EARTHQUAKE ACTIVITY IN THE YELLOWSTONE REGION

Preliminary Epicenters

July 1 – September 30, 2023

Prepared by the University of Utah Seismograph Stations and funded by
the U.S. Geological Survey (Cooperative Agreement No. G21AC10068)

December 21, 2023

Foreword and Data Explanation

This report contains an epicenter map (Figure 1) and listings of earthquakes (Tables 1 and 2) detected and located in the Yellowstone region (lat. 44° 00′ – 45° 10′ N, long. 109° 45′ – 111° 30′ W). The computer program HYPOINVERSE-2000 (F. W. Klein, 2012, U.S. Geological Survey Open-File Report 02-171 revised) was used to process the earthquake data. This report also includes maps and a table of operating seismograph stations in the University of Utah's Yellowstone seismic network (Figure 2, Table 3).

The earthquake listing in Table 2 is estimated to be systematically complete above magnitude 1.5 within Yellowstone. *These data are preliminary—both the locations and magnitudes in this table are subject to revision.*

The following data are listed for each earthquake in Table 2:

- Date (yymmdd) and origin time in Coordinated Universal Time (UTC). To convert to local time, subtract seven hours for Mountain Standard Time (MST) and six hours for Mountain Daylight Time (MDT). During the report period, local time was MDT.

- Earthquake location coordinates in degrees and minutes of north latitude and west longitude, and depth in kilometers below sea level. Note that prior to October 1, 2012, the earthquake depths in these quarterly reports were computed relative to a datum of 2000 m above sea level.

- "*" indicates poor depth resolution: no recording stations within 10 km or twice the depth.

- MAG, the computed Richter local magnitude (M_L) for each earthquake. "W" indicates that peak amplitude measurements from Wood-Anderson records were used. Otherwise, the estimate is calculated from signal durations and is more correctly identified as coda magnitude (M_C). The notation "--" indicates that a reliable magnitude estimate could not be made.

- NO, the number of P and S readings used in the solution.

- GAP, the largest azimuthal separation in degrees between recording stations used in the solution.

- DMN, the epicentral distance in kilometers to the closest station.

- RMS, the weighted root-mean-square of the travel-time residuals in seconds:

$$RMS = \left(\frac{\sum_i (W_i R_i)^2}{\sum_i (W_i)^2} \right)^{\frac{1}{2}}$$

where: R_i is the observed minus the computed arrival time for the i-th P or S reading, and W_i is the relative weight given to the i-th P or S arrival time (0.0 for no weight through 1.0 for full weight).

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July 1 – September 30, 2023

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During the three-month period July 1 through September 30, 2023, the University of Utah Seismograph Stations (UUSS) located 311 earthquakes within the Yellowstone region (Figure 1). The total includes no earthquakes in the magnitude 3 range, and 9 earthquakes in the magnitude 2 range. The largest event to occur during this period was a magnitude 2.8 earthquake on September 10. No earthquakes were reported felt in the region during the report period (see Table 1, a cumulative tabulation of earthquakes that were felt in the Yellowstone region during 2023). Additional information on earthquakes within the Yellowstone region is available from the University of Utah Seismograph Stations.

Online Information

A complete copy of this report, including maps and the earthquake catalog, is available on the UUSS web site at *https://quake.utah.edu/earthquake-center/quarterly-seismicity-reports*.

Note: On October 1, 2012, UUSS began using the ANSS Quake Monitoring System (AQMS) software package for data acquisition and data processing. The primary effect on the data reported herein comes from computing the earthquake locations with a newer version of the computer program HYPOINVERSE-2000 (F. W. Klein, 2012, U.S. Geological Survey Open-File Report 02-171 revised) and a revised and expanded set of velocity models. As implemented at UUSS, this new version of the location program accounts for station elevation differences more accurately and reports focal depths relative to sea level instead of the 2000 m elevation datum used previously.

For earthquakes of magnitude 3 and larger in the Yellowstone region, the U. S. Geological Survey automatically posts a Community Internet Intensity Map (CIIM) on its "Did You Feel It?" web page at http://earthquake.usgs.gov/earthquakes/dyfi/. We encourage anyone who feels an earthquake to report their observations on this interactive web site; felt information is available by zip code on the CIIM site or can be obtained from UUSS directly.

Earthquakes of Magnitude 3.0 or Larger

None

Notable Swarm Seismicity

During the report period, there were four earthquake swarms in the Yellowstone region. For reporting purposes, we use the Mogi definition [Mogi, 1963] of a swarm and require each swarm to have ten or more earthquakes. Note that typically, around 50% of Yellowstone earthquakes occur as part of a seismic swarm [Farrell et al., 2009].

A. A swarm of 15 earthquakes ($0.0 \leq M \leq 1.5$) occurred about 10.9 mi NE of West Yellowstone, MT from July 11th – 13th.
B. A swarm of 13 earthquakes ($0.3 \leq M \leq 1.8$) occurred about 6.4 mi SE of Madison Junction, YNP on August 2nd.
C. A swarm of 10 earthquakes ($-0.1 \leq M \leq 1.9$) occurred about 13.6 mi NE of West Yellowstone, MT from August 24th – 26th.
D. A swarm of 13 earthquakes ($-0.4 \leq M \leq 2.8$) occurred about 10.6 mi NE of West Yellowstone, MT from September 9th – 11th.

These swarms are labeled in Figure 1.

