

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 1933

No.	Date	Inst.	C/D	Phase	G.M.C.T.	S-P	Δ	P-O	Remarks
1	Jan. 1	G-W G-W G-W G-W	C	iP _Z iS _{EZ} e _E eM _E F	9-7-25 9-13-20 9-17-21 9-47-27 10-40 \pm	5'55"	37 ^o .4	7'13"	0=9 ^h 0 ^m 12 ^s .
2	Jan. 4	G-W G-W G-W G-W G-W	D	iP _{ENZ} e _N e _{ENZ} e _E eM _{EZ} F	1-38-24 1-49-07 1-51-20 1-56-40 2-13-30 3-45 \pm				
3	Jan. 4	G-W G-W G-W G-W G-W G-W	C	iP _{ENZ} i _{ENZ} e _{NZ} i _{(E)NZ} iS _E iM _E F	4-07-18 4-07-33 4-09-03 4-09-12 4-13-29 4-21-00 5-30 \pm	6'11"	39 ^o .7	7'32"	0=3 ^h 59 ^m 42 ^s . Epicenter: 60 ^o .3 N., 145 ^o W.
4	Jan. 4	G-W G-W G-W		eP _{ENZ} eS _{EN} M _{EN} F	21-17-12 21-22-27 21-27-15 21-50 \pm	5'15"	31 ^o .3	6'21"	0=21 ^h 10 ^m 51 ^s .
5	Jan. 5	G-W G-W G-W	D	eP _{NZ} iS _{ENZ} iM _N F	6-55-17 6-59-23 7-02 7-40 \pm	4'11"	23 ^o .4	5'04"	0=6 ^h 50 ^m 13 ^s .
6	Jan. 7	G-W G-W	D	iP _{NZ} e _{EN} F	4-19-33 4-29-54 7-30 \pm				
7	Jan. 9	W-A		i _Z F	2-19-41 3-30 \pm				

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8	Jan. 12	G-W G-W		e _E eM _E F	1-23-34 1-38-25 1-50 ±				
9	Jan. 15	G-W G-W G-W		eP _E e _{EN} eL _E F	18-06-09 18-31-47 18-58-08 19-30 ±				
10	Jan. 17	G-W	D	eP _Z F	19-07-36 20-40 ±				
11	Jan. 13	G-W G-W G-W G-W	D	eP _Z e _{EN} e _{ENZ} eL _{EZ} F	8-55-11 9-04-00 9-09-30 9-24 11-00-00				
12	Jan. 21	G-W G-W G-W G-W G-W G-W G-W G-W	C C	iP _{1Z} iP _{2Z} iPR _{1Z} iScPcS _{EZ} e _{EZ} eScPcPcS _E i _{EN} eL _E eM _E F	19-41-04 19-41-22 19-45-00 19-43-28 19-51-49 19-55-13 20-14-41 20-44-00 20-50-30 22-50		154°1	19'43"	O=19h21m21s. Prob. depth = 60 km. Epicenter: 31°1 S., 57°5 E.
13	Jan. 24	G-W G-W G-W	D	eP _{ENZ} i _{ENZ} i _{EN} F	15-44-01 15-44-19 15-43-02 16-15				
14	Jan. 27	G-W G-W G-W G-W	C	iP _{EZ} e _E eL _E eM _{EZ} F	22-49-57 23-00-02 23-19-51 23-27-40 1-10		93°7	13'16"	O=22h36m41s. Epicenter: 9°5 S., 173°1 W.
<p>Minor seismic movement--- Jan. 8 18.8h.-19.4h.</p>									

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15	Feb. 3	G-W	D	iP _{ENZ}	22-23-46	09-57	78°4	11-58	O=22-11-48 Epicenter= 46°N 151°E Deep Focus
		G-W		iZ	22-23-48				
		G-W		iZ	22-24-18				
		G-W		iZ	22-26-46				
		G-W		eS _{EN}	22-33-33				
		G-W		iS _N	22-33-38				
		G-W		iN	22-33-56				
		G-W		iN	22-33-57				
		G-W		iN	22-34-06				
		G-W		eL _E	22-48-01				
		G-W		eM _{EN} F	22-52-30 00-10±				
16	Feb. 10	W-A		eE	9-56-55				
		W-A		eE	10-05-43				
				F	10-15±				
17	Feb. 18	G-W	C	iP _{NZ}	19-50-43				Epicenter about 13°N-90°W Deep Focus
		G-W		eS _{EN}	19-54-56				
		G-W		iS _N	19-55-00				
				F	20-25±				
18	Feb. 19	G-W		eNZ	9-03-06				
		G-W		eLNZ	9-27-00				
		G-W		eMNZ	9-39-00				
				F	10-20±				
19	Feb. 23	G-W	D	iP _{ENZ}	8-19-33	8-19	60°	10-02	O=8-09-31 Epicenter =19°8S. 71°W. Depth about 100km.
		G-W		C	iP _{ENZ}				
		G-W		iEZ	8-20-17				
		G-W		i _{ENZ}	8-20-30				
		G-W		i _{EN}	8-21-55				
		G-W		i _{SE}	8-27-52				

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No.	Date	Inst.	C/D	Phase	G.M.C.T.	S-P	Δ	P-O	Remarks
	Feb. 23 (cont.)	W-A G-W W-A		i _E eL _E eM _E F ₁	8-28-14 8-38-00 8-44-00 5-00 [±]				
<p>Minor Seismic Movement at 2d. 20.7h.-22.2h. 3d. 3.6h.-3.7h. 14d. 18.2h.-18.8h. 19d. 4.6h.-4.7h. 20d. 11.4h.-11.8h.</p>									

