EARTHQUAKE ACTIVITY IN THE YELLOWSTONE REGION

Preliminary Epicenters

July 1 – September 30, 2024

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

December 31, 2024

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, 2024

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During the three-month period July 1 through September 30, 2024, the University of Utah Seismograph Stations (UUSS) located 159 earthquakes within the Yellowstone region (Figure 1). The total includes 9 earthquakes in the magnitude 2 range. The largest event to occur during this period was a magnitude 2.7 earthquake on July 20. One earthquake was 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 2024). 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*.

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 was one earthquake swarm 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 10 earthquakes ($-0.3 \leq M \leq 1.5$) occurred about 13.8 mi NE of West Yellowstone, MT from July 11th – 12th.

This swarm is labeled in Figure 1.

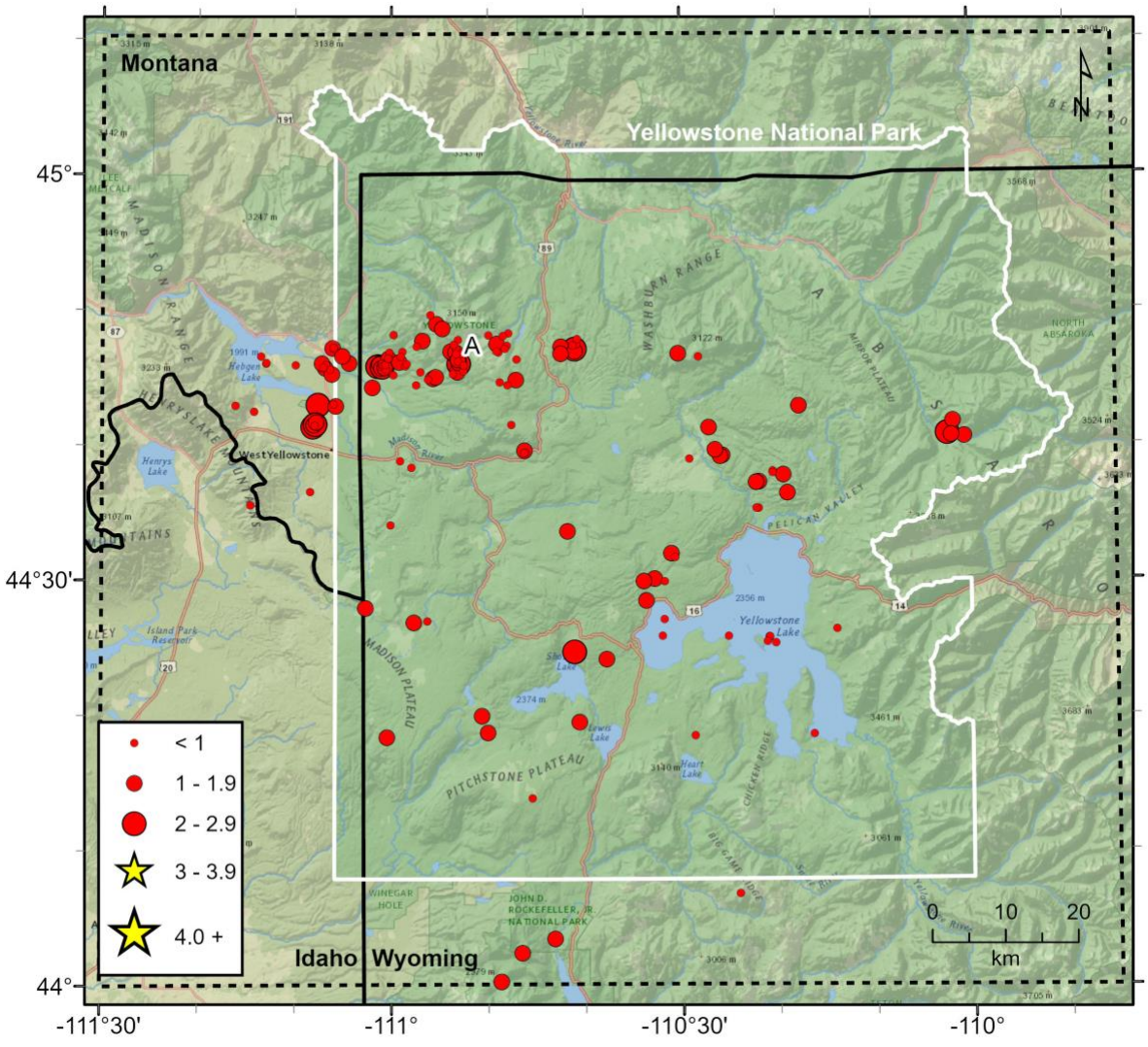

Figure 1. Epicenters of earthquakes located by the University of Utah Seismograph Stations, July 1, 2024, through September 30, 2024. The earthquake swarm (labeled A) is discussed in the text.