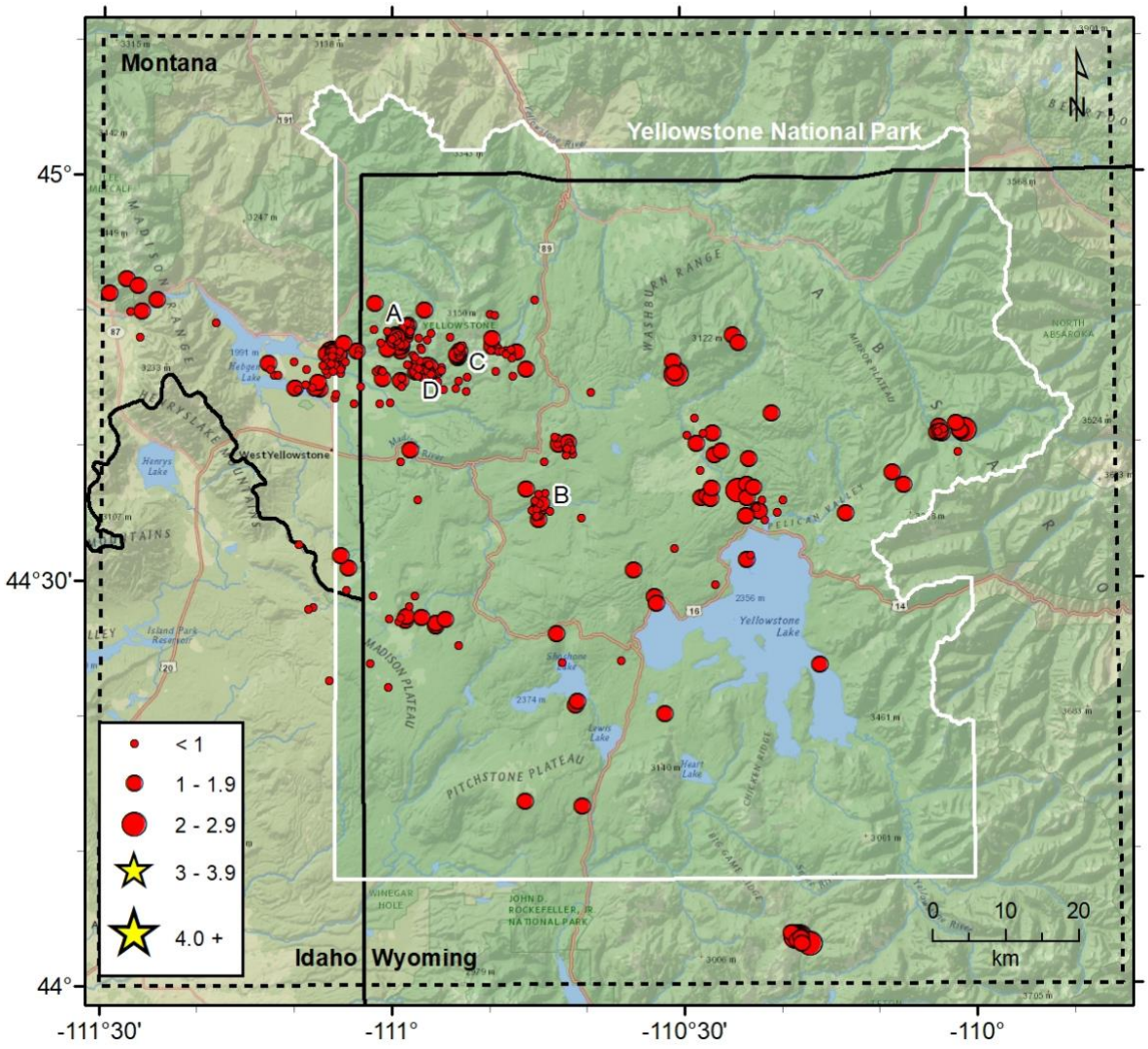

Figure 1. Epicenters of earthquakes located by the University of Utah Seismograph Stations, July 1, 2023, through September 30, 2023. Earthquake swarms (labeled A–D) are discussed in the text.

Table 1

EARTHQUAKES FELT IN THE YELLOWSTONE REGION
January 1, 2023, to September 30, 2023

Date	Time†	Felt Information‡	Latitude	Longitude	Magnitude§
March 29	08:24 MDT 14:24 UTC	Yellowstone. Felt (III) at Yellowstone National Park.	44º 31.52′	110º 21.67′	M_L 3.7

† Times are listed both as Local Time—Mountain Standard Time (MST) or Mountain Daylight Time (MDT)—and as Coordinated Universal Time (UTC).
? Indicates on-line reports that appear questionable given the distance from the source
‡ *CIIM* indicates the availability of a Community Internet Intensity Map (http://earthquake.usgs.gov/earthquakes/dyfi), compiled by the U.S. Geological Survey (USGS); *ShakeMap* indicates the availability of computer-generated maps of ground-shaking (*https://quake.utah.edu*), produced by the University of Utah Seismograph Stations (UUSS). Roman numerals correspond to the Modified Mercalli intensity scale. Unless otherwise indicated, felt information is from the USGS (1) CIIM reports and/or (2) PDE Monthly (or) Weekly Listing Files (http://earthquake.usgs.gov/data/pde.php).
§ Richter local magnitude (M_L) or coda magnitude (M_C) determined by UUSS. If labeled "NEIC," data are from the National Earthquake Information Center of the USGS.

Yellowstone Seismic Network
September 30, 2023

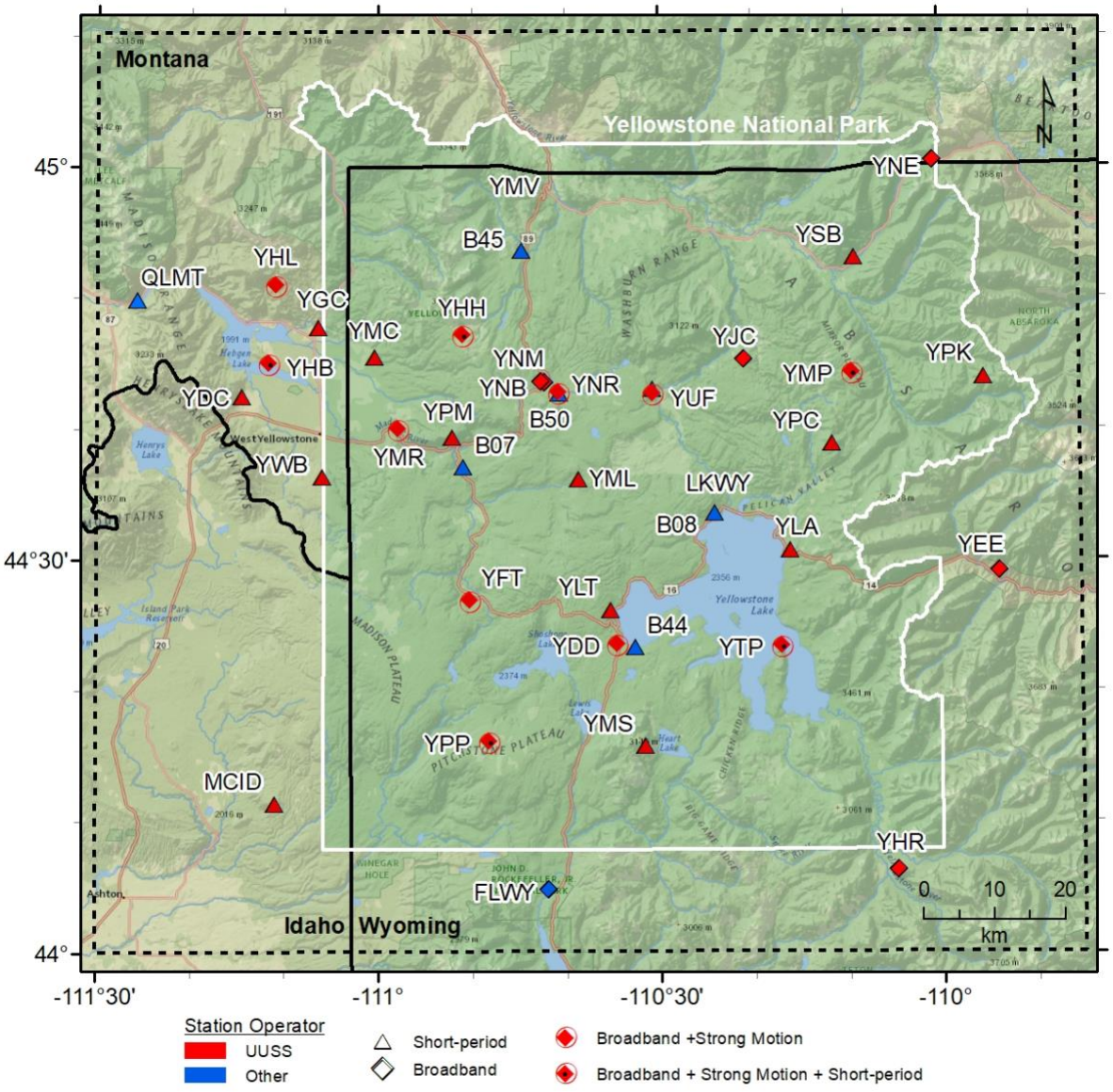

Figure 2. Seismograph stations of the Yellowstone Seismic Network as of September 30, 2023.