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No.	Date	Inst.	C/D	Phase	G.M.C.T.	S-P	Δ	P-O	O--Remarks
20	March 2	G-W	C	iPENZ	17-43-45	10-47	88°2	12-49	O=17-30-57 Epicenter =39°5N 143°E
		G-W		i _{EN}	17-43-50				
		W-A		iScPcSE	17-54-24				
		W-A		iSE	17-54-33				
		W-A		eL _E	18-11-54				
		W-A		iM _E	18-18-51				
		G-W		F	22-35±				
21	March 2	W-A		eP _E	18-14-34				
		W-A		eS _E	18-25-29				
22	March 2	W-A		eP _E	20-55-55				Probably after- shocks "
		W-A		eS _E	21-06-22				
23	March 2	W-A		eP _E	22-33-42				"
24	March 3	W-A		eP _E	9-25-46				"
		W-A		eS _E	9-36-25				
No Records for March 10-11.									
25	March (11)- 12	G-W		ePNZ	4-31-01				
		G-W		eSN	4-35-16				
		G-W		iSN	4-35-17				
				F	5-00±				
26	March 13	G-W		ePEZ	13-22-33				
		G-W		eS _E	13-26-19				
		G-W		iM _{ENZ}	13-31-33				

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No.	Date	Inst.	C/D	Phase	G.M.C.T.	S-P	Δ	P-O	O--Remarks
27	March 13	G-W G-W G-W		eP _{ENZ} eS _{EN} F	13-42-20 13-53-07 14-40 \pm				
28	March (14)- 15	G-W G-W G-W		e _E eM _{ENZ} F	5-22-44 5-50-16 6-51 \pm				
29	March 15	W-A G-W G-W		e _E iM _E F	11-18-49 11-27-33 11-35 \pm				
30	March 17	G-W G-W G-W G-W G-W G-W	D D	iP _{EN} iP _{ENZ} iP _{EN} iS _{EN} i _{EN} i _{EN} eL _{ENZ} eM _{ENZ} F	16-06-28 16-06-30 16-06-41 16-15-27 16-15-44 16-16-40 16-27-06 16-31-36 18-20 \pm	8-59	68 $^{\circ}$.3	Epicenter= 56 $^{\circ}$ N 160 $^{\circ}$ E O=16-55-33	
31	March 18	W-A		eP _E	23-30-19				
32	March 18	G-W G-W		iP _E iS _N F	23-37-48 23-42-06 24-20 \pm				No charac- teristic surface waves

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33	March 26	W-A		eP _E	19-11-49				
		G-W		eS _{EN}	19-16-32				
		G-W		i _E	19-16-52				
				F	19-45 [±]				

Minor Seismic Movements: Mch. 5, 9.2-10.0; Mch. 17, 13.8-14.3; Mch. 17, 19.3-22.3; Mch. 18, 3.4-5.2; Mch. 18, 19.6-20.4; Mch. 23, 18.3-19.2; Mch. 24, 2.0-2.3; Mch. 28, about 6h.

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No Records for April 1 to April 10-11.									
34	April 16	G-W	C	eZ	19-36-36				
		G-W		eENZ	19-37-06				
		G-W		iEZ	19-37-09				
		G-W		iEN	19-47-09				
		G-W		F	21-37 ⁺				
35	April 19	G-W		iP _{ENZ}	6-50-46				
		G-W		eS _{EN}	7-00-12				
		G-W		F	8-58 ⁺				
No Records for April 22-23 and 23-24.									
36	April 27	G-W	C	iP _{ENZ}	2-44-05	6-24	41 ^o .6	7-48	H=2-36-17 Epicenter= 60 ^o .7 N., 148 ^o .8 W.
		G-W		i _{ENZ}	2-44-07				
		G-W		i _{ENZ}	2-44-22				
		G-W		i _{ENZ}	2-44-37				
		G-W		iP _{cS_{EN}}	2-49-00				
		G-W		iS _{EN}	2-50-29				
		G-W		iL _E	2-56-35				
		G-W		iM _E	3-00-05				
		G-W		F	5-30 ⁺				

Minor Seismic Movements: April 16, about 7h.; April 18, 15.0-15.1;
 April 19, 13.9-14.7; April 25, 11.0-11.2; April 27, 12.2-13.5;
 April 27, 20.0-20.1; April 27, 21.4-21.8; April 28, 3.2-3.5;
 April 28, 7.0-7.2; April 28, 7.6-7.8; April 28, 12.3-13.5;
 April 28, 16.8-16.9; April 29, 7.1-7.2; April 29, 16.9-17.0;
 April 30, 4.1-4.4.

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37	May 1	G-W		e _E	10-26-05	
		G-W		e _{ENZ}	10-26-36	
		G-W		i _{ENZ}	10-29-38	
		G-W		F	10-48 [±]	
38	May 1	W-A		e _{P_E}	18-59-30	Δ=55 ⁰ .3
		G-W		e _{S_{EN}}	19-07-19	H=18-50-00
		G-W		i _{S_{EN}}	19-07-24	
		G-W		e _{L_E}	19-16-42	
		G-W		e _{M_{ENZ}}	19-22-06	
39	May 1	W-A		e _{P_E}	20-03-26	Δ=79 ⁰ .7
		G-W		i _{S_{EN}}	20-13-31	H=19-51-21
		G-W		e _{L_E}	20-28-56	
		G-W		e _M	20-36-45	
		G-W		F	21-28 [±]	
40	May 3	W-A		e _E	12-40-52	
		G-W		e _{EN}	12-47-24	
		G-W		e _{EN}	12-55-26	
		G-W		i _{EN}	12-56-27	
		G-W		F	13-28 [±]	
41	May 5	W-A		e _{P_E}	04-20-16	Δ=29 ⁰ .3
		G-W		e _{S_{EN}}	04-25-17	H=04-14-10
		G-W		e _{M_{ENZ}}	04-30-07	
		G-W		F	05-40 [±]	
42	May 6	G-W		e _{P_{NZ}}	05-40-16	Δ=32 ⁰ .5
		G-W		i _{P_{ENZ}}	05-40-19	H=05-33-44
		G-W		i _{P_{R1ENZ}}	05-40-49	Epicenter: 6.0 N. 82.5W.
		G-W		i _{NZ}	05-41-19	
		G-W		i _{NZ}	05-41-28	
		G-W		i _{S_{EN}}	05-45-41	
		W-A		e _{L_E}	05-49-22	
		G-W		e _{M_{ENZ}}	05-51-07	
		G-W		F	07-10 [±]	

