–W	e_N	2 23 44	
		G–W	e_E	2 28 48	
		G–W	i_E	2 28 50	
		G–W	i_E	2 29 52	
		G–W	e_N	2 30 36	
		G–W	i_E	2 32 15	
		G–W	F	6 50 ±	
53	July 5	G–W	$(e)_Z$	$22^h21^m43^s$	
		G–W	e_Z	22 25 00	
		G–W	i_{EZ}	22 26 13	
		G–W	e_E	22 32 17	
		G–W	i_N	22 34 01	
		G–W	e_Z	22 35 35	
		G–W	i_E	22 35 43	
		G–W	F	01 06 ±	
54	July 6	G–W	e_E	$1^h12^m10^s$	
		G–W	e_E	1 12 30	
		G–W	e_N	1 12 36	
		G–W	e_E	1 13 26	
		G–W	e_Z	1 13 38	
		G–W	e_Z	1 14 57	
		G–W	F	1 22 ±	

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
55	July 6	G-W	e_Z	$1^h38^m55^s$	
		G-W	e_Z	1 43 21	
		G-W	i_{EZ}	1 44 02	
		G-W	e_E	1 44 46	
		G-W	i_Z	1 53 17	
		G-W	e_E	1 57 33	
			F	4 59 ±	
56	July 7	G-W	e_Z	$21^h07^m34^s$	(Deep?)
		G-W	e_{NEZ}	21 07 44	
		G-W	e_Z	21 08 26	
		G-W	i_N	21 08 28	
		G-W	e_{NE}	21 10 58	
		G-W	e_E	21 17 23	
		G-W	e_Z	21 17 24	
		G-W	e_{NE}	21 18 25	
		G-W	e_N	21 19 13	
		G-W	e_E	21 19 21	
		G-W	e_Z	21 19 24	
		G-W	e_N	21 19 26	
			F	22 19 ±	
57	July 14	G-W	eP_E	$11^h49^m22^s$	$\Delta_{P-H} = 12°.9$
		G-W	eP_Z	11 49 25	$H = 11^h46^m16^s$
		G-W	iPR_{1E}	11 49 27	(Deep?)
		G-W	iS_{EZ}	11 51 55	
		G-W	iS_E	11 52 03	
		G-W	iSR_{1E}	11 52 19	
		G-W	i	11 53 29	
		G-W	eM_Z	11 53 37	
		G-W	eM_E	11 53 44	
			F	12 24 ±	
58	July 20	G-W	eP_E	$00^h35^m57^s$	$\Delta_{P-H} = 82°.8$
		G-W	eP_Z	00 35 59	$H = 00^h23^m35^s$
		G-W	iP_{NZ}	00 34 01	
		G-W	ePR_{1E}	00 39 10	
		G-W	eS_E	00 46 17	
		G-W	eS_N	00 46 24	
			F	01 46 ±	
59	July 20	G-W	eP_Z	$12^h11^m05^s$	$\Delta_{P-H} = 54°.8$
		G-W	iP_Z	12 11 06	$H = 12^h01^m39^s$
		G-W	eP_{NE}	12 11 07	Record weak.
		G-W	eS_{NE}	12 18 48	
		G-W	iS_E	12 18 52	
		G-W	iS_N	12 18 53	
			F	13 03 ±	

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
60	July 22	W-A	eP_{NE}	$7^h53^m30^s$	$\Delta_{S-P} = 24°.3$
		G-W	iP_E	7 53 32	$\Delta_{P-H} = 24°.4$
		G-W	iP_N	7 53 33	$\Delta_{meas} = 24°.2$
		G-W	iP_E	7 53 36	$H = 7^h48^m11^s$
		G-W	iS_N	7 57 51	Epicenter:
		G-W	eS_E	7 57 54	18°.9 N.,
		G-W	iS_E	7 58 02	106.6 W.
		G-W	iS_{NE}	7 58 08	
		G-W	$i(SR_1)_E$	7 58 52	
			F	12 15 ±	
61	July 23	G-W	e_Z	$14^h44^m15^s$	Record very weak. Only vertical component.
		G-W	i_Z	14 44 17	
		G-W	e_Z	14 48 49	
			F Lost in change of records.		
62	July 23	G-W	e_Z	$23^h20^m12^s$	Record very weak.
		G-W	e_E	23 20 14	
		G-W	i_Z	23 20 19	
		G-W	e_E	23 25 47	
			F	00 39 ±	
63	July 24	G-W	iP_{NEZ}	$13^h21^m27^s$	$\Delta_{P-H} = 51°.0$
		G-W	ipP_Z	13 21 37	$\Delta_{meas} = 51°.0$
		G-W	iS_E	13 28 50	$H = 13^h12^m28^s$
		G-W	iS_N	13 28 51	Epicenter:
		G-W	iS_Z	13 28 52	53°.0 N., 164°.W.
		G-W	isS_N	13 29 09	Depth about
			F Lost in change of records.		50 km by Brunner Depth Chart.