Table 2. Earthquakes in the Yellowstone Region: July 1–September 30, 2023

DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
230701	23:32:44.98	44º29.33’	111º04.68’	16.1	0.5	11	154	13	0.25
230702	08:06:43.58	44º50.55’	111º01.79’	3.9	0.9W	17	197	8	0.15
230702	16:52:43.04	44º36.62’	110º24.14’	4.8	2.0W	20	61	6	0.16
230703	16:50:17.51	44º48.02’	111º26.18’	11.9	0.9	11	187	20	0.14
230704	12:06:14.38	44º29.70’	110º26.64’	2.2	0.8	11	83	8	0.10
230704	17:10:08.86	44º43.92’	110º39.42’	4.8	0.6	7	242	3	0.10
230705	22:13:43.89	44º48.63’	111º01.86’	8.1	0.1	12	168	6	0.13
230706	22:17:15.14	44º47.57’	110º24.02’	5.4	1.5W	17	119	6	0.20
230707	23:23:29.32	44º28.30’	110º32.75’	3.6	1.2	9	99	5	0.11
230708	03:12:19.89	44º36.81’	110º22.64’	3.0*	1.3	9	67	14	0.10
230708	12:59:14.76	44º20.15’	110º31.90’	7.4	1.0	16	105	6	0.20
230708	17:39:48.29	44º46.00’	111º06.88’	10.6	0.1	8	79	3	0.14
230708	21:11:59.19	44º39.23’	110º26.56’	4.1	1.6W	12	105	9	0.13
230709	23:59:44.78	44º45.31’	110º30.66’	4.5	1.7W	16	138	4	0.14
230710	00:01:43.06	44º46.16’	110º30.86’	2.0	1.9W	12	181	6	0.11
230710	18:17:05.76	44º31.85’	111º05.34’	13.8	1.0W	16	149	8	0.17
230711	00:49:27.20	44º13.72’	110º46.33’	3.8	1.9W	18	90	5	0.15
230711	05:09:28.10	44º47.95’	110º59.73’	6.5	0.8W	14	129	4	0.12
230711	12:46:28.37	44º48.50’	111º00.48’	7.8	--	8	261	5	0.09
230711	18:03:32.51	44º48.16’	110º59.61’	7.5	1.1W	13	167	5	0.10
230712	00:44:31.70	44º47.78’	110º59.73’	6.5	1.1W	15	128	4	0.19
230712	00:45:29.33	44º47.85’	110º59.52’	6.6	1.4W	19	163	4	0.18
230712	00:45:48.21	44º47.63’	110º59.52’	6.2	0.7	14	160	4	0.20
230712	05:39:09.24	44º47.95’	110º59.36’	6.5	0.9W	11	165	5	0.12
230712	05:39:12.66	44º47.97’	110º57.25’	18.5	0.8	7	170	6	0.08
230712	08:27:33.62	44º47.80’	110º59.51’	6.0	0.2W	15	162	4	0.18
230712	12:36:18.25	44º48.04’	110º59.68’	7.1	0.2	9	165	5	0.06
230712	13:20:21.12	44º46.57’	110º57.58’	2.3	0.0	11	197	4	0.10
230712	13:20:27.24	44º46.73’	110º57.80’	2.1	0.6	11	205	4	0.13
230712	14:51:55.36	44º48.06’	110º59.53’	7.2	1.0W	14	166	5	0.10
230712	21:42:48.83	44º47.85’	110º59.68’	7.9	1.5W	18	129	4	0.13
230713	04:22:50.62	44º47.35’	110º49.61’	4.4	1.1W	17	103	2	0.19
230713	06:48:09.17	44º48.21’	110º59.43’	7.1	0.6W	13	168	5	0.10
230713	10:04:53.49	44º49.74’	110º49.81’	2.8	0.6	12	127	5	0.15
230714	01:44:06.92	44º40.83’	110º03.50’	14.1	0.9	7	87	10	0.06
230714	22:58:40.00	44º27.32’	110º56.94’	4.4	1.1	9	175	9	0.19
230715	07:13:21.16	44º44.20’	110º54.68’	5.1	0.8W	12	105	8	0.09
230715	11:41:07.18	44º45.99’	110º58.44’	4.9	0.8W	13	135	3	0.16
230716	02:58:09.64	44º46.10’	111º12.82’	7.7	1.6W	18	143	2	0.20
230716	05:09:05.89	44º48.10’	110º59.38’	6.6	0.7W	11	167	5	0.08
230717	03:08:26.68	44º35.36’	110º22.33’	4.2	0.4	7	130	4	0.10
230717	04:19:06.46	44º34.76’	110º23.39’	5.4	1.5	9	64	2	0.13
230717	05:54:59.26	44º47.92’	110º59.48’	7.2	0.9W	15	164	5	0.11
230717	06:14:48.27	44º48.00’	110º59.84’	9.6	1.8W	24	91	5	0.15
230717	06:19:08.12	44º48.08’	110º59.69’	6.9	0.2W	11	166	5	0.11

Table 2. Earthquakes in the Yellowstone Region: July 1–September 30, 2023

DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
230717	10:15:50.75	44º40.86’	110º03.39’	12.9	0.6	6	87	10	0.02
230717	12:46:13.54	44º28.82’	110º32.89’	5.2	1.7W	23	61	6	0.12
230718	05:01:49.90	44º41.45’	110º01.55’	12.4	1.2	8	152	9	0.15
230718	07:22:58.64	44º47.41’	110º52.72’	7.8	-0.1	10	169	2	0.10
230718	08:55:17.25	44º46.74’	111º03.55’	10.0	0.3W	9	136	4	0.11
230718	09:52:34.64	44º46.98’	111º03.68’	9.8	1.5W	16	114	4	0.11
230718	10:25:01.90	44º46.26’	111º04.83’	7.0	-0.2	9	119	3	0.13
230718	13:24:50.51	44º28.93’	111º01.96’	14.5	0.3	9	138	15	0.15
230719	08:13:28.72	44º46.21’	111º10.18’	9.2	0.3	10	129	3	0.13
230719	23:34:20.41	44º47.62’	111º01.20’	9.3	0.6W	13	155	4	0.08
230720	11:54:21.05	44º47.09’	111º03.42’	9.7	0.3W	9	141	4	0.12
230720	16:14:59.52	44º47.09’	111º03.50’	8.8	0.5W	10	141	5	0.08
230721	07:31:20.32	44º38.87’	110º59.16’	8.7	0.2	17	137	3	0.18
230721	08:25:45.12	44º38.81’	110º44.28’	6.5	0.3W	13	130	9	0.17
230721	11:10:46.61	44º47.93’	110º59.95’	5.8	0.1	18	163	4	0.14
230721	21:03:41.20	44º27.09’	110º58.61’	9.0*	1.3	9	186	20	0.14
230721	21:04:07.24	44º27.00’	110º59.34’	7.5*	0.5	8	190	19	0.18
230723	16:55:25.42	44º46.74’	111º06.30’	9.8	0.4	10	89	2	0.11
230724	07:28:10.33	44º44.22’	111º10.07’	12.4	1.6W	19	60	3	0.14
230724	07:35:11.86	44º44.53’	111º08.98’	9.3	-0.3	9	120	4	0.11
230724	07:41:37.33	44º44.17’	111º09.81’	11.1	-0.4	9	142	3	0.14
230724	08:02:50.07	44º46.26’	110º57.59’	9.2	0.9W	14	140	4	0.10
230724	23:14:33.27	44º36.13’	110º27.98’	4.3	1.7W	15	64	7	0.21
230724	23:19:56.93	44º36.02’	110º27.07’	7.8	1.4W	10	144	6	0.14
230724	23:25:50.71	44º36.26’	110º27.46’	5.4	1.7W	15	97	7	0.14
230725	05:45:50.87	44º49.87’	111º27.20’	13.6	0.5	8	207	2	0.09
230725	09:22:29.28	44º44.85’	110º53.07’	6.1	0.7W	9	112	5	0.09
230725	13:47:27.70	44º49.66’	110º49.36’	2.5	0.6	11	124	5	0.15
230725	20:25:54.73	44º36.09’	110º23.34’	5.7	1.7	12	107	5	0.22
230726	02:52:39.73	44º45.26’	110º30.50’	4.9	2.2W	16	95	4	0.18
230726	08:40:43.97	44º35.15’	110º43.71’	7.1	0.6	7	142	7	0.04
230727	09:36:02.02	44º35.91’	110º21.74’	3.6*	0.7	7	109	12	0.20
230727	16:31:15.70	44º31.88’	110º22.92’	2.1	0.8	7	127	4	0.11
230728	00:22:07.48	44º30.94’	111º04.55’	11.4	1.3W	21	146	10	0.19
230728	04:53:05.27	44º47.08’	110º48.16’	4.5	0.8W	15	108	4	0.17
230728	06:53:28.84	44º36.82’	110º26.93’	6.3	1.0W	14	152	7	0.18
230728	14:39:16.19	44º31.49’	110º23.35’	1.5	1.0	8	110	4	0.04
230728	17:01:35.78	44º44.29’	111º08.27’	14.1	0.6	11	81	5	0.12
230729	05:46:10.36	44º45.25’	111º11.84’	11.6	-0.1	7	200	0	0.17
230729	16:34:03.70	44º45.63’	110º46.10’	5.1	1.6W	13	118	7	0.11
230731	11:34:00.05	44º40.72’	110º03.01’	14.9	1.4	9	91	11	0.08
230731	11:53:22.48	44º40.85’	110º01.05’	14.5	1.6	12	103	9	0.21
230731	12:12:48.90	44º46.76’	110º48.13’	3.5	0.2	9	201	4	0.10
230801	01:17:21.85	44º40.90’	110º27.78’	3.5	0.7	13	113	5	0.19
230801	05:18:48.06	44º39.81’	110º42.01’	5.6	0.7W	12	128	6	0.15