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43	May 8	G-W G-W G-W W-A W-A G-W	C	iPENZ ipPENZ iSEN eL eM F	10-38-51 10-39-05 10-43-11 10-44-27 10-45-59 12-58±	$\Delta=24^{\circ}1$ H=10-33-50 Probable Depth=100 Km. Epicenter: $16^{\circ}3$ N. $102^{\circ}2$ W.
44	May 8	G-W G-W G-W G-W G-W G-W		ePENZ ePR ₁ ENZ ePR ₂ ENZ eSEN eMENZ F	18-06-26 18-06-52 18-07-03 18-10-41 18-16-35 19-06±	$\Delta=23^{\circ}5$ H=18-01-16
45	May 8	G-W G-W G-W G-W		ePENZ eSENZ eMENZ F	02-39-28 02-43-44 02-43-51 03-16±	$\Delta=23^{\circ}6$ H=02-34-10
46	May 11	G-W G-W G-W G-W G-W		iPENZ iSEN eLENZ eMENZ F	09-22-01 09-32-07 09-47-57 09-54-57 10-26±	$\Delta=80^{\circ}0$ H=09-09-54
47	May 14	G-W G-W G-W G-W		ePNZ eSNZ eMENZ F	9-18-39 09-22-55 09-28-46 09-46±	$\Delta=23^{\circ}6$ H=09-13-28
48	May 16	G-W G-W G-W		eN eLE eME	01-35-25 02-18-09 02-24-15	Very indistinct.
49	May 18	W-A G-W G-W G-W G-W		eP _E iS _{EN} eL _E eM _E F	00-06-34 00-15-38 00-30-09 00-33-51 00-44±	$\Delta=67^{\circ}9$ H=23-55-39

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50	May 19	G-W		eP _{EN}	18-10-14	H=17-55-02 Epicenter: 1 ^o .9 S. 14 ^o .3 W.
		G-W		eS _{EN}	18-20-09	
		G-W		eL _E	18-30-38	
		G-W		eM _E	18-35-16	
		G-W		F	20-26 [±]	
51	May 20	G-W		e _E	05-02-34	Very indistinct.
		G-W		eM _E	05-29-30	
		G-W		F	06-10 [±]	
52	May 22	G-W		eEN _Z	12-07-25	
		G-W		eM _{ENZ}	12-12-20	
		G-W		F	12-30 [±]	
53	May 30	G-W		eP _N	11-49-55	$\Delta=29^{\circ}.8$ H=11-43-44
		G-W		eS _{EN}	11-54-59	
		G-W		iS _{EN}	11-55-08	
		G-W		i _E	11-57-02	
		G-W		eM _{EN}	11-59-41	
		G-W		F	12-27 [±]	

Minor Seismic Movements: May 6, 20.7-21.3; May 11, 18.4-18.6;
 May 12, 20.6-20.7; May 16, 12.0-12.2; May 19, 12.0-12.2; May 20, 8.4-9.5;
 May 21, 1.1-1.6; May 21, 9.1-9.5; May 23, 7.4-7.6; May 23, 21.1-21.6;
 May 24, 15.3-15.6; May 29, 11.1-11.6.

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54	June 2	W-G W-G W-G		eP _E eS _E F	07-34-16 07-41-19 08-50±	H = 07-32-43 Δ = 48.0
	June 3	W-G		Seismic activity centering at about 18h.30m.		
55	June 4	W-G W-G W-G W-G		eP _E eS _N eL _{EN} F	13-23-53 13-28-17 13-31-29 13-42±	H = 13-18-32 Δ = 24.6
	June 6	W-G		Long phases visible at approximately 3h-30m.		
	June 7	W-G		Emergent phases between 12h. and 13h.		
56	June 8	W-G W-G W-G	D	iP _Z iS _{EN} (?) F	18-23-25 18-34-00 19-30±	Tentative epicenter: 40° N., 144° E. (May be somewhat deep.) H = 18-10-48 Δ = 85.8
57	June 10	W-G W-G W-G W-G W-G W-G W-G W-G	C	eP _N ePR _{1N} ePR _{2N} iS _E i _{EN} L _{EN} M _{EN} F	11-31-55 11-32-19 11-32-28 11-35-58 11-36-06 11-38± 11-40± (Covered by the following)	H = 11-27-05 Tentative epicenter: 17° N., 85° W. Surface waves small compared with the S group. Δ = 21.8
58	June 10	W-G W-G W-G W-G W-G		eP _Z eS _{EN} iSR _{1EN} eL _{EN} F	12-15-33 12-22-19 12-26-07 12-29± 13-30±	H = 12-07-16 Tentative epicenter: 64° N., 25° W. Δ = 45.2

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59	June 11	W-G W-G W-G W-G		ePENZ eSENZ eLENZ F	08-37-40 08-43-07 08-45-48 09-10 [±]	H = 08-31-00 $\Delta = 33.1$
	June 11			Seismic activity centering around 14h.		
	June 12			Seismic activity visible centering around 12h.		
60	June 12	W-G W-G W-G W-G W-G	C	ePZ eSEN eLEN iMEN F	15-31-38 15-38-14 15-44-46 15-47-18 17-00 [±]	H = 09-23-24 $\Delta = 43.6$
61	June 13	W-G W-G W-G	D	iPEZ iSEN F	14-29-31 14-33-54 15-30 [±]	H = 14-24-12 $\Delta = 24.4$
62	June 13	W-G W-G W-G W-G W-G		ePZ iScPcSE iSE eScPcPcSE F	20-46-22 20-56-55 20-57-15 20-57-27 (Covered by following)	H = 20-32-26 $\Delta = 102.1$
63	June 13	W-G W-G W-G W-G W-G W-G W-G W-G	C	ePZ iSEN iSR ₁ EN iSR ₂ EN eScSE eLEN iMEN F	22-27-46 22-34-14 22-37-26 22-38-16 22-39-06 22-41 [±] 22-42-20 24-10 [±]	H = 22-20-00 $\Delta = 42.2$ Tentative epicenter: 61° N., 149° W. (Located by data from seven sta- tions)
64	June 16	W-G W-G W-G W-G	D	ePZ eSEN eLEN iMEN	01-02-07 01-06-07 01-08-07 01-09 [±]	H = 00-57-14 $\Delta = 21.8$