Table 1

EARTHQUAKES FELT IN THE YELLOWSTONE REGION
January 1, 2024, to September 30, 2024

Date	Time†	Felt Information‡	Latitude	Longitude	Magnitude§
January 01	07:41 MST 14:41 UTC	Yellowstone. Felt (II) at Yellowstone National Park.	44º 35.37’	110º 45.07’	M_L 3.1
January 03 January 04	17:10 MST 00:10 UTC	Yellowstone. Felt (III) at Yellowstone National Park.	44º 35.13’	110º 44.76’	M_L 3.3
April 23	03:30 MDT 09:30 UTC	Yellowstone. Felt (III) at Yellowstone National Park.	44º 48.25′	111º 04.00′	M_L 3.0
April 23	04:15 MDT 10:15 UTC	Yellowstone. Felt (II) at Yellowstone National Park.	44º 47.70′	111º 03.74′	M_L 2.7
June 10 June 11	21:29 MDT 03:29 UTC	Yellowstone. Felt (III) at Yellowstone National Park.	44º 39.56′	110º 25.67′	M_L 2.5
July 20	01:34 MDT 07:34 UTC	Yellowstone. Felt (III) at Yellowstone National Park.	44º 41.36′	111º 08.17′	M_L 2.7

† 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, 2024

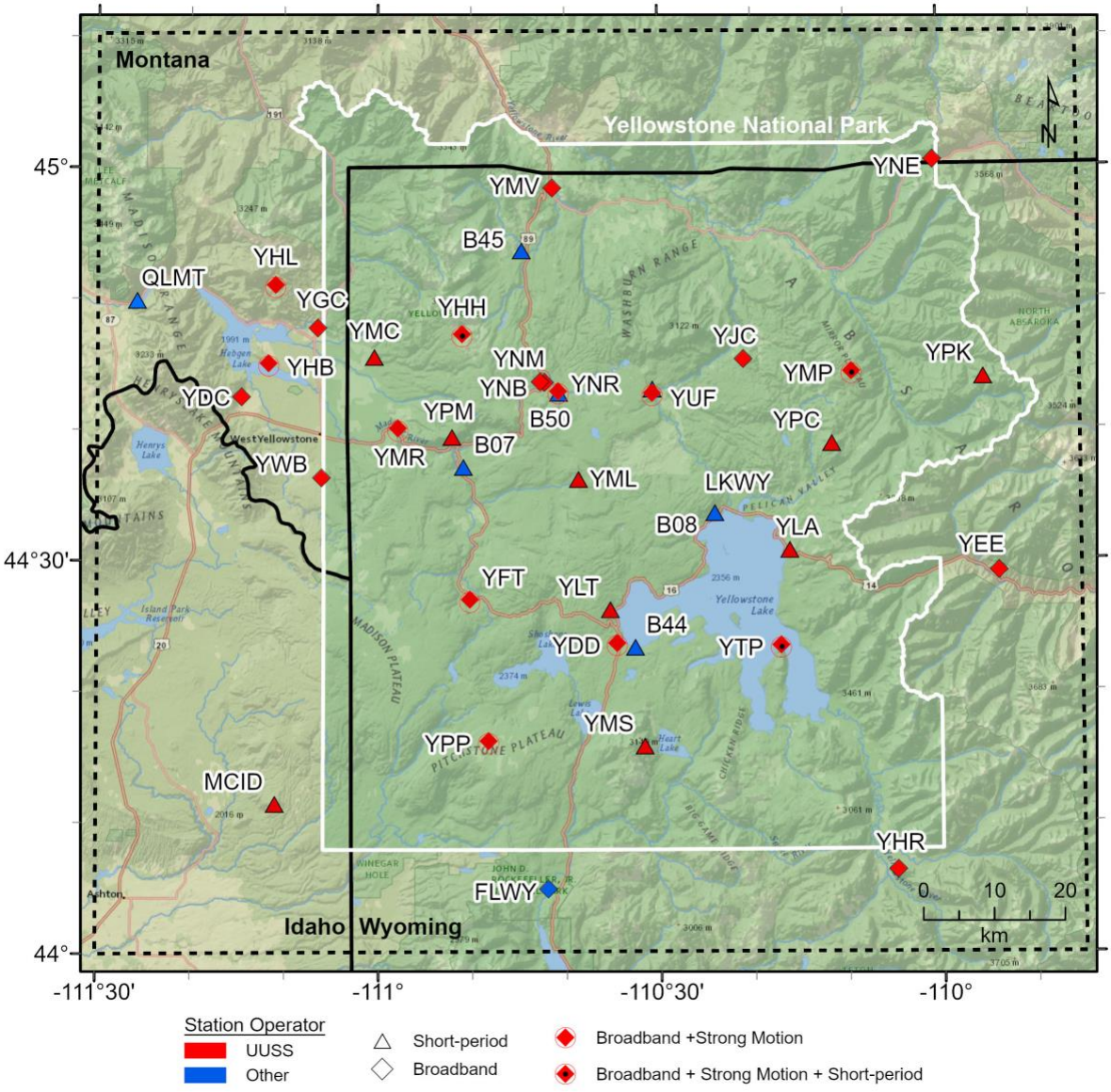

Figure 2. Seismograph stations of the Yellowstone Seismic Network as of September 30, 2024.

Table 2. Earthquakes in the Yellowstone Region: July 1–September 30, 2024

DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
240701	07:10:13.41	44º24.19’	110º37.79’	4.4	1.7W	25	141	4	0.14
240701	20:25:34.50	44º46.86’	111º00.22’	8.3	0.1	12	147	2	0.12