Clock not in operation July 28-30.

Minor Seismic Activity: July 1, 00h00m to 03h00m; 13h44m lost in change of records; 15h30m to 23h46m; July 2, 08h08m to 08h23m; July 5, 03h46m to 00h26m; July 6, 06h57m to 07h14m; 10h32m to 11h14m; July 7, 02h33m to 03h27m; July 8, 22h57m to 23h 15m; July 9, 07h59m to 08h06m; July 10, 16h28m to 04h06m; July 11, 13h03m lost in change of records; July 12,17h27m to 23h00m; July 14, 19h01m to 22h58m; 23h16m to 01h29m; July 16, 16h11m to 18h23m; July 17,11h44m to 11h55m; July 18, 11h11m to 11h29m; July 19, 21h36m to 22h24m; July 20, 10h12m to 11h02m; July 24, 7h25m to 8h06m; July 27, 18h50m to 19h40m; 20h10m to 21h39m; July 31, 00h18m to 11h02m; 22h49m to 23h08m.

J.B. Macelwane, S.J.
Director

Ed. J. Walter
Graduate Fellow

FLORISSANT

SEISMOGRAPHIC STATION, ST. LOUIS UNIVERSITY, ST. LOUIS, MO., U. S. A.

Three Galitzin-Wilip, two Wood-Anderson short-period seismographs, Shortt synchronome clock

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
64	Aug 3	G-W	ePE	13h28m19s	S-P = 4m5s
		G-W	ePZ	13 28 37	ΔS-P = 27°9
		G-W	eSE	13 43 12	H = 13h32m33s
		G-W	eSNE	13 43 18	
		G-W	eN	13 [illegible] 44	
		G-W	iN	13 [illegible] 00	
		G-W	iZ	13 50 13	
		G-W	F	(Lost in change of records)	
65	Aug 4	G-W	iPNEZ	9h05m17s	ΔS-P = 65°8
		G-W	iNE	9 05 22	ΔP-H = 65°4
		G-W	ipPZ	9 06 07	Δmeas. = 65°7
		G-W	iN	9 06 11	H = 8h55m02s
		G-W	iN	9 06 33	h = 225 km by Brunner Depth Chart.
		G-W	iPR1NE	9 07 47	
		G-W	iSN	9 13 46	Epicenter: 22°7 S, 68°3 W
		G-W	isSZ	9 15 19	This interpretation replaces Preliminary Bulletin #29 of the J.S.A. for 1938.
		G-W	F	11 57 ±	
66	Aug 5	G-W	iPNE	17h09m55s	ΔS-P = 13°9
		G-W	iSNE	17 12 39	H = 17h06m36s
		G-W	iZ	17 12 47	
		G-W	iE	17 12 52	
		G-W	F	17 56 ±	
67	Aug 8	G-W	ePE	18h34m07s	ΔS-P = 11°8
		G-W	ePN	18 34 13	H = 18h31m16s
		G-W	ePN	18 34 16	
		G-W	iSN	18 36 29	
		G-W	iSN	18 36 34	
		G-W	F	19 30 ±	
68	Aug 16	G-W	eZ	4h47m21s	ΔS-H = 117°4
		G-W	eN	4 47 23	Δmeas. = 117°9
		G-W	ePR1Z	4 47 28	H = 4h27m53s
		G-W	iE	4 48 12	Epicenter: 95°E., 24°N.
		G-W	iSE	4 55 40	
		G-W	iN	4 57 50	
		G-W	iE	4 57 55	
		G-W	[illegible]	[illegible]	

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
69	Aug 18	G-W	ePKP?NZ	$9^h49^m26^s$	$\Delta_{PKP-H} = 144°8$
		G-W	e_E	9 49 28	$\Delta_{meas} = 144°3$
		G-W	e_E	9 49 41	$H = 9^h30^m00^s$
		G-W	ipPKP?Z	9 49 47	h = 100 km by
		G-W	iPR_1NZ	9 52 40	the Brunner
		G-W	i_{NZ}	9 53 10	Depth Chart.
		G-W	i_N	9 53 44	Epicenter by
		G-W	eSKKS?E	9 59 22	Strasbourg:
		G-W	e_E	10 11 10	4°S, 104°E.
			F	11 09 ±	
70	Aug 18	G-W	i_{NZ}	$12^h00^m49^s$	
		G-W	i_{NE}	12 08 18	
		G-W	e_N	12 09 41	
			F	12 13 ±	
71	Aug 21	G-W	e_{NE}	$16^h33^m16^s$	
		G-W	i_{NE}	16 35 46	
			F	17 37 ±	
	Aug 25	Instruments being adjusted. No records.			
72	Aug 30	G-W	e_E	$12^h09^m42^s$	
		G-W	e_E	12 15 28	
		G-W	e_E	12 15 56	
		G-W	i_E	12 19 35	
			F	16 12 ±	
73	Aug 31	G-W	iP_{NE}	$18^h04^m33^s$	Records weak.
		G-W	e_E	18 11 47	Deep.
		G-W	e_{NE}	18 13 34	Epicenter by
		G-W	e_N	18 14 13	Strasbourg:
		G-W	e_E	18 14 16	3° S, 151° E.
		G-W	i_{NE}	18 16 17	
			F	19 24 ±	

