

EARTHQUAKE ACTIVITY IN THE YELLOWSTONE REGION

Preliminary Epicenters

October 1 – December 31, 2021

Prepared by the University of Utah Seismograph Stations and funded by
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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 (yyymmdd) 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 through 02:00 (2:00 a.m.) on November 7 and MST thereafter.
- 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).

EARTHQUAKE ACTIVITY IN THE YELLOWSTONE REGION
October 1 – December 31, 2021

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During the three-month period October 1 through December 31, 2021, the University of Utah Seismograph Stations (UUSS) located 447 earthquakes within the Yellowstone region (Figure 1). The total includes no earthquakes in the magnitude 3 range and 16 earthquakes in the magnitude 2 range. The largest event to occur during this period was a magnitude 2.6 earthquake on October 5. 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 2021). 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 seven 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 64 earthquakes ($-0.3 \leq M \leq 1.8$) occurred about 6.0 mi E of Madison Junction, YNP from Oct. 1st – 2nd.
- B. A swarm of 22 earthquakes ($-0.7 \leq M \leq 1.9$) occurred about 8.8 mi NE of West Yellowstone, MT from Oct. 1st – 8th.
- C. A swarm of 19 earthquakes ($-0.4 \leq M \leq 1.4$) occurred about 6.5 mi E of Madison Junction, YNP from Oct. 4th – 6th.
- D. A swarm of 31 earthquakes ($-0.2 \leq M \leq 2.6$) occurred about 4.1 mi NE of Norris Geyser Basin, YNP from Oct. 4th – 5th.
- E. A swarm of 24 earthquakes ($-0.7 \leq M \leq 1.5$) occurred about 5.9 mi E of Madison Junction, YNP from Oct. 8th – 10th.
- F. A swarm of 10 earthquakes ($-0.2 \leq M \leq 1.3$) occurred about 3.7 mi NW of Norris Geyser Basin, YNP from Nov. 14th – 17th.
- G. A swarm of 56 earthquakes ($-0.1 \leq M \leq 1.8$) occurred about 7.3 mi SE of Madison Junction, YNP from Nov. 25th – 27th.

These swarms are labeled in Figure 1.

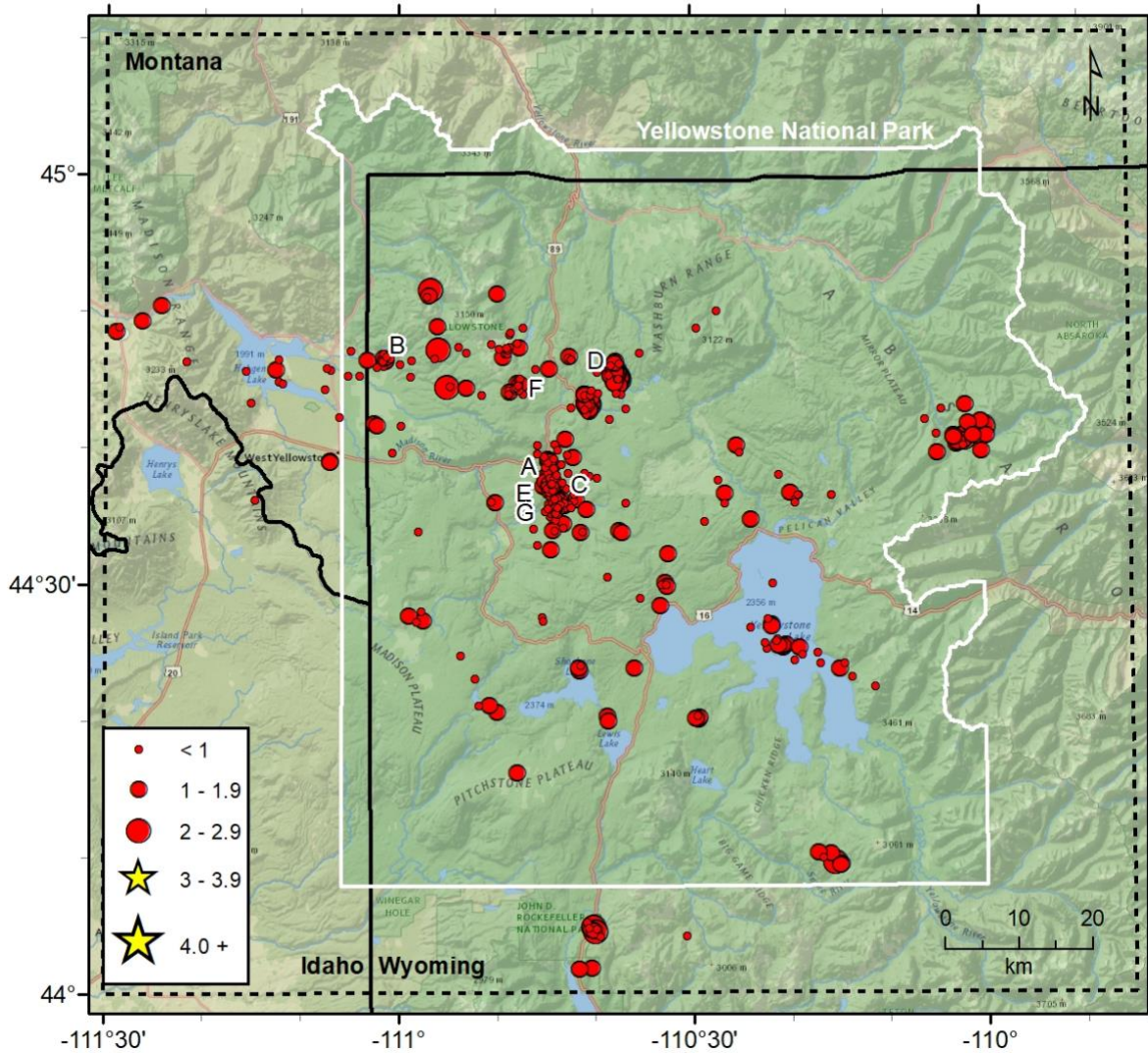


Figure 1. Epicenters of earthquakes located by the University of Utah Seismograph Stations, October 1, 2021, through December 31, 2021. Earthquake swarms (labeled A–G) are discussed in the text.

Table 1
EARTHQUAKES FELT IN THE YELLOWSTONE REGION
January 1, 2021, to December 31, 2021

Date	Time†	Felt Information‡	Latitude	Longitude	Magnitude§
February 09	00:18 MST 07:18 UTC	Yellowstone. Felt (II) at West Yellowstone, MT.	44° 39.00'	111° 06.90'	M _L 2.2
July 16	08:12 MDT 14:12 UTC	Yellowstone. Felt (III) at Yellowstone N.P.	44° 27.05'	110° 20.71'	M _L 3.1
July 16 July 17	18:45 MDT 00:45 UTC	Yellowstone. Felt (III) at Yellowstone N.P.	44° 27.73'	110° 20.66'	M _L 3.6
September 03 September 04	23:51 MDT 05:51 UTC	Yellowstone. Felt (III) at Yellowstone N.P.	44° 39.38'	110° 25.34'	M _L 3.0