Table 2. Earthquakes in the Yellowstone Region: July 1–September 30, 2023

DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
230801	05:26:02.57	44º39.35’	110º42.01’	5.1	0.6W	11	110	7	0.13
230801	10:40:23.63	44º40.11’	110º28.48’	1.9	1.5W	9	89	6	0.15
230801	11:52:48.23	44º44.26’	110º53.42’	4.8	0.3	13	104	6	0.12
230801	19:43:35.17	44º42.00’	110º28.64’	5.8	0.8	8	174	3	0.13
230802	01:11:48.28	44º44.42’	111º03.27’	6.0	0.6W	15	94	4	0.17
230802	10:31:45.07	44º34.85’	110º45.01’	8.3	0.3W	14	93	9	0.15
230802	10:47:02.67	44º35.71’	110º44.75’	6.5	0.5	13	144	8	0.16
230802	11:22:16.65	44º35.44’	110º44.77’	8.1	1.8W	26	55	8	0.18
230802	11:24:16.62	44º35.47’	110º44.67’	8.2	1.1W	22	68	8	0.20
230802	11:27:48.82	44º35.27’	110º45.56’	7.7	0.7W	11	89	8	0.22
230802	11:29:52.59	44º34.83’	110º44.75’	7.7	0.9W	18	69	9	0.15
230802	11:36:10.26	44º35.95’	110º45.22’	5.2	0.3	13	129	8	0.13
230802	11:36:14.79	44º36.42’	110º44.87’	4.8	0.7W	10	179	8	0.10
230802	11:36:42.30	44º35.70’	110º45.07’	5.0	0.8	13	130	8	0.16
230802	11:45:54.84	44º34.56’	110º44.87’	8.0	1.3W	21	70	9	0.19
230802	11:55:55.42	44º35.30’	110º45.09’	4.8	0.6	10	152	8	0.13
230802	12:07:48.03	44º34.77’	110º45.13’	7.2	0.5W	13	94	9	0.16
230802	13:07:57.33	44º34.87’	110º44.88’	9.4	0.6	14	70	9	0.17
230802	14:33:21.74	44º43.22’	111º00.23’	7.2	0.7	9	146	4	0.11
230802	14:37:43.91	44º49.14’	110º58.38’	7.9	0.2	9	265	7	0.08
230802	16:47:43.48	44º43.11’	111º01.26’	9.4	0.7W	16	78	5	0.16
230802	17:23:10.20	44º39.34’	110º01.35’	13.4	0.8	7	109	12	0.06
230802	23:44:08.62	44º34.65’	110º40.40’	7.9	0.4	8	119	4	0.13
230803	22:25:58.47	44º48.54’	110º58.18’	6.8	0.9W	12	212	6	0.17
230804	02:54:07.02	44º46.53’	110º47.53’	2.2	0.5	12	198	5	0.13
230804	18:00:10.86	44º35.72’	110º44.59’	5.2	1.1	14	85	8	0.18
230804	22:50:29.89	44º48.10’	110º24.62’	4.0	1.9W	17	138	7	0.14
230807	07:24:17.94	44º47.06’	110º48.92’	3.2	0.5W	11	205	3	0.10
230808	01:54:54.68	44º45.70’	110º57.20’	5.3	0.1	12	130	4	0.14
230808	12:14:16.19	44º26.10’	110º43.06’	4.7	1.6W	25	60	10	0.16
230809	08:03:47.11	44º23.96’	111º02.22’	12.2	0.5	16	141	17	0.20
230809	12:40:45.96	44º28.96’	110º57.61’	3.7	0.1	9	202	10	0.21
230809	12:40:55.15	44º28.18’	110º58.19’	4.7*	0.8	11	255	11	0.25
230809	12:42:17.94	44º27.41’	110º58.53’	9.4	1.1W	19	119	11	0.23
230810	00:27:50.99	44º47.97’	110º58.18’	7.8	0.5	10	244	5	0.17
230810	01:19:26.16	44º45.55’	111º01.66’	3.7	0.7	11	132	2	0.10
230810	06:43:38.74	44º37.07’	110º23.25’	5.3	1.7W	14	118	7	0.14
230810	16:36:09.63	44º36.76’	110º46.10’	4.0	1.5	8	175	6	0.04
230810	19:58:38.82	44º49.92’	111º25.95’	6.9*	1.4W	16	279	20	0.17
230811	14:40:28.89	44º51.26’	111º29.32’	6.8*	1.2	11	192	24	0.14
230811	17:14:25.32	44º41.05’	110º02.87’	13.8	0.9	6	149	11	0.16
230811	23:01:41.55	44º45.53’	110º57.34’	5.6	1.2W	22	128	4	0.18
230811	23:59:41.30	44º50.78’	110º45.14’	2.2	-0.2	11	152	5	0.16
230812	00:04:49.69	44º47.15’	110º56.92’	4.4	0.3	10	209	5	0.11
230812	00:10:41.45	44º49.01’	110º58.15’	8.0	0.4	7	185	7	0.06