Minor Seismic Activity: Aug 1, 01h03m to 01h22m; Aug 5, 15h00m to 19h12m; Aug 6, 04h14m to 05h16m; Aug 8, 11h35m to 11h 49m; Aug 8, 13h30m to 14h06m; 15h24m to 16h19m; 21h24m to 00h38m; Aug 9, 23h05m to 00h05m; Aug 10, 22h02m to 22h55m; Aug 12, 04h25m to 05h54m; Aug 13, 14h30m to 00h25m; Aug 14, 15h00m to 00h00m; Aug 15, 00h00m to 04h06m; Aug 15, 15h34m to 22h23m; Aug 16, 19h04m to 20h50m; Aug 19, 13h16m to 14h26m; Aug 19, 16h17m to 00h00m; Aug 20, 00h00m to 03h32m; Aug 20, 20h14m to 20h38m; Aug 22, 23h42m to 23h51m; Aug 25, 15h51m to 18h19m; Aug 28, 09h44m to 11h38m; Aug 28, 18h49m to 22h17m; Aug 30, 18h14m to 22h40m; Aug 31, 03h28m to 03h37m.

J.B. Macelwane, S.J., Director Ed.J. Walter, Graduate Fellow

FLORISSANT

SEISMOGRAPHIC STATION, ST. LOUIS UNIVERSITY, ST. LOUIS, MO., U. S. A.

Three Galitzin-Wilip, two Wood-Anderson short-period seismographs, Shortt synchronome clock

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
			No time 20h September 1 to 16h September 3		
74	Sept 6	G-W	i	$21^h08^m15^s$	
			F	21 59 ±	
75	Sept 7	G-W	eP	$4^h17^m57^s$	ΔP-H = 110°
		G-W	iPR$_1$	4 22 29	Δmeas = 110°
		G-W	eSKS	4 28 32	H = $4^h03^m24^s$
		G-W	e(S)	4 30 04	Epicenter by J.S.A.:
		G-W	iS	4 30 07	24°9 N., 122°0 E.
		G-W	iSP	4 31 54	Northeastern
		G-W	i	4 32 11	Formosa.
		G-W	i(PKKP)(ScP)	4 33 03	
		G-W	i	4 33 18	
		G-W	e(PPPS)	4 33 45	
			F	6 38 ±	
76	Sept 7	G-W	e	$13^h18^m11^s$	Epicenter:
		G-W	i	13 25 05	Ø = 8°0 S.,
		G-W	e	13 25 49	λ = 157°1 E.
		G-W	e	13 26 13	Salomon Islands.
		G-W	e	13 33 03	Δmeas = 112°6
			F	(Lost in change of records.)	H = $12^h58^m40^s$
					Depth by Brunner
					Depth Chart 150 km.
					Record weak.
77	Sept 9	G-W	eP	$17^h35^m37^s$	ΔS-P = 41°8
		G-W	eS	17 42 12	Record weak.
		G-W	e	17 43 12	
		G-W	e	17 45 10	
		G-W	e	17 46 14	
			F	18 23 ±	
78	Sept 12	G-W	eP	$6^h16^m16^s$	ΔS-P = 26°2
		G-W	iP	6 16 17	ΔP-H = 26°6
		G-W	ePR$_1$	6 16 53	Δmeas = 26°6
		G-W	eS	6 20 50	H = $6^h10^m35^s$
		G-W	eS	6 20 53	Epicenter by J.S.A.
		G-W	i(SR$_1$)	6 22 03	Ø = 40°2 N.,
		G-W	iL	6 23 38	λ = 125°0 W.
		G-W	i	6 24 10	
		G-W	iM	6 25 38	
			F	7 23 ±	