† 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 December 31, 2021

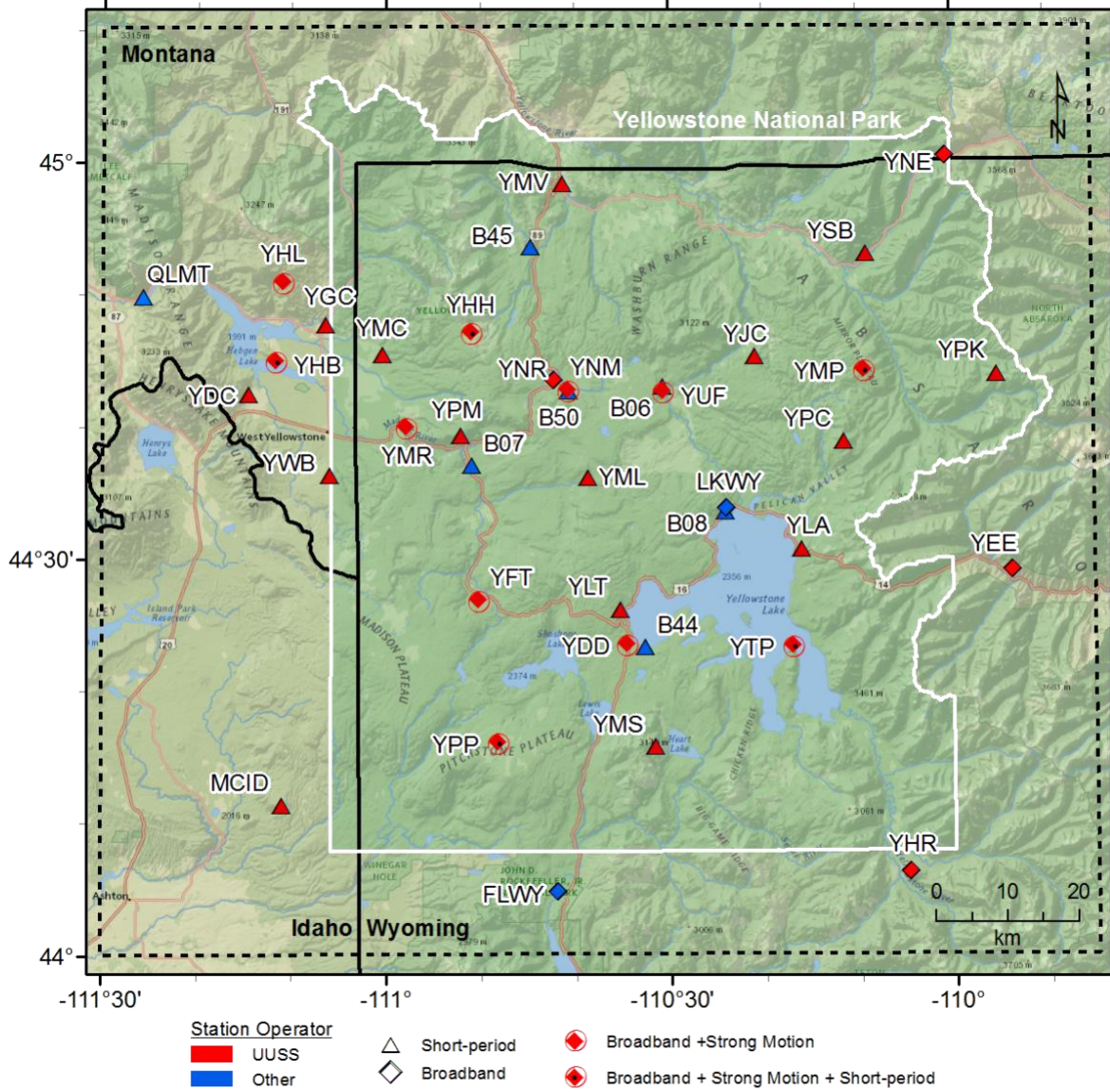


Figure 2. Seismograph stations of the Yellowstone Seismic Network as of December 31, 2021.

Table 2. Earthquakes in the Yellowstone Region: October 1–December 31, 2021

DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
211001	00:11:52.56	44°37.65'	110°44.47'	6.9	0.6	14	95	8	0.18
211001	00:44:45.36	44°37.57'	110°44.99'	7.0	1.2W	19	95	8	0.22
211001	00:44:49.92	44°36.42'	110°43.87'	3.8	1.2W	11	115	7	0.15
211001	00:45:13.12	44°37.36'	110°44.57'	9.8	0.6	13	99	8	0.12
211001	00:54:22.93	44°37.80'	110°44.16'	5.5	--	9	153	8	0.14
211001	00:54:24.04	44°36.51'	110°44.56'	6.9	0.6	7	186	8	0.08
211001	01:10:41.25	44°37.21'	110°45.23'	6.0	1.2W	19	97	8	0.15
211001	01:10:50.47	44°37.14'	110°44.31'	4.1	0.8	16	102	8	0.18
211001	01:33:25.78	44°37.23'	110°44.60'	7.8	1.0	24	51	8	0.16
211001	02:30:31.76	44°37.47'	110°43.31'	12.8	0.1	8	98	7	0.15
211001	02:31:36.94	44°37.04'	110°43.80'	10.2	0.6	10	105	7	0.12
211001	02:31:49.01	44°37.07'	110°42.85'	6.8	0.7	9	105	6	0.14
211001	02:32:21.58	44°36.88'	110°44.12'	5.1	0.6W	16	70	7	0.18
211001	02:36:51.84	44°37.00'	110°43.92'	6.7	0.4	11	80	7	0.15
211001	02:37:05.58	44°38.02'	110°43.86'	2.3	--	9	90	8	0.16
211001	02:37:34.12	44°39.59'	110°45.83'	2.0	--	9	115	8	0.24
211001	02:40:29.15	44°37.43'	110°44.25'	7.5	1.8W	29	50	8	0.18
211001	02:51:20.02	44°37.03'	110°44.25'	6.2	0.6	11	105	8	0.16
211001	02:52:09.34	44°37.28'	110°44.03'	7.7	0.3	16	100	7	0.22
211001	02:52:33.19	44°37.13'	110°44.10'	4.6	0.4	15	103	7	0.16
211001	02:53:17.22	44°37.06'	110°44.24'	5.9	0.9	16	100	8	0.18
211001	02:54:55.05	44°37.13'	110°44.12'	5.0	0.6	14	79	7	0.21
211001	02:55:36.31	44°37.18'	110°44.20'	5.8	0.7	14	79	8	0.15
211001	02:56:43.74	44°36.81'	110°44.15'	7.7	0.9	11	107	7	0.13
211001	02:57:05.26	44°37.35'	110°44.47'	6.7	0.8W	14	85	8	0.15
211001	02:59:21.10	44°37.84'	110°44.52'	2.0	-0.3	12	153	8	0.21
211001	03:04:14.03	44°37.45'	110°43.91'	8.9	0.5W	13	84	7	0.14
211001	03:05:21.07	44°37.43'	110°44.55'	3.7	1.1W	16	98	8	0.17
211001	03:08:25.45	44°37.22'	110°44.68'	6.1	1.2W	19	68	8	0.21
211001	03:08:42.01	44°38.00'	110°44.22'	2.1	0.8	13	148	8	0.19
211001	03:20:45.45	44°37.88'	110°44.32'	2.1	1.5W	17	152	8	0.13
211001	03:23:08.04	44°37.40'	110°44.33'	5.5	0.7W	18	98	8	0.16
211001	03:40:45.56	44°38.27'	110°44.56'	5.0	1.2W	22	143	9	0.19
211001	03:40:55.49	44°38.65'	110°44.32'	4.3	1.3W	17	134	9	0.20
211001	03:41:09.77	44°37.51'	110°43.99'	2.5	0.7	13	159	7	0.14
211001	03:42:44.50	44°37.33'	110°44.66'	7.7	1.0W	20	51	8	0.17
211001	03:49:38.54	44°37.27'	110°43.98'	2.7	0.5	16	101	7	0.31
211001	03:50:36.39	44°37.36'	110°44.47'	2.1	--	7	99	8	0.07
211001	03:50:37.53	44°37.09'	110°43.88'	7.9	0.6	8	104	7	0.10
211001	04:27:56.14	44°37.04'	110°43.85'	8.8	0.2	12	80	7	0.12
211001	04:33:28.36	44°36.96'	110°44.05'	8.4	0.1	10	105	7	0.13
211001	04:51:36.66	44°37.40'	110°44.20'	8.1	1.2W	17	64	8	0.16
211001	04:52:23.69	44°37.02'	110°44.52'	7.7	0.5	19	89	8	0.19
211001	04:58:36.70	44°37.59'	110°44.26'	6.8	0.7W	18	95	8	0.17
211001	05:05:58.59	44°37.29'	110°44.05'	5.8	-0.1	11	101	7	0.16