240702	13:48:28.58	44º46.02’	110º53.04’	6.2	2.1W	31	101	4	0.17
240702	13:48:37.83	44º45.41’	110º53.18’	6.0*	1.6	10	97	24	0.15
240702	14:24:59.73	44º46.11’	110º53.06’	6.6	1.2W	24	102	3	0.16
240702	14:27:40.19	44º46.30’	110º53.05’	8.6	1.8W	39	66	3	0.20
240702	14:27:55.92	44º46.32’	110º53.11’	6.8	1.0	13	125	3	0.19
240702	19:36:04.25	44º46.18’	110º53.08’	6.6	0.9W	19	102	3	0.16
240703	16:30:02.70	44º45.84’	110º58.57’	7.0	0.5W	14	133	2	0.16
240703	17:29:06.91	44º46.01’	110º58.42’	7.7	0.1	14	136	3	0.13
240704	05:53:42.17	44º48.96’	110º55.35’	7.7	1.4W	28	125	6	0.18
240705	08:17:45.26	44º45.70’	111º01.05’	8.0	1.4W	21	99	1	0.18
240705	19:54:41.42	44º32.00’	110º31.07’	5.7	1.5	8	123	10	0.20
240705	19:57:22.00	44º31.71’	110º30.67’	4.8	0.9	14	67	9	0.15
240706	03:06:07.44	44º45.95’	111º00.67’	6.9	0.3	12	133	1	0.10
240706	03:33:31.68	44º45.99’	111º01.24’	8.7	1.9W	21	75	1	0.16
240706	03:34:29.74	44º45.93’	111º00.94’	7.0	0.9W	12	132	1	0.13
240706	07:32:15.63	44º46.03’	111º01.01’	7.5	0.8W	14	133	1	0.10
240706	08:42:19.51	44º45.90’	110º52.51’	5.5	0.3	13	129	3	0.13
240706	08:47:56.85	44º45.82’	111º01.13’	6.4	0.9W	17	154	1	0.17
240706	14:06:19.98	44º45.60’	111º00.58’	6.2	0.4	9	128	0	0.12
240707	12:35:16.55	44º45.74’	111º00.72’	6.8	1.0W	18	100	1	0.17
240707	21:24:35.67	44º37.93’	110º20.55’	5.2	0.5	7	106	9	0.05
240708	08:02:34.13	44º46.14’	110º59.20’	6.0	1.0W	15	104	2	0.13