No.	Date	Instr.	Phase	G.M.C.T.	Records
79	Sept 17	G-W G-W G-W G-W G-W G-W G-W G-W G-W G-W G-W	eP* eP* iP* e ePg iSn iS* iS* iSg? iSg e F	3h35m23.4s 3 35 23.8 3 35 23.2 3 35 35 3 35 23.2 3 36 00 3 36 04 3 36 06 3 36 12 3 36 15 3 36 19	ΔP*-H = 228 miles ΔS*-H = 228 miles Δmeas = 329 miles H = 3h34m23.8s Epicenter by J.S.A. Ø = 90° 20' W, λ = 35° 28' N. Felt throughout Arkansas and the neighboring states. Fr. Jolivet's Tables for near quakes used.
80	Sept 17	W-A W-A W-A W-A W-A W-A W-A G-W G-W G-W	(e)P e ePR2 (e)S (e)S (e)S (e) e iL eM F	17h24m00s 17 24 05.5 17 24 17 17 26 55 (Jeffries) 17 26 59 17 27 03 (Macelwane) 17 27 13.5 17 28 02 17 28 28 17 29 53 17 46 ±	ΔS-P = 15°7 ΔP-H = 15°9 Δmeas = 15°8 H = 17h20m16s Epicenter by J.S.A. Ø = 33°6 N., λ = 109°1 W.
81	Sept 18	G-W G-W	e e F	1h41m33s 1 51 30 1 58 ±	
82	Sept 18	G-W G-W G-W	iP eP e(S) F	4h02m57s 4 02 58 4 13 07 5 04 ±	ΔP-H = 82°1 Δmeas = 82°5 Epicenter by Strasbourg: Ø = 38°0 N., λ = 23°5 E.
83	Sept 21	G-W G-W	i(S) i F	19h16m00s 19 16 25 (Lost in microseisms)	Record obscured by very large microseisms. Δmeas = 96°5 Epicenter by Strasbourg: Ø = 31° N., λ=140° E. (Approximately)
84	Sept 23	G-W G-W	e e F	11h24m17s 11 26 48 11 46 ±	

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
85	Sept 27	G-W	(e)	$2^h50^m46^s$	Records weak.
		G-W	eP	2 51 09	
		G-W	eP	2 51 14	
		G-W	eS	3 00 55	
		G-W	eS	3 01 02	
		G-W	eS	3 01 07	
			F	4 49 ±	
86	Sept 27	G-W	eP	$10^h35^m22^s$	
		G-W	e	10 41 18	
		G-W	e	10 42 49	
		G-W	eS	10 45 06	
		G-W	e	10 51 45	
			F	(Lost in seismic activities)	
87	Sept 28	G-W	e(P)	$18^h32^m28^s$	
		G-W	e(P)	18 32 33	
		G-W	e	18 33 59	
		G-W	e	18 38 44	
		G-W	e	18 39 40	
		G-W	e(S)	18 42 00	
		G-W	e	18 43 05	
			F	(Lost in change of records)	
88	Sept 28	G-W W-A	iS*	$23^h32^m26.5^s$	Reported felt at Malden, Missouri
		G-W	iS*	23 32 27	
89	Sept 29	G-W	eP	$23^h39^m56^s$	ΔS-P = 15°9
		G-W W-A	iP	23 39 59	ΔP-H = 15°7
		G-W	iPL	23 40 16	Δmeas = 15°8
		G-W	iS	23 42 56 (Jeffries)	
		G-W	iS	23 43 04 (Macelwane)	
					Epicenter by J.S.A.: Ø = 33°6 N., λ = 109°1 E.

Minor Seismic Activity: Sept 1, 03h46m to 04h45m; Sept 4, 20h19m to 21h29m; Sept 4, 22h38m to 22h57m; Sept 5, 15h22m to 17h12m; Sept 5, 21h00m to 21h09m; Sept 8, 15h55m to 16h02m; Sept 9, 20h21m to 21h01m; Sept 10, 20h48m to 21h09m; Sept 10, 23h43m to 23h58m; Sept 14, 18h35m to 23h23m; Sept 20, 3h21m to 3h36m; Sept 20, 5h46m to 5h56m; Sept 20, 14h21m to 15h27m; Sept 25, 20h41m to 22h04m; Sept 29, 00h47m to 00h54m; Sept 29, 11h56m to 12h08m.

J.B. Macelwane, S.J.
Director

Ed J. Walter
Graduade Fellow

FLORISSANT

SEISMOGRAPHIC STATION, ST. LOUIS UNIVERSITY, ST. LOUIS, MO., U. S. A.

Three Galitzin-Wilip, two Wood-Anderson short-period seismographs, Shortt synchronome clock

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
90	Oct 1	W-A	e_E	$22^h17^m00.5^s$	Near quake.
		W-A	$i(S)_E$	22 17 51.5	Record weak.
		W-A	$i(S)_E$	22 17 54.5	
		G-W	i_{NE}	22 17 55	
		G-W	i_{NEZ}	22 17 56	
		G-W	i_{NE}	22 18 02	
		W-A	i_E	22 18 07	
		G-W	e_N	22 18 08	
			F	22 22 ±	
91	Oct 7	G-W	e_Z	$17^h45^m17^s$	Record very
		G-W	e_Z	17 46 19	weak.
		G-W	i_Z	17 46 22	
		G-W	i_E	17 46 23	
			F	19 12 ±	

Clock not in operation October 9, 11^h, October 10, 18^h.
Earthquake October 10, about 3^h11^m.
No records October 11, 11^h, October 17, 16^h.