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DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
211001	05:06:08.55	44°38.65'	110°43.95'	2.7	0.8	9	133	8	0.12
211001	05:10:10.37	44°37.05'	110°44.14'	6.6	0.5	14	89	7	0.12
211001	05:11:16.71	44°37.28'	110°44.16'	9.4	0.2	10	80	8	0.14
211001	05:11:41.12	44°37.13'	110°44.12'	8.5	0.3	10	103	7	0.14
211001	05:17:23.02	44°37.24'	110°44.13'	8.4	0.6W	18	66	8	0.16
211001	05:18:53.71	44°37.39'	110°44.33'	2.4	--	7	164	8	0.10
211001	05:18:55.83	44°37.28'	110°45.06'	5.1	0.6	11	172	10	0.23
211001	05:19:19.56	44°37.91'	110°44.32'	2.1	0.4	10	150	8	0.15
211001	05:24:06.35	44°37.93'	110°44.24'	5.6	0.7	11	150	8	0.16
211001	05:24:46.94	44°37.02'	110°44.39'	6.0	0.3	17	104	8	0.15
211001	05:25:13.17	44°36.90'	110°44.30'	2.3	-0.1	11	106	8	0.22
211001	05:27:08.62	44°37.29'	110°44.34'	6.8	0.1	11	85	8	0.16
211001	05:57:04.14	44°37.33'	110°44.41'	7.4	0.5W	17	99	8	0.20
211001	06:30:39.04	44°37.11'	110°43.98'	9.2	0.1	11	103	7	0.11
211001	09:10:12.56	44°46.38'	111°01.47'	9.1	1.1W	20	137	2	0.18
211001	09:41:09.18	44°37.23'	110°43.60'	10.2	0.4W	12	85	7	0.13
211001	12:54:13.22	44°46.60'	111°01.54'	8.7	0.7W	17	140	2	0.15
211001	13:09:43.48	44°48.82'	111°28.77'	14.3	0.8	14	215	22	0.15
211001	13:20:59.11	44°46.44'	111°01.45'	9.4	0.6W	19	138	2	0.19
211001	13:59:57.79	44°46.90'	111°01.58'	9.6	0.2	11	144	3	0.10
211001	17:44:06.43	44°46.58'	111°01.53'	7.9	1.0W	18	140	2	0.19
211001	17:44:14.37	44°46.45'	111°01.36'	8.1	1.9W	17	139	2	0.16
211001	18:14:07.66	44°46.71'	111°01.29'	9.0	0.0	14	142	2	0.13
211001	20:40:26.86	44°37.52'	110°44.61'	6.6	1.5W	23	96	8	0.17
211001	20:46:11.64	44°38.74'	110°44.28'	5.0	-0.1	8	132	9	0.06
211001	20:46:15.23	44°38.42'	110°44.18'	6.2	0.2	9	139	8	0.14
211001	21:18:30.26	44°46.48'	111°01.43'	8.9	0.6W	21	139	2	0.17
211002	00:33:38.03	44°45.68'	111°15.65'	13.9	0.5	16	217	5	0.14
211002	02:23:39.78	44°46.44'	111°01.46'	9.6	0.7W	20	138	2	0.16
211002	04:11:20.91	44°37.26'	110°44.44'	7.7	0.4	12	100	8	0.08
211002	06:05:50.82	44°44.52'	110°54.81'	8.0	0.5	14	119	7	0.13
211002	06:06:09.08	44°44.45'	110°55.10'	10.1	2.0W	28	93	7	0.15
211002	11:34:59.13	44°46.39'	111°01.66'	9.1	0.1	13	137	2	0.12
211002	11:35:10.11	44°46.27'	111°01.56'	10.0	0.2	15	136	7	0.16
211002	11:35:22.55	44°45.96'	111°02.29'	8.7	-0.7	9	130	3	0.11
211002	15:44:55.19	44°39.56'	110°04.81'	4.6*	1.0	8	185	11	0.18
211002	18:05:19.31	44°43.04'	110°01.90'	5.8	1.0	7	160	9	0.06
211002	18:22:22.14	44°49.27'	111°26.41'	11.6	1.8W	17	277	20	0.16
211002	22:49:37.26	44°46.37'	111°01.61'	8.2	0.3	15	136	2	0.16
211002	22:50:06.89	44°46.74'	111°01.31'	8.8	0.6	15	142	3	0.16
211002	22:52:21.22	44°46.05'	111°01.54'	9.0	0.7W	15	133	2	0.09
211003	02:08:28.30	44°40.81'	110°03.16'	2.8*	1.8	9	145	11	0.09
211003	10:15:30.77	44°46.57'	111°01.75'	9.4	0.9W	15	139	3	0.12
211003	14:12:12.98	44°46.58'	111°01.03'	10.1	0.2	13	141	2	0.10
211004	00:02:45.67	44°46.52'	111°12.38'	14.1	0.5	11	172	3	0.13