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65	June 18	W-G	D	eP _Z	04-07-12			
		W-G		eS _c P _c S _{EN}	04-17-46			
		W-G		eS _c P _c P _c S _{EN}	04-18-20			
		W-G		eS _{EN}	04-18-30			
		W-G		F	06-30 ⁺			
66	June 18	W-G	C	iP _Z	21-50-31	H = 21-37-42 Δ = 89 ^o .1 Tentative epicenter: 38 ^o N., 143 ^o E. Probable depth = 40-50 km.		
		W-G	C	iP _c P _Z	21-50-37			
		W-G	D	ipP _Z	21-50-41			
		W-G	C	iPR ₁ Z	21-53-47			
		W-G		iS _c P _c S _{EN}	22-00-57			
		W-G		iS _c P _c P _c S _{EN}	22-01-15			
		W-G		iS _{EN}	22-01-15			
		W-G		isS _{EN}	22-01-30			
		W-G		iS _c S _{EN}	22-01-39			
		W-G		iPS _{EN}	22-02-14			
		W-G		iPPS _{EN}	22-02-36			
		W-G		iSR ₁ EN	22-07-18			
		W-G	D	P _c P _c P _c P _{EN}	22-08-11			
		W-G		iSR ₂ EN	22-11-08			
		W-G		ePR ₂ EN	22-17-18			
		W-G		eL _{EN}	22-20 ⁺			
		W-G		M _{EN}	22-26 ⁺			
		W-G	June 19		F		01-30 ⁺	
		67	June 19	W-G			eP _Z	18-55-45
	W-G				PR ₂ EN		18-57-45	
W-G				P _c P _{EN}	18-57-45			
W-G				iS _{EN}	19-02-08			
W-G				eSR ₂ EN	19-05-29			
W-G				eS _c S _{EN}	19-05-59			
W-G				iL _{EN}	19-09-46			
W-G				iM _{EN}	19-13-16			
W-G				F	21-00 ⁺			

No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
68	June 24	W-G	D	iP ¹ Z	22-14-19	H = 21-54-44
		W-G	C	i(?)Z	22-14-21	Tentative epicenter:
		W-G	C	iPR ₁ Z	22-17-16	4° S., 101° E.
		W-G	C	S _C P _C FZ	22-17-36	Δ = 144.93
		W-G	D	iPR ₂ Z	22-20-33	
		W-G		iS _C P _C SE	22-20-50	
		W-G		iS _C P _C P _C SE	22-24-47	
		W-G		iSEN	22-26-10	
		W-G		iPS _C P _C SEN	22-28-48	
		W-G		iPR ¹ Z	22-30-38	
		W-G		iS _C P _C P _C S'E	22-31-09	
		W-G		iPPSEN	22-31-21	
		W-G		iPR ³ Z	22-34-03	
		W-G		iPS _C P _C S'E	22-36-13	
		W-G		iPR ⁴ Z	22-36-43	
		W-G		eSR ₁ EN	22-37-19	
		W-G		eSR ₂ EN	22-42-44	
		W-G		eLEN	22-44±	
		W-G		MEN	22-55±	
		June 25	W-G	F		02-30±
	June 25	Quake registered, but records were over developed.				
	June 27	Seismic activity centering around 4h-30m. G.M.T.				
	June 27	Seismic activity centering around 16h. G.M.T.				
	June 27	Seismic activity centering around 23h.				
	June 28	Seismic activity centering around 10h.				
69	June 28	W-G	C	iP _Z	23-44-05	H = 23-35-11
			D	ipP _Z	23-44-17	Tentative epicenter
				ePR ₁ EN	23-46-11	53° N., 163° W.
				iSTN	23-51-22	Δ = 50.1
				isSEN	23-51-41	
				iPS _{EN}	23-51-49	Ratio $\frac{sS-S}{pP-P} = 1.6$
				eSR ₂ EN	23-55-30	Probably 50-60 km deep.

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No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
	June 28 (cont.) June 29			eL _{EN} F	23-58-35 02-00±	
70	June 29	W-G		eP _{ENZ} i(?) _{EN} ePR ₁ _{ENZ} i _{SEN} F	02-41-37 02-41-46 02-42-01 02-48-54 03-20±	H = 02-32-43 Same epicenter as above: Aftershock of No.69 $\Delta = 50^{\circ}1$
	June 29	Seismic activity centering around 4h and 13h.				

Donald C. Bradford
Graduate Assistant

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17.

No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
	July 1	Seismic activity centering around 20h-50m.				
	July 3	Seismic activity centering around 7h-30m.				
71	July 9	W-G W-G W-G W-G W-G W-G W-G W-G	D D	iPz ePR1Z eS EN iPS EN eSR1EN eSR2EN eLEN eMEN F	01-42-17 01-45-22 01-52-19 01-52-59 01-57-20 02-00-30 02-08-10 02-14-00 03-30±	H = 01-30-15 Tentative epicenter 44°5 N., 152°3 W. Δ = 79°2 (Location by means of five stations).
72	July 9	W-G W-G W-G W-G W-G W-G W-G W-G W-G W-G W-G	C D D	iPz ePR1Z ePcPz iSEN iSR1EN iSR2EN eLEN iLEN iMEN iScSEN F	05-39-43 05-40-15 05-43-19 05-44-09 05-45-05 05-45-15 05-46-19 05-47-04 05-47-20 05-50-44 06-30±	H = 05-34-20 Tentative epicenter 17°4 N., 104°7 W. Δ = 24°8 (Location by means of six stations.)
73	July 9	W-G W-G W-G W-G W-G W-G	C	iPz ePcPz eSEN ePSEN eSR1EN eLEN F	09-40-14 09-40-38 09-50-12 09-50-54 09-55-36 10-07± 11-15±	H = 09-28-17 Tentative epicenter: 45°3 N., 153°2 E. Δ = 78°2 (Location by means of four stations.)