240708	08:44:14.94	44º46.55’	110º59.06’	5.4	0.7W	13	143	3	0.10
240709	08:55:51.70	44º45.89’	111º00.89’	7.2	0.8W	15	132	1	0.10
240711	03:30:24.87	44º03.54’	110º43.17’	7.5*	1.0	10	140	35	0.12
240711	12:08:10.33	44º45.91’	111º06.77’	7.9	0.6W	16	74	3	0.16
240711	21:32:30.32	44º46.91’	110º53.25’	7.0	0.6	10	180	3	0.10
240711	22:45:00.61	44º47.15’	110º53.28’	7.8	0.1	7	191	3	0.05
240711	23:30:37.46	44º47.43’	110º53.55’	7.3	-0.3	7	203	3	0.11
240712	00:24:32.20	44º46.93’	110º53.87’	7.9	1.4W	19	108	4	0.12
240712	00:42:50.13	44º47.78’	110º53.11’	8.8	0.0	10	182	3	0.07
240712	02:56:47.88	44º46.86’	110º53.36’	7.4	1.1W	16	107	3	0.12
240712	03:20:44.04	44º46.79’	110º52.72’	7.6	0.1	7	168	2	0.11
240712	08:00:13.73	44º46.78’	110º53.62’	8.1	1.5W	21	106	4	0.14
240712	08:10:23.22	44º46.75’	110º53.31’	7.0	-0.2	9	174	3	0.08
240712	09:09:00.08	44º46.96’	110º53.29’	7.0	0.4W	9	182	3	0.08
240712	13:02:48.59	44º46.90’	110º58.87’	4.9	0.7W	15	111	3	0.13
240713	08:35:58.47	44º45.83’	111º01.44’	9.5	2.3W	31	74	1	0.18
240713	08:37:18.94	44º45.79’	111º00.98’	7.4	2.0W	23	100	1	0.15
240714	01:04:21.02	44º45.99’	111º01.07’	7.2	0.9	15	102	1	0.10
240715	19:21:15.18	44º45.60’	111º06.37’	10.0	0.0	6	130	7	0.06
240716	07:35:43.63	44º18.42’	111º00.48’	12.7	1.9W	19	88	19	0.22
240716	23:02:04.64	44º34.10’	111º00.11’	14.5	0.2	8	226	12	0.08