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DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
211004	02:31:46.68	44°42.76'	110°04.35'	9.0	0.9	8	127	7	0.14
211004	09:48:45.30	44°04.30'	110°30.71'	9.7	0.8	12	163	15	0.15
211004	14:21:12.19	44°39.31'	110°42.19'	7.7	1.4W	20	53	7	0.17
211004	14:23:29.13	44°40.68'	110°42.97'	6.8	1.3W	10	112	5	0.10
211004	17:14:33.01	44°37.80'	110°43.76'	7.8	0.8	7	154	7	0.07
211004	17:41:49.27	44°37.30'	110°44.44'	7.0	0.9	9	99	8	0.11
211004	18:02:30.60	44°37.44'	110°44.54'	5.2	1.0	9	163	8	0.06
211004	20:35:18.20	44°36.84'	110°44.55'	4.8	1.1W	14	107	8	0.13
211004	21:33:23.16	44°45.51'	110°37.91'	4.5	1.8W	13	169	6	0.15
211004	22:16:13.49	44°43.92'	110°37.22'	2.0	0.7	8	211	5	0.07
211004	22:32:01.10	44°45.08'	110°37.49'	2.6	0.7	7	244	6	0.06
211004	22:34:56.89	44°45.55'	110°37.83'	2.3	1.2W	9	195	6	0.15
211004	22:34:58.33	44°44.55'	110°37.41'	6.9	1.5W	13	181	5	0.18
211004	22:37:02.87	44°45.24'	110°37.52'	4.3	2.5W	27	145	6	0.16
211004	22:39:42.96	44°45.78'	110°37.84'	3.2	1.5W	16	172	7	0.16
211004	22:39:56.72	44°45.03'	110°37.63'	4.7	2.4W	28	70	6	0.15
211004	22:41:03.17	44°45.49'	110°37.86'	3.5	2.0W	19	168	6	0.19
211004	22:41:23.65	44°45.70'	110°37.92'	2.7	2.2W	18	171	6	0.17
211004	23:10:15.00	44°46.21'	110°37.89'	2.3	1.1	7	295	7	0.07
211004	23:38:47.18	44°45.24'	110°37.61'	4.4	2.3W	24	165	6	0.17
211004	23:50:16.07	44°44.71'	110°37.86'	4.3	1.0	9	181	5	0.05
211004	23:50:35.11	44°45.31'	110°37.68'	5.0	1.6W	14	167	6	0.09
211004	23:54:22.16	44°45.31'	110°38.08'	4.1	1.6W	18	166	6	0.17
211004	23:56:06.63	44°44.93'	110°37.84'	4.5	1.4W	8	220	5	0.06
211004	23:56:36.81	44°45.05'	110°37.60'	2.1	0.8	8	244	6	0.07
211004	23:57:52.61	44°46.08'	110°37.96'	2.2	1.6W	14	175	7	0.09
211005	00:07:41.44	44°37.56'	110°44.42'	7.8	0.6	12	96	8	0.14
211005	00:16:18.63	44°44.01'	110°37.68'	2.8	-0.2	10	197	5	0.13
211005	00:16:21.95	44°42.09'	110°38.44'	2.4	0.2	8	135	3	0.04
211005	00:27:18.41	44°45.86'	110°37.97'	4.1	1.4W	13	173	7	0.10
211005	00:30:08.81	44°45.02'	110°37.43'	4.9	2.6W	33	79	6	0.19
211005	01:24:24.67	44°45.96'	110°37.97'	3.0	1.4W	12	200	7	0.09
211005	04:56:27.86	44°46.38'	111°01.34'	9.1	1.0W	15	137	2	0.11
211005	07:06:17.89	44°38.69'	110°44.42'	8.1	0.6W	13	81	9	0.09
211005	07:09:43.56	44°38.82'	110°43.39'	10.3	0.2	10	102	8	0.24
211005	07:10:16.75	44°39.08'	110°44.59'	6.5	0.2	9	125	9	0.06
211005	07:20:25.12	44°38.70'	110°44.37'	8.5	0.4	10	88	9	0.08
211005	08:58:40.95	44°38.55'	110°44.16'	8.6	-0.4	9	90	8	0.08
211005	09:28:39.33	44°36.22'	111°14.72'	12.2	0.4	11	245	11	0.09
211005	10:33:17.67	44°46.46'	111°01.35'	8.8	0.3	15	139	2	0.12
211005	11:22:35.54	44°42.88'	110°36.71'	0.5	0.7	7	176	5	0.04
211005	13:53:48.02	44°45.76'	110°37.76'	2.2	1.5W	15	198	7	0.18
211005	14:08:23.62	44°46.97'	110°35.35'	3.3	0.8	9	266	10	0.06
211005	14:15:59.37	44°45.78'	110°37.77'	5.0	1.5W	17	137	7	0.13
211005	14:24:56.05	44°45.31'	110°38.26'	5.3	1.5W	16	189	5	0.18

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DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
211005	14:34:43.70	44°46.32'	110°37.80'	3.8	1.5W	15	145	7	0.18
211005	14:58:49.15	44°46.08'	110°38.27'	3.1	0.6	6	264	7	0.02
211005	14:58:55.88	44°45.36'	110°38.49'	4.3	0.5	9	189	5	0.07
211005	14:59:01.41	44°45.57'	110°39.69'	-1.4	0.9	6	252	5	0.04
211005	17:33:19.33	44°37.83'	110°44.63'	4.9	0.6	12	153	8	0.07
211006	00:15:42.37	44°37.93'	110°44.93'	5.6	1.3W	21	91	8	0.21
211006	01:04:35.20	44°37.36'	110°44.52'	7.8	0.9W	17	65	8	0.17
211006	02:54:34.26	44°38.35'	110°44.50'	4.4	0.2	11	102	9	0.17
211006	04:46:53.68	44°37.16'	110°44.49'	8.2	0.9W	24	66	8	0.19
211006	07:13:39.60	44°37.04'	110°44.80'	6.1	0.3	12	103	8	0.11
211006	09:35:48.56	44°36.77'	110°44.62'	8.6	0.4	9	108	8	0.09
211006	18:31:29.05	44°28.49'	110°33.30'	3.8	1.5W	13	71	5	0.06
211007	03:42:29.51	44°42.86'	110°40.51'	4.3	1.3W	19	147	0	0.15
211007	04:58:32.81	44°46.39'	111°01.24'	9.2	0.7W	14	138	2	0.15
211007	07:56:55.73	44°46.57'	111°00.86'	9.9	0.0	12	141	2	0.11
211008	01:49:50.70	44°46.18'	110°37.41'	2.3	0.7	7	208	7	0.16
211008	04:01:50.15	44°46.47'	111°01.13'	9.8	0.2	12	139	2	0.13
211008	15:32:23.40	44°35.98'	110°19.48'	6.3	0.9	7	111	7	0.04
211008	21:03:02.88	44°37.66'	110°44.96'	4.7	0.9W	14	94	8	0.11
211009	00:58:43.11	44°45.74'	111°12.68'	12.4	1.1W	16	171	2	0.15
211009	06:00:07.78	44°39.66'	111°00.64'	6.3	0.5	12	131	4	0.19
211009	08:53:12.08	44°36.51'	110°19.10'	6.5	0.8	10	93	8	0.11
211009	10:41:22.79	44°47.41'	110°53.85'	5.8	0.5	17	166	4	0.10
211009	22:37:18.56	44°20.23'	110°29.70'	5.2	1.1W	17	118	7	0.18
211009	22:37:33.79	44°20.46'	110°29.50'	4.0	0.2	15	129	7	0.13
211009	22:42:35.23	44°20.17'	110°29.42'	4.3	1.7W	15	132	7	0.05
211009	22:44:21.77	44°20.30'	110°29.38'	3.9	1.1W	12	132	7	0.04
211010	02:48:45.43	44°37.76'	110°43.92'	7.9	0.6W	11	93	8	0.12
211010	03:16:19.29	44°37.12'	110°44.26'	9.9	0.6	13	102	8	0.13
211010	07:20:29.64	44°48.34'	110°48.69'	7.7	0.8W	16	108	4	0.12
211010	07:20:35.73	44°47.26'	110°49.70'	5.5	0.6	15	199	2	0.12
211010	09:02:01.27	44°48.44'	110°48.55'	7.6	0.6W	13	214	4	0.11
211010	09:57:58.36	44°37.01'	110°43.95'	7.4	0.3	10	105	7	0.16
211010	09:58:03.95	44°36.46'	110°44.20'	3.3	0.4	9	113	7	0.12
211010	10:23:35.25	44°37.35'	110°43.68'	9.4	0.3	13	85	7	0.14
211010	11:08:50.27	44°38.58'	110°44.70'	8.5	0.8	11	85	9	0.14
211010	11:09:27.93	44°38.86'	110°44.79'	6.6	0.4	11	84	9	0.15
211010	11:10:24.54	44°39.04'	110°44.72'	8.2	1.5W	26	78	9	0.18
211010	11:13:14.67	44°39.17'	110°44.78'	8.0	1.5W	26	65	9	0.18
211010	11:13:26.66	44°40.24'	110°45.82'	2.0	0.2	10	175	8	0.17
211010	11:13:45.21	44°38.70'	110°44.61'	7.7	0.8	17	80	9	0.17
211010	11:14:22.57	44°39.06'	110°44.58'	8.0	1.4W	24	77	9	0.15
211010	11:15:54.40	44°38.77'	110°44.46'	8.1	1.4W	16	60	9	0.13
211010	11:21:16.94	44°38.63'	110°44.99'	6.2	-0.3	7	135	8	0.10
211010	11:21:35.03	44°38.75'	110°44.26'	8.7	-0.4	7	132	9	0.09