No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
74	July 9	W-G	C	ePZ	12-42-51	H = 12-30-49 Tentative epicenter: 44°5 N., 152°3 E. Δ = 7992 (Location by means of five stations)
		W-G	D	iPZ	12-42-56	
		W-G	C	iP _C PZ	12-43-11	
		W-G		ePR ₁ Z	12-46-10	
		W-G		iS _{EN}	12-52-54	
		W-G		iPS _{EN}	12-53-36	
		W-G		iS _C S _{EN}	12-53-54	
		W-G		iSR ₁ EN	12-58-23	
		W-G		eLEN	12-09-50	
		W-G		eMEN	12-14-20	
		W-G		F	15-20±	
		July 9 Seismic activity centering around 23h.				
75	July 10	W-G	C	iP _{EN}	00-34-19	
		W-G		eScPcS (?)	00-45-01	
		W-G		eEN	00-45-59	
76	July 10	W-G	C	iPZ	03-27-11	H = 03-22-02 Tentative epicenter: 17°8 N., 104° W. Probably of the order of 80 km deep. Δ = 24°4 (Location by means of eight stations)
		W-G	D	iPR ₁ Z	03-27-42	
		W-G	C	iPR ₂ Z	03-27-53	
		W-G	C	iPR ₃ Z	03-27-56	
		W-G	D	iP _C PZ	03-30-59	
		W-G		iSE	03-31-27	
		W-G		iSR ₁ E	03-32-08	
		W-G		iSR ₂ N	03-32-15	
		W-G		iLEN	03-33-45	
		W-G		iP _C S _N	03-34-27	
		W-G		iMEN	03-35-31	
		W-G		iS _C S _{EN}	03-39-13	
		W-G		F	05-30±	
July 10 Long waves registered at about 9h.						
77	July 10	W-G	D	iPZ	10-54-27	H = 10-46-03 Δ = 46°1
		W-G		PcP _{EN} (?)	10-55-42	
		W-G		eS _{EN}	11-01-19	
		W-G		eLEN	11-08±	
		W-G		F	12-30±	

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19.

No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
	July 14	Seismic activity centering around 2h.				
	July 15	Seismic activity centering around 1h.				
	July 16	Seismic activity centering around 0h-30m.				
78	July 18	W-G W-G W-G W-G W-G W-G	C	ePz eSE ePSEN eScSEN eMEN F	19-24-43 19-34-13 19-34-45 19-35-32 19-54± 20-30±	H = 19-13-19 Δ = 72°7
	July 19	Seismic activity centering around 0h-30m.				
79	July 19	W-G W-G W-G W-G W-G	C	ePz eSEN eSR1E eLEN F	05-12-28 05-17-16 05-18-26 05-20-30 06-10±	H = 05-06-37 Δ = 27°6
80	July 19	W-G W-G W-G W-G	C	ePz eSEN eLEN F	10-55-16 11-03-13 11-12-40 (covered by following)	H = 10-45-40 Tentative epicenter: 50° N., 170° W. Δ = 56°1 (Probably somewhat deep). (Located by intersections from three stations).
81	July 19	W-G W-G W-G W-G		iPz iSEN iEN F	11-03-44 11-11-37 11-11-57 13±	H = 10-54-09 Δ = 55°9 (Probably in same area as that above)

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20.

No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
82	July 19	W-G W-G W-G W-G W-G	C D	iPZ ipPZ iS _{EN} isS _{EN} F	13-42-10 13-42-23 13-50-04 13-50-22 (covered by following)	H = 13-32-44 Tentative epicenter: 50° N., 170° W. Δ = 56.1 (Estimated depth equal to 80 km)
83	July 19	W-G W-G W-G W-G W-G W-G	C D	iPZ ipPZ iz ePR ₁ EN iS _{EN} isS _{EN} iPS _{EN}	15-09-40 15-09-48 15-09-53 15-12-25 15-17-34 15-17-52 15-18-15	H = 15-00-11 Tentative epicenter: 50° N., 170° W. Δ = 56.1 (Approximately the same depth as of 13-32-44)
84	July 19	W-G W-G	D	ePENZ eSE	20-20-25 20-30-54	H = 20-07-54 Δ = 84.6
85	July 20	W-G W-G W-G W-G	C C	ePENZ ipPZ eSE esSE	04-15-39 04-15-54 04-22-46 04-23-10	H = 04-06-57 Δ = 48.6 (Probably about 80 km deep).
86	July 20	W-G W-G W-G		ePEN eS _{EN} F	18-27-36 18-38-15 19-00±	H = 18-14-56 Δ = 86.8
87	July 21	W-G W-G		ePENZ eS _{EN}	07-06-01 07-10-09	H = 07-00-57 Δ = 22.9
88	July 21	W-G W-G		ePENZ eS _{EN}	07-09-57 07-17-07	H = 07-01-11 Δ = 49.1
89	July 21	W-G W-G		ePENZ eS _{EN}	20-24-47 20-32-25	H = 20-15-28 Δ = 53.8

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21.