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DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
230812	04:16:10.16	44º34.88’	110º13.06’	5.2	1.5	11	114	8	0.11
230812	04:45:25.28	44º48.49’	110º58.12’	7.3	-0.2	11	177	6	0.13
230812	04:47:55.65	44º47.29’	110º57.01’	4.8	0.4	13	214	5	0.11
230812	05:38:22.45	44º40.88’	110º03.19’	12.7	1.0	9	89	10	0.16
230812	18:15:41.80	44º03.55’	110º18.10’	8.1*	1.7	15	205	29	0.16
230812	18:19:06.09	44º03.12’	110º17.99’	6.0*	1.0	14	206	38	0.20
230812	18:21:12.14	44º03.80’	110º18.54’	10.1*	1.5	20	184	28	0.17
230812	18:32:14.77	44º03.12’	110º17.14’	5.0*	2.2W	18	188	31	0.15
230812	18:38:51.70	44º03.60’	110º18.21’	8.7*	2.7W	37	83	18	0.22
230812	18:43:58.94	44º03.64’	110º18.57’	8.0*	2.3W	34	82	19	0.20
230813	01:52:46.78	44º03.91’	110º19.08’	9.2*	1.5	18	129	19	0.15
230813	02:48:36.79	44º45.82’	110º54.91’	6.5	0.6W	16	126	6	0.15
230813	05:13:11.04	44º45.49’	110º55.05’	6.2	0.8W	20	105	6	0.20
230813	05:19:32.65	44º45.81’	111º05.25’	9.4	0.4W	19	103	4	0.17
230813	05:22:21.97	44º45.67’	111º05.31’	9.4	0.3W	16	100	4	0.17
230813	06:15:50.03	44º46.01’	111º05.89’	11.1	0.4	11	93	3	0.12
230813	20:33:53.82	44º03.37’	110º18.45’	12.8	1.4	13	134	19	0.12
230814	12:21:23.81	44º45.17’	110º47.48’	4.3	0.4W	14	163	6	0.17
230815	09:38:49.07	44º46.14’	111º06.24’	7.4	0.4W	12	86	3	0.15
230815	11:01:36.96	44º03.55’	110º18.07’	13.2	1.3	17	134	18	0.13
230815	16:52:13.22	44º46.76’	111º05.56’	8.0	1.4W	19	116	2	0.16
230815	17:18:45.98	44º46.81’	111º05.49’	8.4	0.2	12	120	2	0.15
230815	19:31:14.73	44º36.53’	110º44.17’	2.2	0.8	8	185	7	0.14
230816	00:01:42.84	44º47.87’	110º56.32’	6.5	0.8W	16	170	7	0.15
230816	00:11:08.99	44º48.34’	110º55.90’	7.2	0.3	9	181	7	0.09
230816	00:38:11.30	44º13.33’	110º40.40’	5.5*	1.2	16	107	12	0.14
230816	03:16:19.19	44º46.44’	111º06.18’	8.6	0.1	8	91	2	0.11
230816	04:37:54.74	44º44.23’	111º07.98’	12.2	1.4W	19	103	5	0.19
230816	04:37:59.29	44º44.16’	111º07.52’	9.6	1.5W	11	167	6	0.22
230816	06:02:09.49	44º45.86’	110º57.55’	6.2	0.8W	14	133	4	0.12
230817	08:57:57.25	44º45.25’	111º12.27’	8.4	0.4	19	158	1	0.19
230817	10:20:09.93	44º34.98’	110º20.20’	3.6	0.5	6	100	6	0.06
230817	15:59:04.62	44º32.70’	111º09.67’	11.2	0.8	13	204	8	0.23
230818	07:52:32.02	44º45.39’	110º55.13’	9.6	0.8W	18	119	6	0.15
230818	07:55:22.05	44º52.27’	111º27.59’	10.0*	1.2	17	188	22	0.15
230818	10:54:12.79	44º51.83’	111º26.38’	10.1	1.0W	20	186	20	0.15
230819	03:29:05.44	44º48.90’	110º58.28’	7.9	1.3W	12	183	7	0.09
230819	03:47:35.55	44º50.77’	111º24.37’	10.4	1.4W	18	282	18	0.15
230819	05:43:30.23	44º48.65’	110º58.52’	7.8	1.2W	20	178	6	0.18
230820	08:16:57.31	44º45.28’	111º06.70’	11.7	0.5W	12	90	5	0.13
230820	18:50:30.65	44º45.01’	110º59.00’	6.6	0.3	11	121	2	0.12
230820	23:25:02.36	44º46.69’	111º05.91’	8.0	2.2W	17	103	2	0.15
230821	01:16:17.15	44º44.81’	110º59.08’	7.1	1.6W	18	116	2	0.19
230821	05:39:32.05	44º46.65’	111º06.37’	7.7	0.5W	12	86	2	0.12
230822	04:25:11.46	44º35.12’	110º22.03’	3.7	1.6W	16	101	4	0.11

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DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
230822	04:25:44.39	44º34.44’	110º21.47’	2.0	0.6	16	95	4	0.13
230822	04:27:15.40	44º35.13’	110º22.11’	2.0	1.7W	24	100	4	0.18
230822	12:08:29.91	44º46.31’	110º57.15’	8.0	0.6W	17	141	4	0.18
230822	13:45:48.55	44º35.91’	110º19.53’	6.1	0.5	5	187	7	0.04
230822	15:06:17.98	44º45.60’	111º01.10’	9.6	0.4	10	235	1	0.13
230822	15:10:29.55	44º45.66’	111º01.33’	9.7	0.6	10	185	1	0.09
230822	15:10:59.05	44º45.50’	111º00.97’	9.3	0.2	9	233	1	0.11
230822	19:32:58.31	44º44.69’	111º07.74’	12.7	1.2	17	94	5	0.16
230824	14:26:47.55	44º46.64’	110º53.08’	6.0	1.5W	17	110	3	0.15
230824	18:44:59.14	44º46.89’	110º47.08’	5.1	1.4W	15	185	5	0.11
230824	22:01:58.63	44º46.92’	110º53.06’	6.4	0.8	16	81	3	0.16
230825	01:24:06.79	44º46.99’	110º53.02’	6.5	1.4W	17	82	3	0.12
230825	07:05:51.12	44º46.81’	111º06.78’	9.8	1.7W	20	81	2	0.16
230825	14:49:50.87	44º46.74’	110º53.20’	5.9	0.9W	15	112	3	0.14
230825	17:16:51.32	44º46.70’	110º53.25’	5.6	1.0W	15	111	3	0.14
230825	17:16:58.46	44º47.06’	110º53.18’	6.3	0.7	10	114	3	0.10
230825	17:27:20.19	44º47.40’	110º52.85’	6.6	0.4	10	168	2	0.10
230825	17:34:03.65	44º46.65’	110º53.03’	6.4	0.9W	11	110	3	0.10
230825	21:00:39.29	44º46.83’	111º06.24’	8.4	2.2W	18	76	2	0.12
230826	04:36:51.97	44º46.48’	110º53.17’	6.6	1.9W	20	105	3	0.14
230826	05:38:24.08	44º46.93’	111º06.17’	7.9	1.4W	16	76	2	0.12
230826	06:06:31.22	44º44.98’	111º01.01’	8.0	0.9W	13	87	1	0.12
230826	06:55:12.47	44º47.27’	110º52.85’	7.1	-0.1	9	161	2	0.08
230826	09:19:24.59	44º46.67’	111º06.24’	9.2	-0.2	8	91	2	0.11
230826	18:28:49.95	44º23.72’	110º15.83’	6.7	1.0	10	174	2	0.13
230826	22:32:19.03	44º47.09’	111º06.10’	8.2	0.0	10	104	1	0.13
230827	03:25:11.27	44º24.14’	110º36.33’	2.0	0.8	11	70	2	0.15
230827	11:57:35.54	44º46.97’	111º05.38’	8.8	-0.2	7	129	2	0.08
230827	17:13:59.00	44º47.63’	110º58.98’	8.7	1.0W	12	161	4	0.10
230827	19:09:52.23	44º47.39’	110º59.38’	8.3	0.7W	9	156	4	0.09
230827	22:31:12.28	44º47.03’	110º59.16’	9.0	1.9W	19	111	3	0.13
230827	22:38:13.11	44º47.51’	110º59.16’	8.7	0.4	11	159	4	0.08
230828	00:10:27.10	44º46.34’	110º57.62’	5.0	0.6	11	189	4	0.11
230828	02:01:05.44	44º46.99’	110º48.93’	3.8	0.4	10	202	3	0.12
230828	04:24:58.18	44º47.36’	110º59.04’	8.7	1.5W	16	83	4	0.11
230828	04:49:46.48	44º47.33’	110º59.11’	8.9	1.6W	16	124	4	0.12
230828	23:17:52.34	44º45.35’	111º05.33’	9.5	0.7	16	96	5	0.18
230829	08:53:59.86	44º48.04’	110º53.96’	6.0	0.9W	15	124	4	0.15
230829	13:17:20.45	44º39.53’	110º25.90’	5.3	1.3W	13	136	9	0.20
230829	18:59:11.57	44º24.01’	110º42.40’	2.0	0.8	8	116	10	0.26
230829	23:07:10.56	44º36.96’	110º07.07’	2.1	1.2	7	177	7	0.18
230829	23:27:05.18	44º37.85’	110º08.22’	6.4	1.5	6	163	5	0.13
230831	07:00:21.83	44º32.37’	110º30.84’	5.1	0.5	9	123	9	0.07
230831	12:36:05.43	44º47.01’	111º06.16’	8.7	1.4W	15	100	1	0.12
230902	01:07:07.71	44º28.07’	111º08.18’	16.1	0.7	12	169	16	0.15