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DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
211010	11:21:52.28	44°38.49'	110°44.33'	8.4	0.2	11	88	9	0.10
211010	11:27:03.69	44°39.41'	110°45.10'	6.7	-0.6	8	201	9	0.10
211010	11:27:24.51	44°38.96'	110°44.75'	6.7	-0.6	9	128	9	0.11
211010	11:27:33.66	44°39.91'	110°43.78'	7.9	-0.1	8	108	7	0.18
211010	11:37:33.18	44°38.78'	110°44.40'	8.1	0.6	6	131	9	0.05
211010	11:38:56.43	44°38.78'	110°44.40'	8.4	0.6	14	80	9	0.09
211010	11:47:02.46	44°39.22'	110°44.12'	8.9	--	13	92	8	0.14
211010	11:47:04.24	44°39.56'	110°42.81'	9.8	0.6W	11	113	7	0.15
211010	19:32:02.28	44°27.52'	110°22.35'	2.9	0.4	11	82	10	0.04
211010	21:55:11.80	44°41.98'	110°06.09'	2.0	0.8	8	138	6	0.13
211011	02:38:15.69	44°50.02'	110°27.41'	5.5*	0.8	16	92	14	0.11
211011	14:57:34.99	44°22.47'	110°11.36'	8.6	0.4	6	271	8	0.04
211012	12:44:12.08	44°40.14'	110°25.43'	2.2	1.5W	15	222	8	0.09
211012	13:49:04.77	44°37.62'	110°44.21'	6.5	0.7	12	158	8	0.15
211013	08:49:52.71	44°45.34'	111°05.20'	12.4	0.9W	19	97	5	0.18
211013	08:59:53.81	44°36.53'	110°19.13'	8.5	0.6	9	93	8	0.11
211014	07:34:09.42	44°25.52'	110°20.89'	6.3	1.1	13	91	6	0.14
211014	07:39:13.79	44°25.52'	110°21.23'	5.9	1.0	13	90	7	0.12
211014	07:41:57.24	44°25.85'	110°21.46'	2.5	0.2	10	127	7	0.11
211014	07:42:54.41	44°25.40'	110°20.79'	7.2	1.6W	18	92	6	0.16
211014	07:49:56.94	44°26.01'	110°21.37'	2.7	0.6	11	124	7	0.07
211014	08:03:35.38	44°25.59'	110°20.49'	7.4	1.6W	21	86	6	0.18
211014	08:36:21.93	44°46.65'	110°49.30'	4.8	1.5W	20	87	3	0.17
211014	08:37:52.94	44°46.91'	110°49.02'	3.2	0.5	12	198	3	0.11
211014	08:54:13.54	44°25.32'	110°22.46'	2.3	0.2	8	141	8	0.17
211014	09:41:37.44	44°47.36'	110°48.94'	4.0	0.4	13	185	3	0.11
211014	15:30:10.87	44°46.89'	110°48.83'	3.3	0.5	9	199	3	0.07
211014	15:41:41.11	44°24.18'	110°14.51'	7.7	0.8	12	191	4	0.12
211015	00:20:43.79	44°23.94'	110°41.68'	3.9	1.1	15	87	9	0.13
211015	06:48:40.01	44°38.19'	110°44.71'	2.6	0.0	10	144	8	0.15
211016	20:30:17.70	44°33.94'	110°58.01'	13.4	0.8W	15	90	11	0.11
211018	15:57:47.64	44°30.14'	110°32.83'	4.5	1.6W	19	58	8	0.11
211018	16:16:30.64	44°29.99'	110°33.14'	5.8	0.8	15	67	8	0.08
211018	16:28:34.37	44°29.88'	110°32.61'	4.8	1.4W	22	62	8	0.14
211018	17:15:33.05	44°30.01'	110°32.72'	4.8	0.5	18	72	8	0.11
211019	05:56:31.78	44°43.30'	111°15.18'	9.2	0.3	12	170	2	0.09
211019	09:17:08.38	44°45.84'	111°07.41'	8.8	0.2	10	82	4	0.12
211020	14:47:01.91	44°20.36'	110°38.71'	4.1	1.7	12	111	8	0.07
211020	14:47:13.01	44°20.07'	110°38.61'	3.7	1.0	9	165	9	0.07
211020	15:28:51.13	44°46.30'	111°21.78'	10.9	0.9	12	96	8	0.09
211020	16:08:16.74	44°38.06'	110°21.09'	2.7	0.5	11	136	9	0.18
211020	20:30:34.11	44°47.66'	110°50.55'	4.8	0.7	13	111	1	0.15
211022	03:33:28.20	44°46.54'	111°01.74'	10.2	0.9	17	139	3	0.14
211022	10:58:56.01	44°41.81'	111°02.56'	13.4	1.4W	23	71	7	0.15
211022	11:10:19.63	44°41.66'	111°02.26'	11.7	1.1W	19	89	6	0.14

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211023	05:18:28.34	44°45.27'	110°58.80'	6.6	0.3	11	144	2	0.11
211024	12:34:03.72	44°46.52'	110°42.29'	2.2	-0.1	11	245	5	0.11
211024	12:52:32.99	44°46.70'	110°42.48'	3.9	1.9W	20	190	6	0.16
211024	13:05:15.28	44°34.48'	110°43.18'	6.5	1.6W	20	81	7	0.13
211024	13:05:50.66	44°34.70'	110°43.79'	6.5	1.6	9	145	8	0.18
211024	13:23:20.44	44°33.95'	110°44.02'	2.2	0.4	10	89	8	0.11
211024	23:32:46.23	44°46.56'	110°56.36'	4.7	0.4	14	187	6	0.11
211025	02:08:55.03	44°42.70'	110°40.50'	4.6	1.6W	16	124	0	0.09
211025	02:24:56.79	44°42.96'	110°40.51'	4.7	1.8W	20	148	0	0.11
211025	02:32:14.25	44°42.85'	110°40.60'	4.4	1.7W	15	140	0	0.08
211025	03:25:47.28	44°42.99'	110°42.32'	1.6	-0.4	8	169	2	0.11
211025	03:26:23.98	44°42.45'	110°40.78'	4.0	0.3	9	118	1	0.12
211025	03:26:50.26	44°43.85'	110°40.35'	3.7	-0.1	8	179	2	0.13
211025	03:29:10.93	44°43.19'	110°40.49'	4.8	2.1W	16	151	1	0.13
211025	07:53:23.03	44°40.30'	110°44.08'	24.4	0.8	21	131	6	0.21
211026	09:48:08.40	44°39.66'	110°25.09'	5.3	0.5	9	221	9	0.04
211026	17:06:33.92	44°46.41'	111°03.26'	8.3	1.4W	23	133	4	0.16
211026	20:17:20.69	44°04.79'	110°40.53'	9.8	1.9W	15	132	2	0.11
211026	21:13:54.54	44°04.30'	110°39.49'	8.8	0.8	10	182	4	0.17
211026	22:25:08.03	44°04.84'	110°39.90'	8.9	0.9	10	133	3	0.12
211027	06:40:48.37	44°37.67'	110°27.31'	2.5	0.4	7	171	8	0.05
211027	13:21:53.95	44°28.12'	110°57.76'	3.4	0.5	10	144	10	0.20
211027	13:56:36.66	44°44.76'	111°11.98'	9.2	0.2	11	120	1	0.07
211027	14:12:23.97	44°27.33'	110°58.20'	4.3*	0.9	12	118	11	0.20
211027	14:13:00.59	44°27.36'	110°57.51'	2.8	1.4	9	177	10	0.05
211027	18:40:27.59	44°46.91'	110°49.15'	5.0	0.5	9	196	3	0.09
211028	03:19:10.09	44°40.45'	110°02.07'	13.2	1.9W	19	159	11	0.21
211028	03:29:23.02	44°40.10'	110°02.18'	15.5	0.9	8	161	11	0.07
211028	03:30:09.85	44°40.28'	110°02.76'	14.4	1.4	8	157	12	0.09
211028	03:47:15.03	44°40.13'	110°02.85'	14.1	1.6	10	95	12	0.06
211028	04:46:11.40	44°40.56'	110°02.03'	13.0	2.3W	21	98	11	0.23
211028	04:57:23.95	44°24.11'	110°41.47'	3.6	0.9	18	86	9	0.13
211028	12:14:31.33	44°23.15'	110°52.21'	3.2	0.8	10	133	8	0.09
211029	03:21:00.81	44°43.15'	110°40.61'	5.1	0.7	19	153	0	0.17
211029	04:06:44.65	44°30.08'	110°21.81'	0.9	0.6	9	104	7	0.23
211029	05:53:26.01	44°46.64'	110°42.61'	3.5	0.6	19	189	6	0.19
211030	04:28:34.69	44°25.71'	110°22.65'	5.8	0.1	9	135	8	0.13
211030	06:25:58.51	44°23.23'	110°13.70'	6.4	0.8	10	197	5	0.05
211030	08:05:30.58	44°24.26'	110°16.97'	3.6	0.3	7	182	1	0.05
211030	08:08:16.10	44°24.87'	110°18.77'	1.3	0.4	8	124	3	0.04
211030	15:40:42.49	44°45.76'	110°45.95'	7.6	0.2	11	193	7	0.14
211031	17:32:24.42	44°40.95'	110°04.92'	4.6	0.9	7	99	9	0.24
211101	05:04:11.43	44°40.64'	110°03.14'	15.0	1.3	7	90	11	0.08
211101	06:38:23.28	44°43.34'	110°40.59'	4.9	2.0W	24	119	1	0.16
211101	06:39:10.01	44°43.66'	110°40.25'	5.4	1.7W	26	123	2	0.18