92	Oct 19	G-W	$i(SKS)_N$	$4^h37^m16^s$	Epicenter by
		G-W	eS_N	4 37 40	Strasbourg:
		G-W	iS_E	4 37 43	$\phi = 49^\circ.7$ N.,
		G-W	eS_N	4 37 44	$\lambda = 90^\circ.5$ E.
		G-W	iPS_{NZ}	4 38 53	$H = 4^h13^m32^s$
			F	5 53 ±	$\Delta S\text{-}H = 91^\circ.9$
					$\Delta_{meas} = 92^\circ.4$
93	Oct 20	G-W	$ePKPZ$	$2^h38^m45^s$	Epicenter:
		G-W	$e(PKP)_{NE}$	2 38 50	$\phi = 9^\circ.5$ S.,
		G-W	$ipPKP_E$	2 39 12	$\lambda = 122^\circ.8$ E.
		G-W	i_N	2 39 24	$H = 2^h19^m30^s$
		G-W	i_E	2 41 46	Depth by the
		G-W	$epPR_{1N}$	2 41 52	Brunner Depth
		G-W	$iSKP_Z$	2 42 12	Chart about
		G-W	$i(sSKP)_E$	2 42 35	100 km.
		G-W	$iSKKS_E$	2 48 13	$\Delta PKP\text{-}H = 139^\circ.0$
			F	5 09 ±	$\Delta_{meas} = 138^\circ.7$

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
94	Oct 23	G-W	$e(S)_{EZ}$	$5^h15^m58^s$	Record weak.
		G-W	$i(S)_{EZ}$	5 16 00	
		G-W	e_Z	5 17 26	
		G-W	e_E	5 17 27	
		G-W	i_E	5 22 08	
		G-W	$e(M)_E$	5 28 19	
		G-W	F	5 54 ±	
95	Oct 23	G-W	i_Z	$15^h24^m01^s$	Record very weak. Epicenter by Strasbourg Region of Madagascar.
		G-W	i_E	15 24 04	
		G-W	$(e)_E$	15 32 59	
		G-W	e_E	16 15 12	
			F	16 43 ±	
96	Oct 28	G-W	e_E	$13^h32^m31^s$	Record very weak. Epicenter by Strasbourg: $\emptyset = 34°0$ N., $\lambda = 142°0$ E. $H = 13^h08^m30^s$ $\Delta_{PS-H} = 93°2$ $\Delta_{meas} = 93°1$
		G-W	$e(SKKS)_N$	13 32 31	
		G-W	$(e)(S)_E$	13 32 57	
		G-W	ePS_E	13 33 56	
		G-W	$e(SR_1)_E$	13 38 46	
		G-W	eL_{NZ}	13 55 31	
			F	14 23 ±	

Minor Seismic Activity: Oct 4, 08h52m to 09h45m; Oct 5, 00h45m to 01h23m; Oct 7, 01h54m to 03h09m; Oct 17, 23h23m to 23h49m; Oct 18, 07h31m to 07h52m; Oct 21, 21h38m to 22h24m; Oct 23, 00h29m to 01h25m; Oct 23, 03h26m to 04h10m

J. B. Macelwane, S.J.
Director

E. J. Walter
Graduate Fellow

** E R R A T A **

Florissant Station Bulletin for July 1938, Earthquake #57, July 14 should read:

G-W	eS	11 49 22	Pasadena
G-W	eS	11 49 25	gives
G-W	eS	11 49 27	Mexico.
G-W	i(L)	11 51 55	
G-W	iM	11 52 19	
G-W	F	12 24 ±	

FLORISSANT

SEISMOGRAPHIC STATION, ST. LOUIS UNIVERSITY, ST. LOUIS, MO., U. S. A.

Three Galitzin-Wilip, two Wood-Anderson short-period seismographs, Shortt synchronome clock