No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
90	July 22	W-G	C	iPz	21-04-38	H = 20-55-18 Tentative epi- center: 51°9 N., 166°1 W. $\Delta = 53^\circ$ Ratio $\frac{sS-S}{pP-P} = 1.84$ Probable depth= 80-100 km (May be somewhat modified, if depth is taken into account)
		W-G	C	ipPz	21-04-57	
		W-G	C	iPcPz	21-06-14	
		W-G	C	iPRIZ	21-06-47	
		W-G		iPcSE	21-10-01	
		W-G		iSE	21-12-10	
		W-G		isSE	21-12-45	
		W-G		iLEN	21-19-45	
		W-G		MEN	21-23±	
	July 23	W-G		F	01-45±	
91	July 23	W-G	C	iPz	04-22-45	H = 04-13-19 $\Delta = 54^\circ 7$
		W-G		iSE	04-30-30	
		W-G		FEZ	05-20±	
92	July 23	W-G	C	iPz	09-45-32	H = 09-37-56 $\Delta = 40^\circ 1$
		W-G		eS	09-51-47	
		W-G		F	10-30±	
93	July 24	W-G	D	ePz	19-08-55	H = 18-55-35 Tentative epi- center: 15°2 S., 174°5 W. $\Delta = 94^\circ 7$
		W-G		iScPcSEN	19-19-32	
		W-G		iscPcPcSE	19-20-11	
		W-G		eSEN	19-20-28	
		W-G		F	21-45±	
94	July 26	W-G		iMEN	05-18-37	Other phases indistinct.
		W-G		F	06-20±	
95	July 30	W-G		ePz	17-33-28	H = 17-26-07 $\Delta = 38^\circ 2$
		W-G		eSE	17-39-31	
		W-G		F	19-30	

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No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
96	July 31	W-G	D	ePz	11-43-10	H = 11-35-38 Δ = 39.6
		W-G		eS _{EN}	11-49-22	
		W-G		eL _{EN}	11-54±	
		W-G		iM _{EN}	11-58-15	
		W-G		F	12-10±	
97	July 31	W-G	D	iPz	16-32-37	H = 16-23-18 Δ = 53.7
		W-G		iS _{EN}	16-40-16	
		W-G		F	17-15±	

James B. Macelwane, S.J.
Director

Donald C. Bradford
Assistant

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No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
96	July 31	W-G W-G W-G W-G W-G	D	ePz eS _{EN} eL _{EN} iM _{EN} F	11-43-10 11-49-22 11-54± 11-58-15 12-10±	H = 11-35-38 Δ = 39 ^o .6
97	July 31	W-G W-G W-G	D	iPz iS _{EN} F	16-32-37 16-40-16 17-15±	H = 16-23-18 Δ = 53 ^o .7

James B. Macelwane, S.J.
Director

Donald C. Bradford
Assistant

FLORISSANT

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23.

No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
	Aug. 2	Seismic activity centering around 4h.				
98	Aug. 4	W-A W-A W-A W-A		iP _n E iP _g E eS _n E iS _g E	04-34-37.5 04-34-38.0 04-34-49.6 04-34-51.2	H = 04-34-15 Δ = 98 km Fault zone near St. Mary's, Mo. For particulars, see St. Louis Bulletin for Aug., 1933.
	Aug. 5	Seismic activity centering around 1h.				
	Aug. 6	Seismic activity centering around 3h and also around 8h-30p.				
99	Aug. 7	W-G W-G W-G W-G		eP _{EN} eP _c P _{EN} eS _{EN} F	03-08-25 03-12-34 03-13-00 04-30±	H = 03-02-51 Δ = 25°9 Probably some- what deep.
	Aug. 11	Seismic activity centering about the 10h.				
100	Aug. 12	W-A W-G W-G		eP _E eS _{EN} F	09-10-03 09-14-21 09-40±	H = 09-04-50 Δ = 23°8 Probably some- what deep.
101	Aug. 13	W-G W-G W-G	D	iP' ₁ Z eL _{EN} F	09-47-51 10-30± 12-00±	
	Aug. 15	Seismic activity centering around 1h, 4h, and 23h-40m.				

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24.

No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
102	Aug. 25	W-A		ePEN	08-04-56	H = 07-50-36 Tentative epi- center: 30°9 N, 103°2 E. Δ = 109°1 (See Supplementary Bulletin)
		W-G		eP ₁ N	08-08-51	
		W-G		iPR ₁ EN	08-09-29	
		W-G		iPR ₂ EN	08-11-45	
		W-G		iScPcSEN	08-15-39	
		W-G		iScPcPcS _{EN}	08-16-31	
		W-G		iSEN	08-17-08	
		W-G		iScSEN	08-17-16	
		W-G		iPS _{EN}	08-18-51	
		W-G		i(?) _{EN}	08-19-18	
		W-G		iPPS _{EN}	08-19-57	
		W-G		PcPcPcPN	08-20-33	
		W-G		iSR ₁ N	08-24-58	
		W-G		ScPcPcS' _N	08-27-51	
		W-G		iPR' ₂ N	08-28-15	
		W-G		eSR ₂ N	08-28-50	
		W-G		i(?) _N	08-30-37	
		W-G		iPR' ₃ N	08-33-06	
		W-G		eLN	08-41±	
		W-G		iMN	08-49-36	
W-G		F	11-30±			
103	Aug. 28	W-G	C	iPZ	22-34-18	H = 22-19-46 Tentative epi- center: 58° S, 27° W (See Supplemen- tary Bulletin) *(well developed phases) Δ = 109°9
		W-G	D	iP ₁ Z	22-38-12	
		W-G	D*	iPR ₁ Z	22-39-03	
		W-G		*iPR ₂ Z	22-41-30	
		W-G		ScPcS _{EN}	22-44-30	
		W-G		ScPcPcS _N	22-45-30	
		W-G		SN	22-46-11	
		W-G		ScSN	22-46-23	
		W-G		*iPS _N	22-48-36	
		W-G		*iPPS _N	22-49-35	
		W-G		*iPcPcPcPZ	22-50-23	
		W-G		*iSR ₁ N	22-54-18	
		W-G		*iScPcPcS'	22-57-22	
		W-G		*iPR' ₂ Z	22-57-34	