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211101	06:57:02.97	44°43.44'	110°40.83'	4.3	1.7W	17	153	1	0.11
211101	11:49:36.42	44°43.91'	110°40.97'	3.4	-0.1	14	160	2	0.11
211102	05:51:34.13	44°23.71'	110°41.57'	4.2	1.5W	24	89	9	0.15
211102	07:48:23.89	44°40.77'	109°59.80'	14.0	1.1	11	110	8	0.20
211102	15:23:17.17	44°44.44'	110°47.93'	3.8	-0.7	7	143	7	0.08
211102	15:23:29.77	44°44.36'	110°48.14'	2.8	-0.5	7	140	7	0.07
211105	06:37:49.90	44°34.00'	110°44.25'	7.2	1.2W	11	152	9	0.07
211105	13:33:29.69	44°40.74'	110°01.15'	15.5	1.0	10	162	10	0.15
211105	21:57:59.32	44°47.42'	110°48.60'	5.0	0.7W	10	221	3	0.07
211106	16:38:16.44	44°43.85'	110°40.94'	4.2	0.9	10	160	2	0.05
211106	16:38:30.96	44°43.96'	110°40.96'	4.4	1.9W	21	160	2	0.17
211106	16:44:17.57	44°43.66'	110°40.90'	4.3	0.3	8	160	1	0.07
211107	23:06:06.97	44°36.68'	110°26.67'	4.8	1.4W	10	169	6	0.06
211109	04:23:27.10	44°51.55'	110°56.77'	7.7	2.3W	30	169	11	0.11
211109	18:51:41.65	44°51.12'	110°56.93'	7.5	1.6W	22	203	11	0.16
211109	20:18:06.06	44°51.11'	110°57.11'	6.4	0.5	12	214	11	0.12
211110	10:44:51.70	44°43.92'	110°51.56'	8.1	0.4	10	91	6	0.14
211110	12:56:48.82	44°04.99'	110°40.21'	10.1	2.5W	31	133	2	0.16
211110	13:15:06.81	44°04.65'	110°40.04'	7.2	2.2W	21	133	3	0.12
211111	04:07:35.10	44°21.16'	110°50.74'	2.1	1.5	15	108	10	0.32
211111	04:07:58.05	44°21.17'	110°51.87'	2.5	0.6	8	127	10	0.18
211111	04:09:00.09	44°20.67'	110°49.99'	9.0	1.6W	19	85	8	0.28
211111	18:15:36.08	44°05.32'	110°40.90'	9.1	0.9	12	130	2	0.12
211112	10:14:24.42	44°36.51'	110°15.72'	7.6	0.9	7	132	7	0.04
211112	13:45:20.84	44°43.95'	110°40.96'	4.2	1.7W	19	160	2	0.18
211113	06:57:46.49	44°04.90'	110°40.66'	9.4	--	11	131	2	0.09
211113	07:03:14.68	44°04.72'	110°40.18'	9.6	1.8W	19	133	2	0.13
211113	14:33:45.50	44°37.98'	110°40.48'	4.6	0.6	10	142	4	0.07
211114	08:53:40.82	44°44.67'	110°47.56'	9.1	1.3W	17	140	7	0.14
211114	08:55:26.06	44°44.57'	110°47.81'	5.5	--	10	147	7	0.13
211114	08:55:27.30	44°45.79'	110°44.58'	10.2	1.2W	13	208	5	0.06
211114	08:56:10.43	44°44.76'	110°47.91'	9.2	1.3W	13	140	6	0.10
211114	08:59:21.19	44°44.94'	110°47.62'	9.0	0.8W	12	154	6	0.11
211114	09:08:07.11	44°44.54'	110°47.97'	5.1	0.6	13	141	7	0.13
211114	09:18:26.78	44°45.05'	110°47.76'	9.4	0.9W	11	155	6	0.10
211114	10:13:55.95	44°44.24'	110°48.08'	2.6	0.1	10	132	7	0.07
211116	07:46:51.98	44°35.96'	110°26.67'	5.4	0.6	9	95	6	0.08
211116	08:51:05.57	44°43.99'	110°47.25'	2.2	0.8	12	141	8	0.14
211116	12:31:31.97	44°34.77'	110°23.95'	2.0	1.9W	19	95	2	0.14
211117	02:39:56.38	44°44.28'	110°47.67'	2.8	-0.2	9	143	7	0.06
211117	08:27:21.54	44°43.16'	110°40.96'	4.5	1.2W	18	149	1	0.13
211117	22:47:28.39	44°47.66'	110°47.81'	6.2	0.4	12	211	4	0.12
211118	00:58:48.08	44°01.93'	110°41.65'	10.7	1.1	13	132	6	0.14
211119	13:24:55.12	44°43.17'	110°40.72'	4.4	1.2W	16	150	0	0.11
211120	09:54:35.12	44°41.66'	110°01.68'	12.3	1.2	9	92	9	0.19