Bulletin for November 1938

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
97	Nov 2	W-A	eP_N	$5^h46^m56^s$	Record very weak.
		W-A	iP_{NE}	5 46 58	
		W-A	eS_E	5 50 55	
			F	6 00 ±	
		Clock not in operation Nov. 4, 19^h to Nov. 5, 15^h. Two strong quakes during this period. First about 10^h Nov. 5. Second about 12^h Nov. 5.			
98	Nov 6	W-A	eP_E	$9^h06^m51^s$	Epicenter by J.S.A.: $\phi = 37°4$ N., $\lambda = 143°7$ E. $\Delta P\text{-}H = 89°6$ $\Delta meas = 89°5$ $H = 8^h53^m58^s$
		G-W	iP_{NEZ}	9 06 54	
		G-W	iPR_{1N}	9 10 26	
		G-W	$eSKS_E$	9 17 13	
		G-W	i_N	9 17 22	
		W-A	eS_E	9 17 39.5	
		G-W	iS_{NE}	9 17 40	
			F	13 11 ±	
99	Nov 6	G-W	eP_Z	$21^h51^m46^s$	Aftershock of previous quake #98, Nov. 6. $H = 21^h38^m53^s$.
		G-W	iP_Z	21 51 52	
		G-W	iPR_{1Z}	21 55 25	
		G-W	iS_E	22 02 36	
		G-W	i_Z	22 06 25	
			F	1 55 ±	
100	Nov 7	G-W	$i(S)_E$	$2^h02^m17^s$	Record weak. Strasbourg Bulletin gives Japan.
		G-W	$i(S)_Z$	2 02 20	
		G-W	e_E	2 08 19	
		G-W	e_Z	2 08 47	
			F	4 20 ±	
101	Nov 7	G-W	eP_Z	$19^h46^m35^s$	Aftershock of earthquake #98, Nov. 6. $\Delta P\text{-}H = 90°2$ $H = 19^h33^m36^s$
		G-W	$e(SKS)_N$	19 57 02	
		G-W	eS_E	19 57 29	
		G-W	iS_N	19 57 30	
		G-W	$ePPS_Z$	19 58 45	
			F	22 02 ±	

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
102	Nov 9	G-W	(e)P_Z	$9^h 23^m 52^s$	Aftershock of earthquake #98, Nov. 6.
		G-W	iP_Z	9 29 02	
		G-W	iZ	9 32 02	ΔP-H = 88°9
		G-W	eS_E	9 39 41	H = $9^h 16^m 00^s$
		G-W	iS_{NE}	9 39 50	Probably deep.
			F	11 22 ±	
103	Nov 10	G-W	i$_{NE}$	$11^h 10^m 24^s$	Record weak. Aftershock of earthquake #98, Nov. 6 by Strasbourg.
		G-W	i$_E$	11 11 02	
		G-W	L	11 32	
		G-W	M	11 44 30	
			F	11 52 ±	
104	Nov 10	G-W	iP_Z	$20^h 27^m 16^s$	Epicenter by J.S.A.:
		W-A	i(S)$_E$	20 34 19	ϕ = 55°6 N.,
			F	(Lost in following quake)	λ = 157°7 W.
					H = $20^h 18^m 48^s$
					Δ_{P-H} = 46°7
					Δ_{meas} = 47°0
					Amplitudes very large.
105	Nov 11	G-W	eP_Z	$1^h 06^m 15^s$	Epicenter by J.S.A.:
		G-W	iP_Z	1 06 24	ϕ = 54°9 N.,
		G-W	i$(PR_1)_Z$	1 08 13	λ = 156°0 E.
		G-W	iS_N	1 13 10	H = $1^h 57^m 57^s$
		W-A G-W	i$(SR_1)_{NE}$	1 16 06	Aftershock of earthquake #104, Nov. 10.
		G-W	i$_N$	1 17 01	
		G-W	L	1 22 ±	Δ_{P-H} = 46°5
			F	3 16 ±	Δ_{meas} = 45°9
106	Nov 12	G-W	eP_Z	$15^h 01^m 51^s$	Record weak. Epicenter by Strasbourg:
		G-W	e$_E$	15 11 39	ϕ = 47°2 N.,
		G-W	iS_N	15 11 44	λ = 153°8 E.
		G-W	i$_N$	15 15 16	H = $14^h 50^m 06^s$
		G-W	L$_Z$	15 31 ±	
		G-W	M$_Z$	15 40 ±	
			F	18 04 ±	
107	Nov 13	G-W	iP_Z	$13^h 25^m 50^s$	Epicenter by J.S.A.:
		G-W	iP_{NE}	13 25 51	ϕ = 46°0 N.,
		G-W	ipP_{NEZ}	13 26 14	λ = 149°4 E.
		G-W	iPR_1NEZ	13 28 57	H = $13^h 13^m 50^s$
		G-W	ipPR_1Z	13 23 20	Δ_{P-H} = 80°5
		G-W	iS_EZ	13 35 52	Δ_{meas} = 80°0
		G-W	i$_E$	13 36 03	Depth about 100 km by the Brunner Depth Chart.
		G-W	isS_E	13 36 21	
		G-W	i$_E$	13 36 48	
		G-W	i$_E$	13 37 12	
		G-W	L	13 51 ±	
		G-W	M	13 58 ±	
			F	(Lost in	