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DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
230902	08:43:11.89	44º27.91’	111º08.61’	15.7	0.5	11	178	16	0.15
230902	20:29:15.26	44º45.52’	110º49.23’	3.3	0.6	11	148	4	0.12
230902	22:23:56.26	44º47.30’	110º59.35’	8.2	1.2W	15	154	3	0.15
230902	22:51:37.34	44º46.47’	111º05.94’	7.6	0.7	15	98	2	0.16
230903	12:07:00.06	44º40.97’	110º00.65’	14.1	2.3W	23	105	9	0.18
230903	12:09:26.18	44º40.88’	110º01.22’	13.0	1.4	10	101	10	0.20
230904	07:24:17.48	44º45.62’	110º54.83’	5.2	0.1	9	148	6	0.10
230904	13:27:37.33	44º45.20’	110º57.29’	7.2	0.4	9	122	4	0.12
230904	17:47:45.47	44º45.09’	110º56.98’	6.7	0.8	12	121	5	0.12
230904	19:24:01.30	44º45.15’	110º57.25’	7.6	0.7	8	143	4	0.11
230905	17:45:47.73	44º47.08’	110º49.74’	6.2	0.4	11	197	2	0.10
230906	08:08:04.41	44º46.24’	111º06.17’	11.9	0.6	11	169	3	0.07
230906	11:30:35.43	44º40.77’	110º03.50’	13.6	1.0	6	88	10	0.08
230906	16:47:05.79	44º39.68’	110º41.45’	5.9	0.7	10	140	6	0.12
230906	16:48:36.84	44º40.10’	110º42.80’	2.3	1.0	6	122	6	0.13
230906	16:50:09.36	44º40.16’	110º42.89’	3.8	0.5	10	113	6	0.11
230906	16:57:36.73	44º39.38’	110º41.24’	5.7	0.7	9	143	7	0.11
230907	08:19:55.70	44º39.99’	110º41.61’	6.0	0.2	12	138	6	0.17
230907	08:21:58.39	44º45.59’	111º06.92’	8.9	0.2W	13	77	4	0.18
230907	09:27:04.20	44º40.26’	110º41.82’	6.9	1.0W	22	96	5	0.19
230907	11:05:02.31	44º46.19’	111º06.75’	11.6	0.0	9	76	3	0.14
230907	12:05:48.95	44º46.83’	110º48.12’	4.7	0.3	10	201	4	0.07
230908	12:57:34.26	44º30.75’	110º35.03’	2.0	1.0W	8	195	8	0.24
230908	18:17:39.18	44º38.94’	110º23.04’	4.6*	1.9W	12	77	12	0.19
230908	23:54:20.43	44º46.44’	111º06.86’	9.1	0.4	7	79	3	0.14
230909	06:48:00.51	44º36.00’	110º57.39’	9.6	0.5	14	72	8	0.14
230909	07:08:05.20	44º39.77’	110º41.34’	6.2	0.1	10	143	6	0.11
230909	07:08:14.97	44º40.66’	110º43.17’	3.7	0.2	8	125	5	0.10
230909	07:08:38.76	44º40.58’	110º42.81’	4.3	0.3	9	117	5	0.08
230909	07:08:58.69	44º39.78’	110º41.90’	5.5	-0.4	9	131	6	0.19
230909	08:19:45.71	44º45.48’	110º56.48’	7.6	1.2W	15	100	5	0.20
230909	09:08:04.99	44º48.35’	110º58.17’	6.5	0.0	11	90	6	0.18
230909	09:20:50.70	44º45.65’	110º56.24’	6.8	0.7W	15	101	5	0.16
230909	10:08:08.05	44º48.29’	110º58.22’	6.8	0.1	10	173	6	0.16
230909	11:14:52.73	44º45.58’	110º56.17’	7.0	0.9W	17	101	6	0.15
230909	14:07:07.68	44º47.19’	110º48.95’	2.6	0.5	7	211	3	0.09
230909	15:16:41.90	44º47.93’	110º49.64’	4.3	1.1W	20	107	2	0.15
230909	15:37:31.02	44º46.69’	110º47.57’	5.1	0.7	12	202	5	0.16
230909	16:50:34.00	44º45.34’	110º55.98’	6.5	0.2	11	145	6	0.14
230909	16:50:54.98	44º44.75’	110º55.22’	2.3	-0.4	7	126	7	0.07
230909	23:11:12.09	44º47.54’	111º05.04’	10.3	1.4W	15	141	2	0.14
230910	02:51:44.54	44º40.23’	110º41.67’	6.0	0.7W	15	114	5	0.17
230910	10:28:30.14	44º45.69’	110º56.36’	10.5	2.8W	24	101	5	0.17
230910	10:56:13.23	44º45.55’	110º56.03’	6.9	0.7W	20	75	6	0.17
230910	11:04:28.77	44º46.00’	110º56.21’	7.6	0.4	21	104	6	0.17

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DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
230910	12:18:27.21	44º45.60’	110º56.34’	7.6	0.5	17	101	5	0.16
230910	12:48:01.12	44º45.59’	110º56.21’	7.0	0.8W	19	101	5	0.16
230910	13:02:05.22	44º45.93’	110º56.11’	8.1	0.3	14	133	6	0.16
230910	15:48:56.43	44º46.02’	110º56.16’	7.3	0.2	15	104	6	0.13
230910	23:59:35.08	44º43.83’	111º05.85’	10.6	0.4	13	105	8	0.17
230911	08:41:41.39	44º46.09’	111º06.35’	11.2	-0.2	10	84	3	0.11
230911	09:38:11.10	44º45.63’	110º56.16’	7.3	0.8W	13	101	6	0.11
230911	09:42:30.95	44º45.94’	111º07.18’	12.5	-0.4	9	80	4	0.15
230911	12:30:17.32	44º45.94’	111º06.82’	11.2	0.0	10	74	3	0.13
230912	10:40:11.83	44º43.57’	111º05.95’	15.3	0.4W	9	103	8	0.09
230912	14:28:54.99	44º44.06’	110º52.27’	2.7	-0.4	8	187	6	0.18
230912	14:29:24.42	44º45.07’	110º52.18’	6.2	0.2	14	85	4	0.21
230913	20:47:04.64	44º42.29’	110º20.71’	2.0*	1.1	9	161	13	0.19
230914	02:58:30.00	44º27.29’	110º59.13’	7.4	0.4	15	123	12	0.25
230914	17:07:57.08	44º45.47’	110º57.54’	7.2	1.7W	15	74	4	0.13
230914	23:03:45.34	44º40.77’	110º29.44’	4.9	0.6	5	260	4	0.04
230915	00:34:25.09	44º26.68’	110º55.48’	8.3	1.9W	19	141	7	0.25
230915	00:37:58.90	44º26.90’	110º55.45’	4.1	1.5W	14	168	7	0.18
230915	00:40:02.41	44º27.14’	110º54.53’	4.8	1.0W	10	162	6	0.24
230915	05:56:23.08	44º45.53’	111º06.13’	11.0	0.0	12	85	4	0.20
230915	11:38:16.13	44º45.67’	111º08.93’	5.2	-0.3	9	97	4	0.20
230915	15:21:25.81	44º40.84’	110º26.83’	7.2	1.8W	13	98	6	0.15
230916	09:18:04.99	44º22.21’	111º00.41’	2.0*	0.8	13	129	16	0.21
230916	13:48:19.50	44º41.20’	110º03.33’	11.2	1.1	7	158	10	0.17
230916	14:29:34.53	44º43.13’	111º03.97’	10.3	0.2	13	97	7	0.12
230917	22:48:11.09	44º39.71’	110º58.14’	5.0	1.2	9	105	1	0.09
230918	15:36:20.80	44º49.07’	111º18.24’	10.3	0.7	15	256	10	0.16
230919	11:19:26.35	44º45.68’	111º12.61’	14.8	0.2	11	194	2	0.16
230919	16:50:26.71	44º48.23’	110º58.22’	6.2	0.5	13	172	6	0.19
230921	10:07:45.15	44º27.27’	111º00.31’	6.7	0.8W	10	130	13	0.25
230921	12:20:45.90	44º25.24’	110º53.10’	4.6	0.6	12	163	5	0.15
230921	12:55:28.68	44º20.81’	110º41.12’	3.1	1.2	10	103	10	0.09
230921	13:08:10.81	44º21.11’	110º40.92’	3.2	1.1	9	100	10	0.11
230921	23:33:26.57	44º47.02’	111º06.39’	8.1	0.9W	13	88	1	0.15
230924	18:05:04.67	44º47.16’	111º00.51’	5.3	1.1W	13	168	3	0.16
230924	21:39:33.30	44º46.97’	110º48.51’	4.0	0.3	7	205	3	0.05
230926	19:31:47.16	44º38.11’	110º28.05’	2.5	0.8	7	154	9	0.10
230927	09:04:37.03	44º44.43’	110º59.00’	6.8	0.5	18	81	3	0.14
230928	09:46:01.44	44º47.14’	110º47.67’	5.0	0.1	7	216	4	0.07
230930	04:34:11.91	44º50.05’	110º56.69’	4.9	1.2W	15	100	9	0.17
230930	17:59:11.01	44º22.70’	111º06.43’	9.4*	0.8	11	164	22	0.26

number of earthquakes = 311

* indicates poor depth control

W indicates Wood-Anderson data used for magnitude calculation

Table 3
UNIVERSITY OF UTAH YELLOWSTONE SEISMIC NETWORK
Operating Seismograph Stations
September 30, 2023