Table 2. Earthquakes in the Yellowstone Region: July 1–September 30, 2024

DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
240717	13:40:45.94	44º38.35’	110º57.94’	9.6	0.2	9	244	3	0.08
240717	19:47:57.86	44º28.51’	110º33.67’	4.6	1.4W	13	72	5	0.09
240718	20:53:05.99	44º44.26’	111º02.00’	6.0	1.5W	13	85	3	0.12
240720	07:34:57.53	44º41.36’	111º08.17’	7.8	2.7W	30	93	8	0.14
240720	08:28:28.35	44º41.54’	111º07.92’	7.7	2.0W	24	91	8	0.15
240720	08:48:42.19	44º41.45’	111º07.97’	6.4	0.6W	18	119	8	0.18
240720	08:49:25.11	44º41.70’	111º07.82’	7.8	1.1W	16	118	8	0.13
240720	09:20:16.87	44º29.95’	110º33.93’	2.7	1.0W	14	62	7	0.09
240720	10:43:57.48	44º41.51’	111º08.07’	8.5	1.3W	15	120	8	0.14
240721	08:02:44.19	44º41.51’	110º47.58’	6.1	0.8W	7	115	7	0.04
240723	08:21:41.02	44º40.57’	110º00.69’	12.9	1.4	7	107	9	0.14
240725	13:20:12.45	44º27.97’	111º02.70’	18.5	1.0W	11	174	17	0.12
240726	15:37:05.76	44º44.45’	110º57.45’	8.4	-0.1	8	119	4	0.10
240726	18:06:56.58	44º45.49’	110º52.55’	4.1	0.4	9	119	4	0.10
240727	13:37:29.22	44º45.92’	111º09.95’	11.0	0.3	12	170	10	0.16
240728	10:15:44.02	44º46.59’	111º05.11’	7.4	0.9W	15	128	7	0.11
240729	15:56:53.55	44º25.90’	110º32.01’	4.4	0.8	11	97	4	0.12
240730	02:47:30.34	44º44.83’	110º47.11’	4.5	1.2W	14	157	6	0.19
240804	07:57:02.14	44º39.65’	110º26.50’	3.5	1.4W	22	106	8	0.17
240805	13:19:19.91	44º38.06’	110º20.55’	4.4	0.9	10	105	9	0.09
240806	07:07:54.82	44º33.64’	110º41.81’	7.7	1.0W	22	76	7	0.18
240807	00:16:50.11	44º25.82’	110º20.93’	2.7	0.2	9	128	7	0.11
240807	00:52:52.53	44º25.75’	110º20.96’	2.1	0.3	10	130	7	0.12
240807	00:53:07.82	44º25.37’	110º20.31’	6.6	0.6	11	99	5	0.16
240807	01:16:43.00	44º25.82’	110º20.99’	2.1	0.8	9	129	7	0.09
240807	01:25:27.39	44º25.47’	110º21.17’	2.0	0.2	6	152	7	0.07
240809	02:50:26.52	44º29.93’	110º31.77’	3.5	0.6	8	130	8	0.13
240810	07:21:24.34	44º26.38’	110º13.98’	9.4	0.2	9	139	7	0.13
240810	21:02:09.55	44º46.51’	110º28.20’	5.6	0.9	17	92	8	0.18
240811	07:50:28.36	44º40.66’	110º02.03’	13.9	1.1	14	97	11	0.25
240811	21:12:25.26	44º40.80’	110º02.43’	12.6	2.0W	18	94	11	0.17
240812	06:36:20.86	44º46.34’	110º47.04’	4.0	0.1	8	198	6	0.07
240813	07:59:36.49	44º18.76’	110º50.05’	6.8*	1.3W	13	101	15	0.20
240813	14:47:10.65	44º36.44’	110º19.04’	5.2	1.2	10	119	8	0.08
240813	18:19:38.28	44º47.11’	111º05.98’	10.5	0.5	14	130	8	0.14
240813	18:36:14.62	44º47.17’	111º06.11’	11.1	1.1W	20	107	1	0.16
240813	18:36:40.78	44º47.22’	111º06.01’	10.2	0.4	18	115	1	0.19
240815	20:17:02.25	44º46.76’	110º30.30’	4.6	1.7W	22	89	7	0.20
240816	03:16:53.13	44º47.72’	110º56.79’	8.3	0.9W	17	116	6	0.14
240818	21:52:50.29	44º37.78’	110º19.44’	6.8	1.3W	7	169	9	0.03
240819	20:06:54.47	44º30.12’	110º32.80’	2.2	1.2	11	91	8	0.13
240820	13:31:05.70	44º18.54’	110º28.68’	7.2	0.6	14	157	10	0.08
240821	12:39:50.50	44º42.86’	110º17.82’	5.0	1.8W	14	88	6	0.17
240821	19:49:27.38	44º45.40’	110º57.00’	7.5	-0.2	16	125	4	0.16
240821	20:45:33.79	44º44.87’	110º56.22’	4.5	0.7	11	132	6	0.16