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
108	Nov 13	G-W	ePZ	$22^h44^m30^s$	Record weak. $\Delta S-P = 89°6$ Probable aftershock of earthquake #98, Nov. 6 by Strasbourg.
		G-W	eZ	22 45 08	
		G-W	iPR_1Z	22 47 42	
		G-W	iPR_2Z	22 48 45	
		G-W	iSE	22 55 23	
		G-W	iN	22 55 39	
		G-W	L	22 42 ±	
		G-W	M	23 51 ±	
			F	1 35	
109	Nov 15	G-W	iSE	$10^h04^m38^s$	Record very weak. Probable aftershock of earthquake #101 Nov. 10 by Strasbourg.
		G-W	L	10 14	
		G-W	M	10 16	
			F	10 38 ±	
110	Nov 15	G-W	$eP'Z$	$21^h19^m59^s$	Record very weak. Epicenter by Strasbourg: $\phi = 5°0$ S., $\lambda = 97°0$ E.
		G-W	$i(SR_1)E$	21 42 07	
		G-W	L	22 04	
		G-W	M	22 23	
			F	23 08 ±	
111	Nov 17	W-A	ePE	$4^h03^m04^s$	Epicenter by J.S.A.: $\phi = 55°3$ N., $\lambda = 157°5$ W. $H = 3^h54^m37^s$ $\Delta P-H = 46°9$ Depth about 50 km. by the Brunner Depth Chart. $\Delta meas = 46.8$
		W-A	iPE	4 03 08	
		G-W	$ipPNEZ$	4 03 12	
		W-A G-W	$iSNE$	4 09 52	
		W-A	$isSE$	4 10 09	
		G-W	$i(PS)N$	4 10 46	
		W-A	$e(SR_1)E$	4 12 55	
		G-W	L	4 17 ±	
		G-W	M	4 27 ±	
			F	7 32 ±	
112	Nov 19	G-W	iPZ	5 51 38	Record very weak. Epicenter by Strasbourg: $\phi = 45°0$ N., $\lambda = 149°0$ E.
		G-W	eSE	6 01 16	
		G-W	eSN	6 01 20	
		G-W	L	6 23 ±	
			F	7 00 ±	
113	Nov 22	G-W	ePZ	$1^h27^m02^s$	Epicenter by J.S.A.: $\phi = 36°3$ N., $\lambda = 141°6$ E. $H = 1^h14^m06^s$ $\Delta P-H = 91°0$ $\Delta meas = 91°0$ Depth about 80 km. by the Brunner Depth Chart.
		G-W	iPZ	1 27 05	
		G-W	$epPZ$	1 27 21	
		G-W	$e(SKS)E$	1 37 31	
		G-W	$e(SKS)N$	1 37 34	
		G-W	eSN	1 37 56	
		G-W	$isSN$	1 38 32	
		G-W	iSR_1E	1 44 07	
			F	4 31 ±	

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
114	Nov. 30	G-W	iP_Z	$2^h42^m53^s$	Epicenter by J.S.A.:
		G-W	iP_E	2 43 00	$\phi = 37°.5$ N.,
		G-W	ePR_1Z	2 46 26	$\lambda = 141°.3$ E.
		G-W	$eSKS_N$	2 53 16	$H = 2^h29^m52^s$
		G-W	$iSKKS_E$	2 53 42	$\Delta_{P-H} = 90°.6$
		G-W	iS_{NZ}	2 53 46	$\Delta_{meas} = 90°.4$
		G-W	iE	2 54 05	
		G-W	iSP_E	2 54 46	
		G-W	M	3 16 ±	
			F	5 10 ±	

Minor Seismic Activity: Nov 2, 09h07m to 09h11m; Nov 6, 18h05m to 18h21m; Nov 7, 05h03m to 06h02m; Nov 10, 15h34m to 15h50m; Nov 10, 18h26m to 18h45m; M waves of distant quake. Nov 10, 19h40m to 19h52m; M waves of distant quake. Nov 10, 20h55m to 22h28m; Surface waves of distant quake. Nov 11, 14h59m to 15h39m; Nov 12, 08h49m to 09h43m; Nov 12, 13h21m to 13h41m; Nov 12, 17h40m to 18h10m; Nov 13, 07h25m to 07h40m; Nov 14, 12h33m to 13h35m; Surface waves of a distant quake. Nov 15, 20h38m to 20h57m; Nov 16, 05h51m to 06h29m; Nov 18, 18h21m to 19h40m; Nov 19 23h50m to 00h08m; Nov 21, 02h15m to 03h03m; Nov 25, 00h27m to 00h39m; Nov 25, 09h06m to 09h29m; Nov 27, 00h20m to 00h25m.

J. B. Macelwane, S.J.
Director

E. J. Walter
Graduate Fellow

FLORISSANT

SEISMOGRAPHIC STATION, ST. LOUIS UNIVERSITY, ST. LOUIS, MO., U. S. A.