Table 2. Earthquakes in the Yellowstone Region: October 1–December 31, 2021

DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
211121	08:23:06.00	44°43.05'	110°40.67'	4.4	1.9W	20	149	0	0.15
211121	08:23:28.68	44°44.26'	110°40.26'	3.0	-0.1	14	167	3	0.18
211121	10:08:19.80	44°44.09'	110°48.64'	5.9	1.2W	23	121	7	0.16
211121	10:17:22.17	44°43.98'	110°48.74'	4.8	0.8W	27	119	7	0.16
211121	10:37:30.32	44°44.25'	110°48.79'	6.5	0.4	13	129	6	0.14
211121	10:39:00.66	44°43.95'	110°48.79'	4.2	0.1	7	125	7	0.06
211122	17:06:06.56	44°42.87'	110°40.66'	5.0	1.8W	20	132	0	0.15
211122	20:59:20.48	44°36.04'	110°50.16'	1.5	1.5W	17	89	2	0.16
211123	05:54:45.71	44°37.85'	110°39.75'	8.4	0.7	9	158	3	0.05
211123	17:44:11.05	44°51.27'	110°49.92'	7.6	1.2W	17	210	8	0.17
211123	23:48:00.20	44°46.45'	110°58.73'	6.1	0.1	14	143	3	0.12
211124	09:51:05.58	44°36.10'	110°50.55'	1.5	0.6	12	97	2	0.18
211124	10:55:54.15	44°44.36'	111°07.58'	11.6	0.1	14	99	6	0.16
211125	12:45:33.54	44°47.20'	110°48.86'	3.9	0.4	10	212	3	0.07
211125	13:12:42.41	44°16.25'	110°48.01'	5.1	1.5	21	87	0	0.29
211125	16:27:16.20	44°38.17'	110°40.96'	4.7	0.3	12	136	5	0.08
211125	20:01:25.92	44°24.46'	110°19.56'	8.9	0.6	12	102	4	0.16
211126	14:34:30.53	44°35.79'	110°44.22'	8.1	1.2W	15	88	8	0.16
211126	14:41:25.94	44°36.00'	110°36.79'	0.5	0.0	8	194	2	0.28
211126	14:42:10.73	44°35.04'	110°44.57'	3.2	0.5	6	134	8	0.07
211126	14:42:28.56	44°36.33'	110°44.10'	10.0	--	6	116	7	0.10
211126	14:43:41.22	44°37.35'	110°44.32'	2.4	0.9W	11	84	8	0.13
211126	14:44:16.91	44°36.24'	110°41.88'	-1.8*	1.3W	8	104	12	0.16
211126	14:45:05.51	44°35.50'	110°44.05'	6.4	1.1W	12	88	7	0.12
211126	14:45:26.96	44°32.56'	110°44.43'	3.0	1.1	10	170	10	0.14
211126	14:47:59.24	44°35.63'	110°42.40'	11.9	--	7	139	5	0.08
211126	14:48:30.12	44°35.96'	110°43.75'	8.8	1.2	11	85	7	0.17
211126	14:49:02.84	44°35.92'	110°43.49'	8.0	0.2	7	84	7	0.15
211126	14:49:17.05	44°35.24'	110°44.48'	2.3	0.5	8	91	8	0.16
211126	14:49:50.48	44°30.57'	110°38.64'	22.4	-0.1	7	149	11	0.09
211126	14:50:02.22	44°35.78'	110°43.67'	8.5	0.7	12	66	7	0.08
211126	14:52:27.80	44°35.66'	110°43.55'	8.4	0.9W	11	130	7	0.10
211126	14:52:56.74	44°35.91'	110°43.88'	7.3	1.0W	16	65	7	0.13
211126	14:58:22.82	44°35.99'	110°43.05'	8.1	0.1	8	82	6	0.13
211126	14:58:42.78	44°35.85'	110°43.72'	8.6	0.5	11	85	7	0.13
211126	14:58:54.68	44°34.11'	110°46.19'	10.1	0.3	6	121	11	0.09
211126	14:59:19.74	44°36.05'	110°43.55'	8.3	1.0W	9	84	7	0.10
211126	14:59:34.54	44°36.87'	110°44.25'	3.1	1.1	6	192	8	0.03
211126	15:00:09.05	44°35.73'	110°43.97'	7.7	1.8W	16	86	7	0.14
211126	15:00:23.63	44°35.69'	110°44.18'	6.9	0.9	9	88	7	0.11
211126	15:01:22.66	44°38.18'	110°42.68'	10.0	0.4	6	106	6	0.10
211126	15:01:38.96	44°34.73'	110°44.01'	2.9	0.2	6	143	8	0.19
211126	15:02:08.72	44°35.79'	110°43.12'	8.8	1.1W	12	82	6	0.16
211126	15:02:32.59	44°36.31'	110°43.51'	9.1	1.3W	15	83	7	0.15
211126	15:03:50.23	44°36.67'	110°42.10'	8.8	--	7	89	5	0.09

Table 2. Earthquakes in the Yellowstone Region: October 1–December 31, 2021

DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
211126	15:04:24.99	44°36.12'	110°42.10'	3.2	0.9W	9	77	5	0.06
211126	15:05:15.02	44°35.57'	110°44.71'	2.7	--	9	91	8	0.18
211126	15:06:10.09	44°34.19'	110°43.21'	5.6	0.0	5	158	7	0.25
211126	15:14:45.25	44°35.62'	110°43.79'	5.6	0.1	7	86	7	0.11
211126	15:15:01.76	44°35.65'	110°42.98'	10.6	0.8W	11	82	6	0.10
211126	15:15:33.71	44°35.54'	110°40.77'	16.5	1.2	6	156	3	0.03
211126	15:56:11.38	44°36.16'	110°43.45'	8.7	0.4	7	121	6	0.05
211126	16:01:22.12	44°35.88'	110°42.62'	12.0	0.2	9	80	5	0.08
211126	16:59:57.77	44°36.30'	110°43.19'	10.1	0.7	9	120	6	0.09
211126	18:52:58.94	44°36.40'	110°43.75'	8.0	0.5	8	200	7	0.06
211126	18:58:00.95	44°36.78'	110°43.96'	6.6	0.8W	9	109	7	0.10
211127	04:59:54.37	44°26.90'	110°21.91'	9.8	1.1	13	86	9	0.09
211127	05:50:22.24	44°35.16'	110°43.75'	8.1	0.2	6	138	7	0.06
211127	05:50:44.72	44°35.23'	110°43.92'	6.8	-0.1	7	135	7	0.06
211127	05:58:13.67	44°32.92'	110°45.84'	7.6	0.4	9	102	10	0.20
211127	06:39:19.10	44°35.71'	110°43.88'	7.9	1.0W	15	78	7	0.13
211127	06:43:01.63	44°35.53'	110°43.64'	7.5	0.4	9	132	7	0.07
211127	06:49:16.77	44°35.36'	110°45.08'	4.7	0.3	7	90	8	0.19
211127	06:54:25.98	44°36.10'	110°43.72'	9.4	1.2W	18	64	7	0.18
211127	07:01:31.94	44°36.13'	110°43.66'	7.8	1.0W	19	63	7	0.16
211127	07:06:20.44	44°36.11'	110°43.94'	4.9	0.3	7	196	7	0.06
211127	07:06:43.77	44°35.43'	110°43.73'	7.5	0.5	8	133	7	0.06
211127	07:11:27.16	44°35.90'	110°43.50'	8.3	0.1	8	126	7	0.09
211127	07:59:04.85	44°36.40'	110°43.47'	7.4	0.5	11	125	6	0.10
211127	08:10:22.20	44°36.30'	110°43.72'	6.7	0.2	10	73	7	0.11
211127	08:41:41.14	44°35.47'	110°43.50'	8.2	0.4	11	134	7	0.08
211127	09:00:34.35	44°33.99'	110°37.44'	7.2	1.9W	25	64	5	0.17
211127	09:34:08.88	44°35.63'	110°43.77'	7.5	-0.1	5	208	7	0.05
211127	09:34:28.97	44°36.35'	110°43.75'	6.4	0.1	8	189	7	0.08
211127	09:34:57.65	44°27.37'	110°45.25'	2.2	0.8	13	77	7	0.20
211127	09:35:29.42	44°35.63'	110°43.91'	7.0	0.3	6	208	7	0.06
211127	10:11:58.23	44°35.21'	110°44.06'	6.1	0.2	10	135	8	0.06
211127	11:28:39.99	44°35.39'	110°43.88'	7.4	0.2	9	133	7	0.09
211127	11:34:48.36	44°35.72'	110°44.00'	6.2	0.2	7	206	7	0.06
211127	16:22:15.84	44°36.25'	110°43.93'	7.8	0.9W	17	75	7	0.13
211127	18:42:20.88	44°24.83'	110°53.74'	7.8	0.3	9	125	6	0.13
211127	18:57:59.24	44°44.61'	110°47.62'	6.7	0.4	9	150	7	0.09
211127	19:18:22.77	44°35.41'	110°44.03'	6.4	0.5	7	141	7	0.05
211127	19:18:59.65	44°36.00'	110°43.56'	7.9	0.4	10	124	7	0.10
211128	04:34:27.75	44°33.81'	110°37.18'	4.7	1.3W	19	64	5	0.10
211128	15:42:27.35	44°27.06'	110°21.96'	9.6	1.2	10	87	9	0.09
211129	00:00:59.67	44°47.24'	110°55.94'	7.8	2.4W	33	73	6	0.14
211129	10:59:47.13	44°23.90'	110°35.97'	2.2	1.5	13	91	2	0.09
211129	23:13:34.93	44°32.24'	110°32.51'	6.6	1.9W	12	71	11	0.07
211201	11:02:14.48	44°27.62'	110°45.40'	4.5	0.9	11	89	6	0.15