Table 2. Earthquakes in the Yellowstone Region: July 1–September 30, 2024

DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
240821	21:07:26.57	44º19.55’	110º40.61’	4.1*	1.2	12	134	11	0.15
240823	08:48:11.53	44º46.94’	110º49.13’	5.9	0.4	11	100	3	0.10
240823	17:00:06.57	44º00.38’	110º48.70’	10.2	1.2	11	113	12	0.09
240825	12:41:10.07	44º47.13’	110º48.24’	4.8	0.6W	8	213	4	0.06
240825	13:02:13.90	44º48.27’	110º47.90’	6.4	0.8W	10	216	5	0.08
240825	13:37:39.42	44º46.86’	110º48.91’	5.0	0.9W	17	100	3	0.15
240825	13:57:12.09	44º47.35’	110º48.05’	4.9	0.7W	9	221	4	0.07
240827	06:00:11.02	44º47.29’	110º57.39’	5.5	0.2	20	122	5	0.18
240828	13:38:33.62	44º38.84’	110º59.12’	10.8	0.9W	7	155	3	0.10
240829	06:29:31.20	44º18.63’	110º16.42’	10.2	0.7	12	182	9	0.16
240829	12:43:11.69	44º26.90’	110º57.71’	7.7	1.0W	19	111	10	0.19
240830	00:50:46.94	44º42.89’	111º05.79’	9.4	1.2W	21	81	9	0.14
240830	10:31:20.21	44º13.92’	110º45.48’	11.1	0.8	14	83	17	0.21
240830	12:51:51.25	44º48.07’	110º48.45’	2.2	--	7	239	4	0.17
240831	05:42:09.66	44º45.27’	110º53.64’	5.7	-0.2	6	128	5	0.05
240831	07:06:33.14	44º48.12’	110º49.96’	5.8	0.7W	18	108	2	0.13
240831	21:12:26.78	44º41.70’	110º01.84’	13.2	1.2	6	148	10	0.06
240901	05:09:15.56	44º24.74’	110º41.11’	5.8	2.2W	31	80	8	0.19
240902	14:20:14.07	44º39.24’	110º25.76’	4.6	1.5W	15	111	9	0.14
240903	09:08:16.33	44º41.29’	110º27.15’	5.2	1.4W	18	110	5	0.18
240904	10:31:34.17	44º47.10’	110º41.02’	5.4	2.0W	30	96	7	0.17
240904	10:33:06.27	44º46.94’	110º41.01’	4.6	1.5W	22	97	6	0.16
240904	10:41:16.54	44º47.44’	110º40.85’	2.2	0.6	11	213	7	0.14
240904	10:45:41.73	44º47.84’	110º40.76’	2.0	0.1	7	219	8	0.09
240904	14:35:17.63	44º46.08’	111º12.98’	11.1	0.1	15	97	2	0.14
240904	18:35:18.15	44º47.38’	110º41.22’	2.3	0.4	7	211	8	0.08
240905	11:06:39.33	44º06.87’	110º24.14’	8.7*	0.6	15	106	24	0.21
240907	01:54:24.69	44º42.99’	111º07.64’	13.3	2.1W	33	81	7	0.18
240907	06:12:55.18	44º35.31’	110º22.01’	3.9	0.9	18	93	4	0.12
240907	09:16:26.77	44º27.13’	110º31.81’	3.3	0.6	14	81	5	0.15
240908	00:24:29.68	44º49.62’	110º55.97’	2.2	0.7	11	203	8	0.15
240908	07:22:58.42	44º39.43’	110º46.27’	7.3	0.2	14	74	7	0.13
240908	07:24:37.16	44º39.45’	110º46.13’	5.9	0.2	7	116	8	0.07
240908	07:31:54.75	44º39.60’	110º46.24’	7.9	1.1W	22	73	8	0.14
240908	15:49:46.66	44º47.49’	110º49.09’	5.2	1.2W	12	185	3	0.12
240908	17:05:55.74	44º44.93’	110º55.70’	10.0	1.4W	19	97	6	0.10
240908	19:21:53.67	44º45.03’	110º55.42’	10.1	0.9W	12	102	7	0.09
240909	18:31:58.58	44º46.06’	111º04.41’	10.9	1.1W	10	176	5	0.13
240909	18:33:26.76	44º45.25’	111º06.19’	14.4	1.5W	15	82	5	0.16
240910	20:10:40.72	44º46.04’	111º13.01’	12.7	0.9	12	174	10	0.15
240911	17:15:21.26	44º46.04’	111º07.21’	10.9	1.6W	21	65	3	0.15
240912	19:42:54.58	44º44.44’	110º47.99’	5.5	0.8W	9	143	7	0.12
240913	00:26:39.29	44º02.49’	110º46.55’	9.6	1.2	20	111	8	0.15
240913	08:37:12.56	44º44.65’	110º48.78’	5.4	0.5W	11	137	6	0.15
240913	19:39:13.76	44º45.75’	111º07.06’	8.4	-0.5	15	74	4	0.16