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No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
	Aug. 28 (cont.)	W-G		iSR ₂ N	22-58-31	
		W-G		iPR' ₃ Z	23-00-47	
		W-G		LEN	23-10±	
		W-G		MEN	23-18±	
	Aug. 29	W-G		F	02-30±	
104	Aug. 29	W-A	C	iP _E	15-00-58	H = 14-52-38
		W-G	C	ipP _{EZ}	15-01-58	Tentative epicen-
		W-G		iPR _{1Z}	15-02-54	ter: 8°3' S, 70°8' W
		W-A		iS _E	15-07-39	Approximately
		W-A		iSP _{EN}	15-07-49	400 km deep.
		W-A		isS _E	15-09-40	Δ = 50°4
		W-A		F	16-00±	
	Aug. 31	Seismic activity centering around 03-10-20				

James B. Macelwane, S.J.
Director

Donald C. Bradford
Assistant

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

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No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
105	Sept. 2	W-G	D	iPz	16-53-35	H = 16-41-12 Tentative epicen- ter: 5° N, 178° E Approximately 400 km deep. Δ = 87.9
		W-G		ipPz	16-55-06	
		W-G		i(?)z	16-55-12	
		W-G		iPR ₁ Z	16-58-07	
		W-G		iS _{EN}	17-03-59	
		W-G		iSP _{EN}	17-04-32	
		W-G		iPS _{EN}	17-04-51	
		W-G		ipS _{EN}	17-06-16	
		W-G		isS _{EN}	17-06-51	
		W-G		iSR ₁ EN	17-10-40	
		W-G		F	18-10±	
106	Sept. 6	W-G		iPz	22-21-28	H = 22-08-29 Tentative epicen- ter: 24° S, 178° W Probably about 600 km deep. Δ = 103.0
		W-G		ipPz	22-23-53	
		W-G		iP ⁺ z	22-25-47	
		W-G		iPR ₁ Z	22-25-53	
		W-G		iPR ₂ Z	22-28-57	
		W-G		iS _c P _c S _{EN}	22-31-03	
		W-G		iS _c P _c P _c S _{EN}	22-31-51	
		W-G		iS _{EN}	22-32-23	
		W-G		iSP _{EN}	22-34-43	
		W-G		iPS _{EN}	22-34-53	
		W-G		ipS _{EN}	22-35-27	
		W-G		isS _{EN}	22-36-26	
		W-G		iSR ₁ EN	22-39-43	
		W-G		F	23-30±	
	Sept. 19	W-G		Emergent phases centering around 23h-50m.		
107	Sept. 24	W-G		iPz	15-29-34	H = 15-19-50 Tentative epi- center: 51.9° N, 174.4° W Probable depth= 50 km. Δ = 57.1
		W-G		ipPz	15-29-45	
		W-G		iPcPz	15-30-29	
		W-G		iPR ₁ Z	15-31-57	
		W-G		iPR ₂ Z	15-32-50	
		W-G		iS _{EN}	15-37-34	
		W-G		isS _{EN}	15-37-53	

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No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
	Sept. 24 (cont.)	W-G		iPSEN	15-38-23	
		W-G		iScSEN	15-40-08	
		W-G		iSR ₁ EN	15-40-54	
		W-G		F	17-00±	
	Sept. 25	Seismic activity centering around 20h. Phases indistinct.				
	Sept. 27	Seismic activity centering around 23h.				
108	Sept. 30	W-G	C	ePz	14-41-44	H = 14-29-56
		W-G		eSN	14-51-34	Δ = 76°6
		W-G		F	17-00±	

James B. Macelwane, S.J.
Director

Donald C. Bradford
Assistant

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No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
109	Oct. 2	W-G		eP _Z	09-15-33	H = 09-10-24 Δ = 23 ^o 4
		W-G		iS _{EN}	09-19-47	
		W-G		iL _E	09-24-17	
		W-G		F	10-15-±	
110	Oct. 2	W-G	D	iP _Z	15-37-13	H = 15-29-50 Δ = 42 ^o 5 Tentative epi- center: 2 ^o 5 S, 80 ^o W. Depth probably about 230 km.
		W-G		ipP _Z	15-38-01	
		W-G		iPR _{1Z}	15-38-53	
		W-G		iPR _{2Z}	15-39-28	
		W-G		iS _{EN}	15-43-26	
		W-G		isS _{EN}	15-44-42	
		W-G		eSR _{1EN}	15-46-50 20-±	
111	Oct. 3	W-G	D	iP _N	10-29-16	H = 10-21-39 Δ = 38 ^o 9
		W-G		iPR _{1N}	10-30-57	
		W-G		iS _{EN}	10-35-24	
		W-G		F	12-±	
112	Oct. 3	W-G		iP _N	14-29-42	H = 14-22-06 Δ = 40 ^o 1
		W-G		iPR _{2N}	14-31-22	
		W-G		iS _N	14-35-57	
		W-G		F	15-30-±	
113	Oct. 10	W-A		iP _E	13-39-46	H = 13-34-51 Δ = 22 ^o 0 Probably about 100 km deep.
		W-G		ipP _Z	13-40-05	
		W-G		iS _{EN}	13-43-47	
		W-G		isS _{EN}	13-44-35	
114	Oct. 14	W-A	D	iP _E	22-28-01	H = 22-19-13 Probably about 100 km deep.
		W-G		ipP _Z	22-28-24	
		W-G		iS _{EN}	22-35-13	

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No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
114	Oct. 14 (cont.)	W-G W-G W-G		esSEN L(?) F	22-35-54 22-43-± 24-15-±	$\Delta = 49^{\circ}4$
	Oct. 16	Seismic activity at about 3h-15m.				
115	Oct. 17	W-G W-G W-G	D	iP _Z iS _{EN} F	13-39-23 13-43-57 14-30-±	H = 13h-33m-50s $\Delta = 25^{\circ}8$
116	Oct. 25	W-G W-G W-G W-G W-G W-G W-G W-G W-G	D D C C D	iP _Z ipP _Z isP _Z iP _c P _Z iPR ₁ Z iS _{EN} isS _{EN} iS _c S _{EN} iSR ₁ EN F	23-38-38 23-39-14 23-39-34 23-39-40 23-39-50 23-47-05 23-48-11 23-48-53 23-51-35 25-30-±	H = 23-28-28 $\Delta(S-P)_{180} = 64^{\circ}1$ Tentative epi- center: 22°0 S, 68°0 W. Probable depth of focus = 180 km.