Table 2. Earthquakes in the Yellowstone Region: October 1–December 31, 2021

DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
211201	12:15:36.78	44°47.37'	110°47.66'	4.5	1.9W	18	109	4	0.14
211202	02:56:32.40	44°48.82'	110°47.28'	5.1	0.4	12	197	6	0.08
211202	16:21:52.66	44°44.04'	110°39.62'	5.3	0.5	8	242	3	0.04
211203	00:06:33.69	44°48.75'	110°29.45'	2.0*	0.6	7	284	11	0.09
211203	07:44:31.62	44°50.43'	111°24.41'	11.5	1.2W	19	97	18	0.11
211203	14:04:07.29	44°41.81'	110°00.39'	20.4	1.2	5	155	8	0.03
211205	04:07:45.73	44°23.76'	110°15.01'	5.1	1.2	11	193	3	0.16
211205	08:37:40.65	44°25.34'	110°19.11'	8.1	1.3	10	99	4	0.07
211205	23:01:10.22	44°44.43'	110°53.09'	7.9	1.6W	25	88	6	0.13
211206	14:43:49.48	44°39.64'	110°00.30'	12.5	1.7	17	117	10	0.16
211206	16:26:12.32	44°26.85'	110°24.08'	5.9	0.5	8	94	11	0.05
211208	19:28:23.19	44°45.07'	110°47.56'	9.4	0.6	8	160	6	0.09
211208	19:59:34.33	44°34.65'	110°28.69'	2.7	0.8	8	140	6	0.09
211209	02:46:21.38	44°42.85'	110°41.00'	3.8	0.2	10	120	0	0.08
211209	08:56:19.93	44°43.24'	110°40.70'	4.2	1.8W	18	152	1	0.13
211209	15:25:02.05	44°29.04'	110°35.34'	4.4	0.7	21	52	5	0.19
211209	18:23:23.42	44°45.72'	111°07.00'	11.1	0.3	15	74	4	0.15
211209	21:29:35.00	44°02.00'	110°40.38'	6.0	1.1	15	136	6	0.14
211210	07:12:04.53	44°10.02'	110°16.83'	12.0	0.9	16	128	17	0.18
211214	03:48:37.95	44°09.44'	110°15.06'	6.7*	1.1	10	185	26	0.11
211215	13:53:09.69	44°46.99'	110°53.10'	6.1	0.6	13	150	3	0.12
211215	18:12:37.98	44°27.77'	110°59.03'	5.3*	1.1W	12	122	12	0.23
211216	11:49:35.71	44°36.20'	110°19.43'	2.0	0.9	10	114	8	0.14
211217	05:27:49.78	44°39.03'	111°07.14'	9.3	1.5W	19	127	5	0.16
211217	06:51:36.05	44°38.95'	111°07.06'	8.5	1.0W	19	96	5	0.17
211218	21:12:15.87	44°41.40'	110°00.10'	15.0	2.6W	27	106	8	0.21
211218	23:37:58.53	44°25.03'	110°17.21'	9.3	0.6	11	137	3	0.12
211219	06:45:53.95	44°46.13'	110°59.87'	3.4	0.8	13	137	1	0.16
211220	04:32:44.29	44°44.90'	111°12.35'	11.9	0.5	13	86	1	0.09
211222	02:00:24.12	44°48.50'	111°29.07'	11.4	1.5W	26	80	17	0.15
211222	09:50:12.83	44°41.69'	110°59.81'	3.2	0.7	11	72	4	0.17
211223	12:30:18.87	44°36.66'	110°19.98'	2.4*	0.9	10	85	12	0.08
211224	07:41:01.56	44°09.69'	110°15.55'	11.4	2.5W	24	92	15	0.21
211224	07:48:05.38	44°10.41'	110°17.34'	2.2*	1.2	12	126	18	0.15
211224	07:48:41.88	44°10.29'	110°16.08'	6.0*	1.4	10	140	17	0.16
211226	00:08:00.67	44°45.28'	111°04.06'	7.3	0.5	12	110	5	0.12
211227	14:36:04.18	44°09.55'	110°15.02'	13.4	1.9	17	93	15	0.14
211228	03:50:41.72	44°33.88'	110°41.18'	6.9	0.2	15	111	6	0.16
211228	03:50:46.42	44°33.86'	110°41.42'	5.7	1.6W	16	110	6	0.19
211228	05:35:01.46	44°48.91'	110°56.03'	6.5	1.6W	19	125	7	0.14
211231	20:05:50.24	44°42.32'	111°06.12'	8.5	0.9W	15	130	9	0.14
211231	21:21:10.46	44°47.11'	111°04.92'	9.5	-0.8	10	135	2	0.11

number of earthquakes = 447

* indicates poor depth control

W indicates Wood-Anderson data used for magnitude calculation

Table 3
UNIVERSITY OF UTAH YELLOWSTONE SEISMIC NETWORK
Operating Seismograph Stations
December 31, 2021

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*	Teepee 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 PH	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			
		EN[ZEN]	3					Titan	Centaur	Digital	
YHH	Holmes Hill (YNP), WY	EHZ	1	WY	44° 47.30'	110° 51.03'	2717	S13	PSN	Analog	USGS
		HH[ZEN]	3					Trillium 120			
		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
YJC	Joseph's Coat (YNP), WY	EH[ZEN]	3	WY	44° 45.33'	110° 20.95'	2684	S13	PSN	Analog	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			
		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	EHZ	1	WY	44° 58.42'	110° 41.33'	1829	L4C	PSN	Analog	USGS
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	Q330	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			
		EN[ZEN]	3					Titan			
YSB	Soda Butte (YNP), WY	EHZ	1	WY	44° 53.04'	110° 09.06'	2072	L4C	PSN	Analog	USGS
YTP	The Promontory (YNP), WY	EHZ	1	WY	44° 23.51'	110° 17.10'	2384	L4	PSN	Analog	USGS
		HH[ZEN]	3					Trillium 120			
		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: 150 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	Kinematics 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	Kinematics FBA-23 accelerometer
EpiSensor	Kinematics 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	Kinematics Altus Series K2 (19-bit resolution field digitizer)
Etna	Kinematics 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	Kinematics 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 October 1–December 31, 2021

None