Table 2. Earthquakes in the Yellowstone Region: July 1–September 30, 2024

DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
240914	07:10:27.02	44º42.92’	111º16.19’	10.6	-0.1	23	143	2	0.19
240915	01:10:42.02	44º45.70’	111º06.88’	8.9	1.9W	26	55	4	0.14
240915	03:03:56.35	44º45.94’	111º06.77’	9.3	0.6W	15	75	3	0.10
240916	00:12:17.84	44º35.56’	111º14.61’	10.6	0.6	17	158	11	0.14
240916	13:38:44.83	44º48.61’	110º54.74’	6.8	1.0W	15	121	5	0.12
240916	22:38:10.35	44º36.56’	111º08.44’	11.8	0.5	12	168	15	0.15
240917	20:08:03.69	44º46.43’	111º00.38’	7.4	-0.2	11	140	2	0.16
240917	20:08:14.48	44º46.41’	111º00.26’	6.9	0.2	11	140	2	0.13
240917	20:11:13.25	44º46.39’	111º00.32’	8.3	1.1W	25	140	2	0.15
240917	21:43:12.62	44º42.48’	111º14.25’	4.9	0.8W	18	137	0	0.17
240917	23:39:54.60	44º39.17’	110º25.98’	4.6	1.4W	13	109	9	0.11
240918	13:40:04.94	44º48.15’	110º59.79’	6.6	0.1	10	166	5	0.08
240918	19:52:28.81	44º37.23’	110º22.27’	2.1	1.1	9	194	7	0.13
240918	20:13:07.74	44º37.27’	110º21.98’	4.6	1.7W	17	142	7	0.09
240920	14:31:04.36	44º35.32’	110º22.24’	3.4	0.6	11	131	4	0.09
240922	01:39:39.65	44º47.28’	110º42.45’	4.9	1.8W	26	103	7	0.15
240922	02:09:08.67	44º46.76’	110º42.46’	2.3	1.4W	14	112	6	0.10
240922	02:25:38.23	44º25.87’	110º25.18’	6.0	0.4	7	134	11	0.06
240924	05:25:50.18	44º45.19’	110º59.81’	6.5	0.6W	14	91	1	0.20
240925	09:33:37.86	44º46.56’	111º13.53’	13.6	0.0	16	102	4	0.12
240926	07:38:31.53	44º27.00’	110º56.31’	3.4	0.8W	15	114	8	0.13
240926	18:52:57.20	44º43.04’	111º06.02’	9.2	-0.1	12	179	8	0.16
240927	20:19:16.76	44º38.97’	110º29.17’	2.0	-0.2	10	104	7	0.17
240930	16:03:38.49	44º20.00’	110º50.67’	6.2	1.0	9	95	8	0.18

number of earthquakes = 159
* 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, 2024

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	HH[ZEN]	3	WY	44° 42.51′	111° 14.60′	2025	Trillium 120	Centaur	Digital	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	HH[ZEN]	3	WY	44° 47.77′	111° 06.45′	2075	Trillium 120	Centaur	Digital	USGS
YHB	Horse Butte, MT	HH[ZEN]	3	WY	44° 45.07′	111° 11.71′	2157	Compact	Centaur	Digital	USGS
		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	Centaur	Digital	
		EN[ZEN]	3					Titan			
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

SEED Station	Location	SEED Channel	No. of Channels	Network Code	Latitude	Longitude	Elevation (meters)	Sensor	Digitizer	Telemetry	Sponsor
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]	3	WY	44° 43.64′	110° 42.67′	2307	Trillium 120	Centaur	Digital	USGS
		HDF[1,2,3]	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	HH[ZEN]	3	WY	44° 16.26′	110° 48.27′	2707	Trillium 120	Centaur	Digital	USGS
		EN[ZEN]	3					Titan			
YTP	The Promontory (YNP), WY	EHZ	1	WY	44° 23.51′	110° 17.10′	2384	L4	PSN	Analog	USGS
		HH[ZEN]	3					Trillium 120	Centaur	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	HH[ZEN]	3	WY	44° 36.35′	111° 06.05′	2310	Trillium 120	Centaur	Digital	USGS

* Station operated by another agency and recorded as part of the Yellowstone Seismic Network
Network Statistics: 163 data channels from 46 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, 2024

July 16th	Analog channels from YDC removed.
July 16th	Analog channels from YWB removed.
July 17th	Analog channels from YGC removed.
July 17th	Analog channels from YHB removed.
July 30th	Station YDC upgraded to 3-component broadband.
July 30th	Station YGC upgraded to 3-component broadband.
July 31st	Station YWB upgraded to 3-component broadband.
Sept. 24th	Station YSB removed.
Sept. 28th	Analog channels from YPP removed.