James B. Macelwane, S.J.
Director

Donald C. Bradford
Assistant

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

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

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No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
	Nov. 1	Seismic activity at about 15h-30m.				
117	Nov. 2	W-G W-G W-G W-G W-G W-G	C C	iPz ipPz iS _{EN} isS _{EN} eL _{EN} F	12-36-52 12-37-08 12-44-50 12-45-15 12-56± 15-00±	H=12-27-08 Possibly about 100-130 km. deep. $\Delta(S-P) = 57^{\circ}2$
	Nov. 3	Seismic activity at about 10h-40m.				
118	Nov. 4	W-A W-G W-G		eP _E eS _E eL _{EN}	08-48-03 08-53-32 08-55±	H=08-41-19 $\Delta=33^{\circ}3$
119	Nov. 4	W-G W-G		eP _Z eS _{EN}	20-35-14 20-39-31	H=20-30-02 $\Delta=23^{\circ}7$
120	Nov. 14	W-G W-G W-G W-G W-G W-G	D	iPz ipPz isPz iPR ₁ Z iS _{EN} isS _{EN}	14-16-34 14-17-02 14-17-16 14-20-00 14-25-58 14-26-46	
121	Nov. 16	W-A W-A		iP _E iS _E	09-29-05 09-29-09	$\Delta=31.5$ km. Epicenter near Grover, Missouri. (Saint Louis County) 38°6 N, 90°6 W.
	Nov. 17	Seismic activity around 4h-30m.				
	Nov. 19	Seismic activity around 3h-50m. (Timing Failed.)				

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No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
122	Nov. 20	W-G W-G W-G W-G W-G W-G W-G W-G	C	iPZ ipPENZ iPR1Z iPR2Z iPcPZ iSEN isSEN F	23-28-33 23-28-44 23-29-38 23-30-00 23-31-02 23-34-10 23-34-27 27-30±	H=23-21-40 Tentative epicenter: 72° N, 70° W. Probable depth 30km. (This earthquake is being studied at Kew Observatory.) Δ=34.3
123	Nov. 21	W-G W-G W-G W-G	C	iPZ eSEN iLEN F	23-55-08 23-00-02 00-02-09 01-30±	H=23-49-11 Δ=28.3
124	Nov. 22	W-G W-G	D	iPZ iSEN	04-58-24 05-03-30	H=04-52-11 Δ=30.1
	Nov. 22	W-G	Seismic activity around 08h-30m.			
125	Nov. 22	W-G W-G W-G W-G W-G W-G W-G W-G W-G W-G	D	iPRZ iSKSE iSKKSE i(?)E iSE ePSE eSR1E LEN MEN F	13-01-59 13-07-49 13-09-05 13-09-17 13-09-34 13-11-40 13-17-57 13-35-30 13-44± 16-00±	H=12-42-26 Δ=114.4 Tentative epicenter: 3° S, 150.4 E.
126	Nov. 23	W-G W-G W-G W-G W-G W-G W-G		iPZ PR1Z PR2Z iSN SR1E LEN F	19-04-05 19-04-58 19-05-07 19-09-14 19-10-43 19-12± 20-30±	H=18-57-50 Δ=30.1 Tentative epicenter: 8.8 N, 83.5 W.
127	Nov. 29	W-G W-G		ePZ eSEN	05-09-28 05-16-50	H=05-00-28 Δ=50.8

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32.

No.	Date	Inst.	C/D	Phase	G.M.C.T.	H--Remarks
	Dec. 2			Seismic activity centering around 21 hour.		
128	Dec. 12	W-G W-G W-G W-G W-G W-G W-G		i _{EN} i _{EN} i _{EN} i _{EN} i _{EN} i _{EN} F	14-30-52 14-36-37 14-36-54 14-37-44 14-38-01 14-40-30 17-00 ⁺ _±	
129	Dec. 13	W-G W-G W-G W-G W-G W-G	C	i _{PZ} i _{PR1Z} i _{PR2Z} i _{PcP(?)Z} i _{SEN} F	21-28-51 21-29-20 21-29-35 21-32-09 21-33-08 23-30 [±]	Tentative epicenter: 18°5 N, 103°5 W. Provisional H=21h23m47s. Δ=23°7
130	Dec. 14	W-G W-G W-G W-G W-G W-G W-G	C	i _{PZ} i _{PR1Z} i _{SENZ} i _{SR1N} e _{LEN} i _{MEN} F	07-21-36 07-22-07 07-25-53 07-26-37 07-28-18 07-30-45 09-00 [±]	Provisional H=07h16m30s. Tentative epicenter: 18° N, 103°5 W. Δ=23°7
131	Dec. 15	W-G W-G W-G W-G W-G W-G	C C	i _{PZ} i _{PR1Z} e _{PR2Z} i _{SEN} e _{LEN} F	07-49-50 07-51-24 07-51-54 07-56-05 08-02-19 09-30 [±]	Provisional H=07h42m15s. Tentative epicenter: 54°2 N, 35°0 W. Δ=40°0
	Dec. 16			Seismic activity centering around 12 h.		
	Dec. 19			Seismic activity centering around 4 h.		

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132	Dec. 19	W-G		eP _{ENZ}	17-54-57	Possibly deep. Characterized by long continuation of P phases.
		W-G		L(?) _{ENZ}	18-06-15	
		W-G		F	18-30±	
	Dec. 21			Seismic activity centering around 1 h.		
133	Dec. 21	W-G		eP _{ENZ}	04-40±	
		W-G		iS _{EN}	04-52-23	
	Dec. 23			Seismic activity centering around 12 h.		

Donald C. Bradford
Assistant

James B. Macelwane, S.J.
Director