SEED Station	Location	SEED Channel	No. of Channels	Network Code	Latitude	Longitude	Elevation (meters)	Sensor	Digitizer	Telemetry	Sponsor
B206*	Canyon206bwy2008, Yellowstone, WY	EH[ZEN]	3	PB	44° 46.66′	110° 30.70′	2400	IESE-S2	Q330	Digital	PBO
B207*	Madisn207bwy2007, Yellowstone, WY	EH[ZEN]	3	PB	44° 37.14′	110° 50.91′	2182	IESE-S2	Q330	Digital	PBO
B208*	Lakejn208bwy2008, Yellowstone, WY	EH[ZEN]	3	PB	44° 33.61′	110° 24.09′	2406	IESE-S2	Q330	Digital	PBO
B944*	Grantt944bwy2008, Yellowstone, WY	EH[ZEN]	3	PB	44° 23.38′	110° 32.63′	2365	IESE-S2	Q330	Digital	PBO
B945*	Panthr944swy2008, Yellowstone, WY	EH[ZEN]	3	PB	44° 53.64′	110° 44.65′	2249	IESE-S2	Q330	Digital	PBO
B950*	Norris950bwy2013, Yellowstone, WY	EH[ZEN]	3	PB	44° 42.77′	110° 40.71′	2328	IESE-S2	Q330	Digital	PBO
FLWY*	Flagg Ranch, WY	BH[ZEN]	3	IW	44° 04.96′	110° 41.96′	2078	3ESP	RT-130	Digital	ANSS
IMW*	Indian Meadows, WY	BH[ZEN]	3	IW	43° 53.58′	110° 56.58′	2670	3ESP	RT-130	Digital	ANSS
LKWY*	Lake, WY	BH[ZEN]	3	US	44° 33.91′	110° 24.00′	2424	STS-2	Q330	Digital	USGS
LOHW*	National Elk Refuge, WY	BH[ZEN]	3	IW	43° 36.76′	110° 36.30′	2245	3ESP	RT-130	Digital	ANSS
MCID	Moose Creek, ID	EHZ	1	WY	44° 11.45′	111° 11.03′	2137	L4C	PSN	Analog	USGS
MOOW*	Moose Ponds, WY	BH[ZEN]	3	IW	43° 44.92′	110° 44.69′	2128	3ESP	RT-130	Digital	ANSS
QLMT*	Earthquake Lake, MT	EHZ	1	MB	44° 49.84′	111° 25.80′	2064	L4C	-	Analog	MBMT
REDW*	Red-Top Meadows, WY	BH[ZEN]	3	IW	43° 21.74′	110° 51.18′	2322	3ESP	RT-130	Digital	ANSS
SNOW*	Snow King Mountain, WY	BH[ZEN]	3	IW	43° 27.75′	110° 45.31′	2390	3ESP	RT-130	Digital	ANSS
TPAW*	Teton Pass, WY	BH[ZEN]	3	IW	43° 29.41′	110° 57.04′	2512	3ESP	RT-130	Digital	ANSS
TPMT*	Teepe Creek, MT	EHZ	1	MB	44° 43.79′	111° 39.94′	2518	L4C	-	Analog	MBMT
YDC	Denny Creek, MT	EHZ	1	WY	44° 42.51′	111° 14.60′	2025	L4C	PSN	Analog	USGS
YDD	Grant Junction, Yellowstone, WY	HH[ZEN]	3	WY	44° 24.00′	110° 34.80′	2400	STS-2	Q330	Digital	NSF
		EN[ZEN]	3					Episensor			
YEE	East Entrance (YNP), WY	HH[ZEN]	3	WY	44° 29.12′	109° 53.81′	2270	Compact PH	Centaur	Digital	USGS
YFT	Old Faithful (YNP), WY	HH[ZEN]	3	WY	44° 27.05′	110° 50.24′	2292	Compact	Centaur	Digital	USGS
		EN[ZEN]	3					Titan			
YGC	Grayling Creek, MT	EHZ	1	WY	44° 47.77′	111° 06.45′	2075	L4C	PSN	Analog	USGS
YHB	Horse Butte, MT	EHZ	1	WY	44° 45.07′	111° 11.71′	2157	L4C	PSN	Analog	USGS
		HH[ZEN]	3					Compact	Centaur	Digital	
		EN[ZEN]	3					Titan			
YHH	Holmes Hill (YNP), WY	EHZ	1	WY	44° 47.30′	110° 51.03′	2717	S13	PSN	Analog	USGS
		HH[ZEN]	3					Trillium 120	Q330	Digital	
		EN[ZEN]	3					Titan			

SEED Station	Location	SEED Channel	No. of Channels	Network Code	Latitude	Longitude	Elevation (meters)	Sensor	Digitizer	Telemetry	Sponsor
YHL	Hebgen Lake, MT	HH[ZEN]	3	WY	44° 51.05′	111° 10.98′	2691	Trillium 120	Q330	Digital	USGS
		EN[ZEN]	3					Titan			
YHR	Hawk's Rest, WY	HH[ZEN]	3	WY	44° 06.36′	110° 04.90′	2976	Trillium 120	Q330	Digital	USGS
YJC	Joseph′s Coat (YNP), WY	HH[ZEN]	3	WY	44° 45.33′	110° 20.95′	2684	Trillium 120	Centaur	Digital	USGS
YLA	Lake Butte (YNP), WY	EHZ	1	WY	44° 30.76′	110° 16.12′	2580	L4C	PSN	Analog	USGS
YLT	Little Thumb Creek (YNP), WY	EHZ	1	WY	44° 26.25′	110° 35.28′	2439	L4C	PSN	Analog	USGS
YMC	Maple Creek (YNP), WY	EH[ZEN]	3	WY	44° 45.53′	111° 00.41′	2073	S13	PSN	Analog	USGS
YML	Mary Lake (YNP), WY	EH[ZEN]	3	WY	44° 36.20′	110° 38.63′	2653	S13	PSN	Analog	USGS
YMP	Mirror Plateau (YNP), WY	EHZ	1	WY	44° 44.38′	110° 09.40′	2774	S13	PSN	Analog	USGS
		HH[ZEN]	3					Trillium 120	Q330	Digital	
		EN[ZEN]	3					Titan			
YMR	Madison River (YNP), WY	HH[ZEN]	3	WY	44° 40.12′	110° 57.90′	2149	Trillium 120	Q330	Digital	USGS
		EN[ZEN]	3					Titan			
YMS	Mount Sheridan (YNP), WY	EHZ	1	WY	44° 15.84′	110° 31.67′	3106	L4C	PSN	Analog	USGS
YMV	Mammoth Vault (YNP), WY	HH[ZEN]	3	WY	44° 58.42′	110° 41.33′	1829	Trillium 120	Centaur	Digital	USGS
YNB	Norris Basin (YNP), WY	HH[ZEN]	6	WY	44° 43.64′	110° 42.67′	2307	Trillium 120	Centaur	Digital	USGS
		HDF[1,2,3]						InfraBSU			
YNE	Northeast Entrance (YNP), WY	HH[ZEN]	3	WY	45° 00.46′	110° 00.48′	2343	Compact	Centaur	Digital	USGS
YNM	Norris Museum (YNP), WY	HH[ZEN]	3	WY	44° 43.59′	110° 42.22′	2311	Trillium 240	Centaur	Digital	USGS
YNR	Norris Junction (YNP), WY	HH[ZEN]	3	WY	44° 42.93′	110° 40.75′	2336	Trillium 120	Q330	Digital	USGS
		EN[ZEN]	3					Titan			
YPC	Pelican Cone (YNP), WY	EHZ	1	WY	44° 38.88′	110° 11.55′	2932	L4C	PSN	Analog	USGS
YPK	Parker Peak (YNP), WY	EH[ZEN]	3	WY	44° 43.91′	109° 55.32′	2897	L4C	PSN	Analog	USGS
YPM	Purple Mountain (YNP), WY	EHZ	1	WY	44° 39.43′	110° 52.12′	2582	L4C	PSN	Analog	USGS
YPP	Pitchstone Plateau (YNP), WY	EHZ	1	WY	44° 16.26′	110° 48.27′	2707	S13	PSN	Analog	USGS
		HH[ZEN]	3					Trillium 120	Q330	Digital	
		EN[ZEN]	3					Titan			
YSB	Soda Butte (YNP), WY	EHZ	1	WY	44° 53.04′	110° 09.06′	2072	L4C	PSN	Analog	USGS