Three Galitzin-Wilip, two Wood-Anderson short-period seismographs, Shortt synchronome clock

Bulletin for December 1938

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
115	Dec 1	G-W	e_N	$2^h30^m15^s$	Record very weak.
		G-W	e_Z	2 30 20	
		G-W	i_N	2 36 51	
		G-W	e_E	2 37 52	
		G-W	e_E	2 39 28	
		G-W	e_E	2 50 06	
		G-W	L_E	3 04 ±	
		G-W	M_E	3 14 ±	
			F	4 34	
116	Dec 3	G-W	$i(S)_E$	$12^h36^m14^s$	Time doubtful. Record weak.
		G-W	i_E	12 36 29	
		G-W	M_E	13 01 ±	
			F	14 03	
117	Dec 3	G-W	e_N	$17^h54^m58^s$	Time doubtful Record weak. Preliminary Epicenter by Pasadena: $\emptyset = 36.5°$ N., $\lambda = 118.8°$ W. $H = 17^h42^m50^s$ Reported felt in Sierra, Nevada and on east side of San Joaquin Valley, Calif.
		G-W	i_E	17 56 24	
		G-W	e_Z	17 56 37	
		G-W	i_E	17 56 40	
			F	18 00 ±	
118	Dec 4	G-W	e_E	$16^h51^m35^s$	Record very weak.
		G-W	L_E	17 27 ±	
		G-W	M_E	17 29 ±	
			F	18 01	
119	Dec 6	G-W	i_Z	$23^h20^m07^s$	Record weak.
		G-W	L_Z	23 58 ±	
		G-W	M_E	00 10 ±	
		G-W	F	00 51	
120	Dec 7	G-W	i_E	$13^h27^m53^s$	Record weak.
		G-W	e_Z	13 43 15	
		G-W	i_E	13 53 06	

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
121	Dec 9	G-W	i_{SNE}	$4^h10^m05^s$	
		G-W	e_E	4 13 27	
		G-W	i_N	4 13 43	
		G-W	M_N	4 19 38	
			F	5 00	
122	Dec 12	G-W	e_N	$3^h24^m28^s$	Record weak.
		G-W	e_{SNE}	3 24 51	
		G-W	i_{SE}	3 24 52	
		G-W	i_N	3 25 20	
		G-W	M_Z	3 27 ±	
		G-W	F	3 31	
123	Dec 13	W-A	e_E	$9^h29^m43^s$	Record weak.
		W-A	e_E	9 29 56	
		G-W	e_N	9 29 57	
		W-A	e_E	9 30 15	
		W-A	e_E	9 30 47	
		G-W	e_Z	9 32 32	
		G-W	e_N	9 32 42	
		G-W	e_Z	9 32 45	
			F	9 43	
124	Dec 13	G-W	i_E	$17^h49^m07^s$	Record weak.
		G-W	M_Z	18 24 ±	
		G-W	F	18 35	
125	Dec 16	G-W	$(e)_Z$	$17^h40^m36^s$	Distant quake.
		G-W	$(e)_Z$	17 42 19	Very large sur-
		G-W	e_N	17 51 02	face waves.
		G-W	L_Z	18 30 ±	
		G-W	M_Z	18 39 ±	
			F	(Lost in following quake)	
126	Dec 16	G-W	M_Z	$19^h13^m \pm ^s$	
		G-W	F	20 21	
127	Dec 17	G-W	L_Z	$00^h13^m \pm ^s$	Record weak.
		G-W	M_Z	00 16 ±	Large surface
		G-W	F	01 42	waves.
128	Dec 18	G-W	$i(S)_{NE}$	$22^h09^m17^s$	Record very
		G-W	F	00 54	weak.
129	Dec 19	G-W	L_E	$18^h27^m \pm ^s$	
		G-W	M_E	18 30.5 ±	
		G-W	F	(Lost in following quake)	

No.	Date	Inst.	Phase	G.M.C.T.	Remarks
130	Dec 19	G-W	iP_{NZ}	$18^h36^m02^s$	Record weak.
		G-W	iS_{NE}	18 46 15	$\Delta S-P = 81.^\circ5$
		G-W	e_E	18 46 31	
		G-W	L_N	19 07 ±	
		G-W	M_N	19 08 ±	
			F	21 06	
131	Dec 21	G-W	iZ	$13^h46^m27^s$	Record weak.
		G-W	iZ	13 49 11	
132	Dec 23	G-W	e_{NE}	$18^h29^m56^s$	Record weak.
		G-W	e_E	18 33 00	
		G-W	M_Z	18 41 ±	
		G-W	F	19 10	

Minor Seismic Activity: Dec 2, 23h15m to 23h32m; Dec 12, 22h23m to 23h0(23h00m; Dec 14, 22h08m to 22h23m; Dec 17, 17h27m to 18h03m; Dec 18 08h01m to 08h22m; Dec 18, 21h08m to 21h29m; Dec 22, 17h54m to 18h11m; Dec 29, 14h29m to 14h36m Surface waves; Dec 30, 03h15m to 03h34m Surface waves; Dec 30, 12h32m to 12h38m; Dec 31, 00h42m to 01h00m.

J. B. Macelwane, S.J.
Director

E. J. Walter
Graduate Fellow