SEED Station	Location	SEED Channel	No. of Channels	Network Code	Latitude	Longitude	Elevation (meters)	Sensor	Digitizer	Telemetry	Sponsor
YTP	The Promontory (YNP), WY	EHZ	1	WY	44° 23.51′	110° 17.10′	2384	L4	PSN	Analog	USGS
		HH[ZEN]	3					Trillium 120	Q330	Digital	
		EN[ZEN]	3					Titan			
YUF	Upper Falls (YNP), WY	HH[ZEN]	3	WY	44° 42.76′	110° 30.71′	2394	Trillium 120	Centaur	Digital	USGS
		EN[ZEN]	3					Titan			
YWB	West Boundary (YNP), WY	EHZ	1	WY	44° 36.35′	111° 06.05′	2310	L4C	PSN	Analog	USGS

* Station operated by another agency and recorded as part of the Yellowstone Seismic Network
Network Statistics: 160 data channels from 47 stations were being recorded at the end of this report period

EXPLANATION OF TABLE

UURSN Code: Station code formerly used in routine processing. Owing to software limitations, the station code may not be the same code used by the original operator. For multi-component stations, the vertical, east-west, and north-south high gain (low gain) components are identified by an appended Z(V), E(L), and N(M), respectively, in UUSS phase files.

Location: General description of station location. YNP = Yellowstone National Park.

SEED Station: The SEED (Standard for the Exchange of Earthquake Data) station code used by the original operator.

SEED Channel: The SEED format uses three letters to name seismic channels. See <<http://www.iris.edu/manuals/SEEDManual_V2.4.pdf>> for information about the SEED channel naming convention. Relevant sections are reproduced below. In the SEED convention, each letter describes one aspect of the instrumentation and its digitization. The first letter specifies the general sampling rate and the response band of the instrument. Band codes used in this table include:

Band Code	Band Type	Sample Rate	Corner Period
E	Extremely short period	≥ 80 Hertz	< 10 seconds
H	High broadband	≥ 80 Hertz	≥ 10 seconds
B	Broadband	≥ 10 to < 80 Hertz	≥10 seconds
S	Short period	≥ 10 to < 80 Hertz	< 10 seconds

The second letter specifies the family to which the sensor belongs. Sensor families used in this table are:

Instrument Code	Description
H	High gain seismometer
L	Low gain seismometer
N	Accelerometer

The third letter specifies the physical configuration of the members of a multiple axis instrument package. Channel orientations used in this table are:

Z E N Traditional (Vertical, East-West, North-South)

Number of Channels: Total number of waveform channels recorded.

Network Code: The FDSN (Federation of Digital Seismographic Networks) registered network code. See <<http://www.iris.edu/dms/nodes/dmc/services/network_codes>> for information about registered seismograph network codes. Network codes referenced in this table:

Network Code	Network name; Network operator or responsible organization
IE	Idaho National Laboratory Seismic Network
IU	IRIS/USGS Network; USGS Albuquerque Seismological Laboratory
IW	Intermountain West Network, U.S. Geological Survey

MB	Montana Regional Seismic Network; Montana Bureau of Mines and Geology
PB	Plate Boundary Observatory
UU	University of Utah Regional Network; University of Utah
US	US National Network; USGS National Earthquake Information Center
WY	Yellowstone Wyoming Seismic Network; University of Utah

Latitude, Longitude: Sensor location in degrees and decimal minutes; North latitude, West longitude.

Elevation: Sensor altitude in meters above sea level.

Sensor	**Description**
L4, L4C	Mark Products L4 or L4C short-period seismometer
S13, 18300	Geotech S13 or 18300 short-period seismometer
Ranger	Kinemetrics Ranger short-period seismometer
40T	Guralp CMG-40T broadband seismometer
3T	Guralp CMG-3T broadband seismometer
3ESP	Guralp CMG-3ESP broadband seismometer
STS-2	Streckheisen STS-2 broadband seismometer
FBA23	Kinemetrics FBA-23 accelerometer
EpiSensor	Kinemetrics EpiSensor accelerometer
Applied Mems	Applied Mems accelerometer
PA-23	Geotech PA-23 accelerometer
Compact	Nanometrics Compact broadband seismometer
Compact PH	Nanometrics Compact Posthole broadband seismometer
Trillium 120	Nanometrics Trillium 120 broadband seismometer
Trillium 240	Nanometrics Trillium 240 broadband seismometer
Titan	Nanometrics Titan accelerometer
Observer	Refraction Technology (REF TEK) Model 151 Observer broadband seismometer
IESE-S2	Institute of Earth Science and Engineering S-2 model borehole seismometer

Digitizer	**Description**
K2	Kinemetrics Altus Series K2 (19-bit resolution field digitizer)
Etna	Kinemetrics Altus Series Etna (18-bit resolution field digitizer)
72A-07	Refraction Technology (REF TEK) model 72A-07 (24-bit field digitizer)
72A-08	Refraction Technology (REF TEK) model 72A-08 (24-bit field digitizer)
ANSS-130	Refraction Technology (REF TEK) model 130-ANSS/02 (24-bit resolution field digitizer)
RT-130	Refraction Technology (REF TEK) model RT-130 (24-bit resolution field digitizer)
Q330	Quanterra, Inc Q330 digitizer (24-bit resolution field digitizer)
SMART-24	Geotech SMART-24 digitizer (24-bit resolution field digitizer)
PSN	PSN-ADC-SERIAL version III (16-bit resolution field digitizer)
Basalt	Kinemetrics Basalt (24-bit resolution field digitizer)
Taurus	Nanometrics Taurus (24-bit resolution field digitizer)
Centaur	Nanometrics Centaur (24-bit resolution field digitizer)

Telemetry	Description
Analog	Data transmission is analog along part of the transmission pathway
Digital	Data are converted to digital form at the station site
None	On-site recording system

Sponsor (or Operator for stations marked by * in preceding columns)

USGS	U.S. Geological Survey
Utah	State of Utah
ANSS	Advanced National Seismic System
INL	Idaho National Laboratory
MBMT	Montana Bureau of Mines and Geology
PBO	Plate Boundary Observatory
NSF	National Science Foundation

Network Changes During July 1–September 30, 2023

August 08	Station YJC upgraded to digital with HH[ZEN] channels.
August 10	Trillium Compact PH sensor installed at YFT (Trillium Compact removed).
August 10	Station YMV upgraded to digital with HH[ZEN] channels.
September 06	New station (YNB) installed with HH[ZEN] and HDF[1,2,3] channels.