EARTHQUAKE ACTIVITY IN THE YELLOWSTONE REGION

Preliminary Epicenters

January 1 – March 31, 2016

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 (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 MST from January 1st through March 12th and MDT from March 13th through March 31st.

- 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
January 1 – March 31, 2016

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During the three-month period January 1 through March 31, 2016, the University of Utah Seismograph Stations (UUSS) located 152 earthquakes within the Yellowstone region (Figure 1). The total includes 12 earthquakes in the magnitude 2 range. The largest event to occur during this period was a magnitude 2.5 earthquake on January 31st. 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 2016). 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 *http://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 two 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 10 earthquakes ($0.9 \leq M \leq 2.0$) occurred about 2.8 miles W of Canyon Junction, Yellowstone National Park from January 25th – January 27th.
B. A swarm of 16 earthquakes ($0.2 \leq M \leq 2.5$) occurred about 4.3 miles S of Lake, WY, Yellowstone National Park on January 31st.

These swarms are labeled in Figure 1.

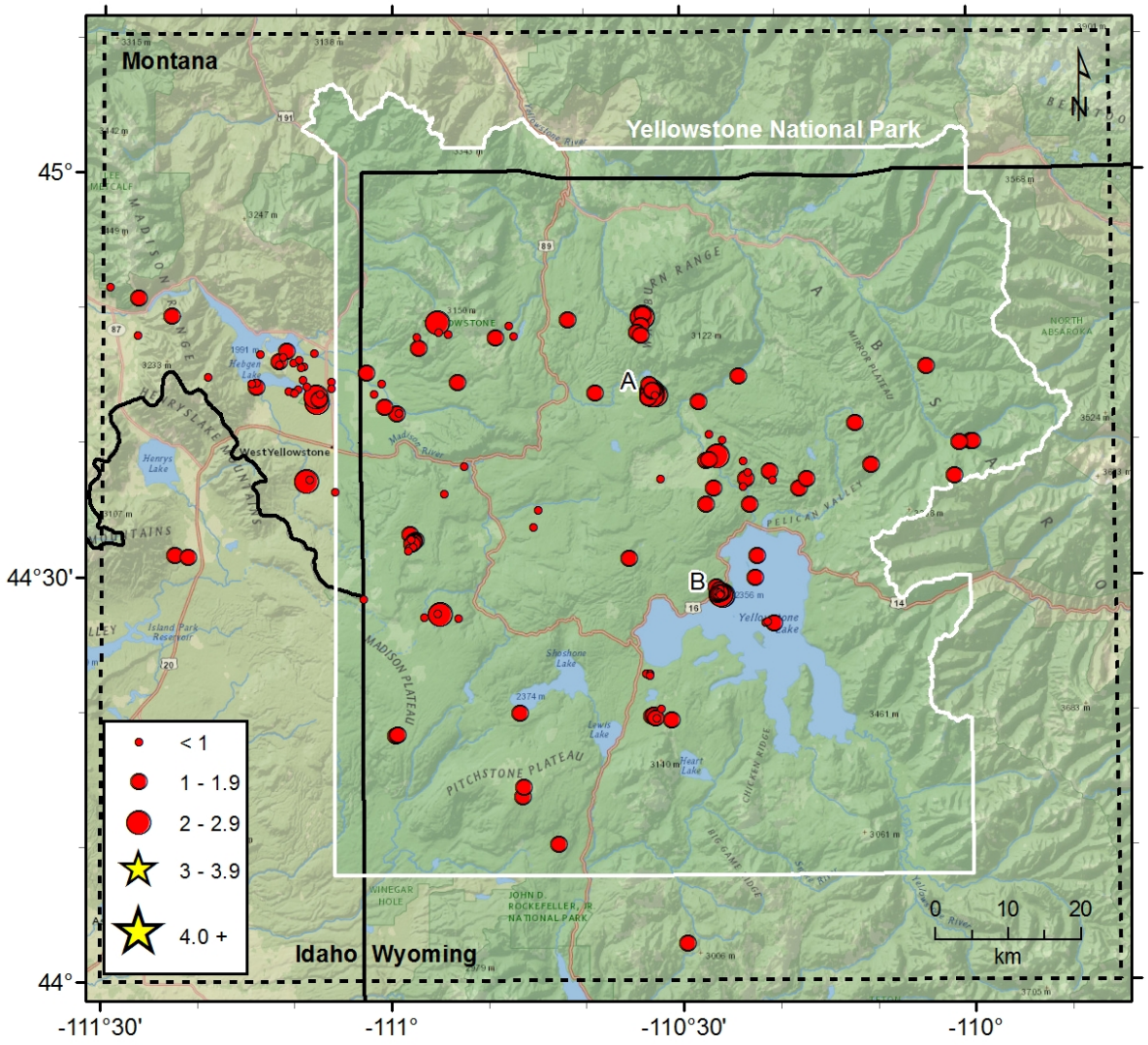

Figure 1. Earthquake epicenters located by the University of Utah Seismograph Stations, January 1, 2016 through March 31, 2016. Earthquakes of magnitude 3.0 and larger are depicted as yellow stars. Earthquake swarms labeled A-B are discussed in the text.

Table 1

EARTHQUAKES FELT IN THE YELLOWSTONE REGION
January 1, 2016 to December 31, 2016

Date	Time†	Felt Information‡	Latitude	Longitude	Magnitude§
None					

† 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 (*http://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
March 31, 2016

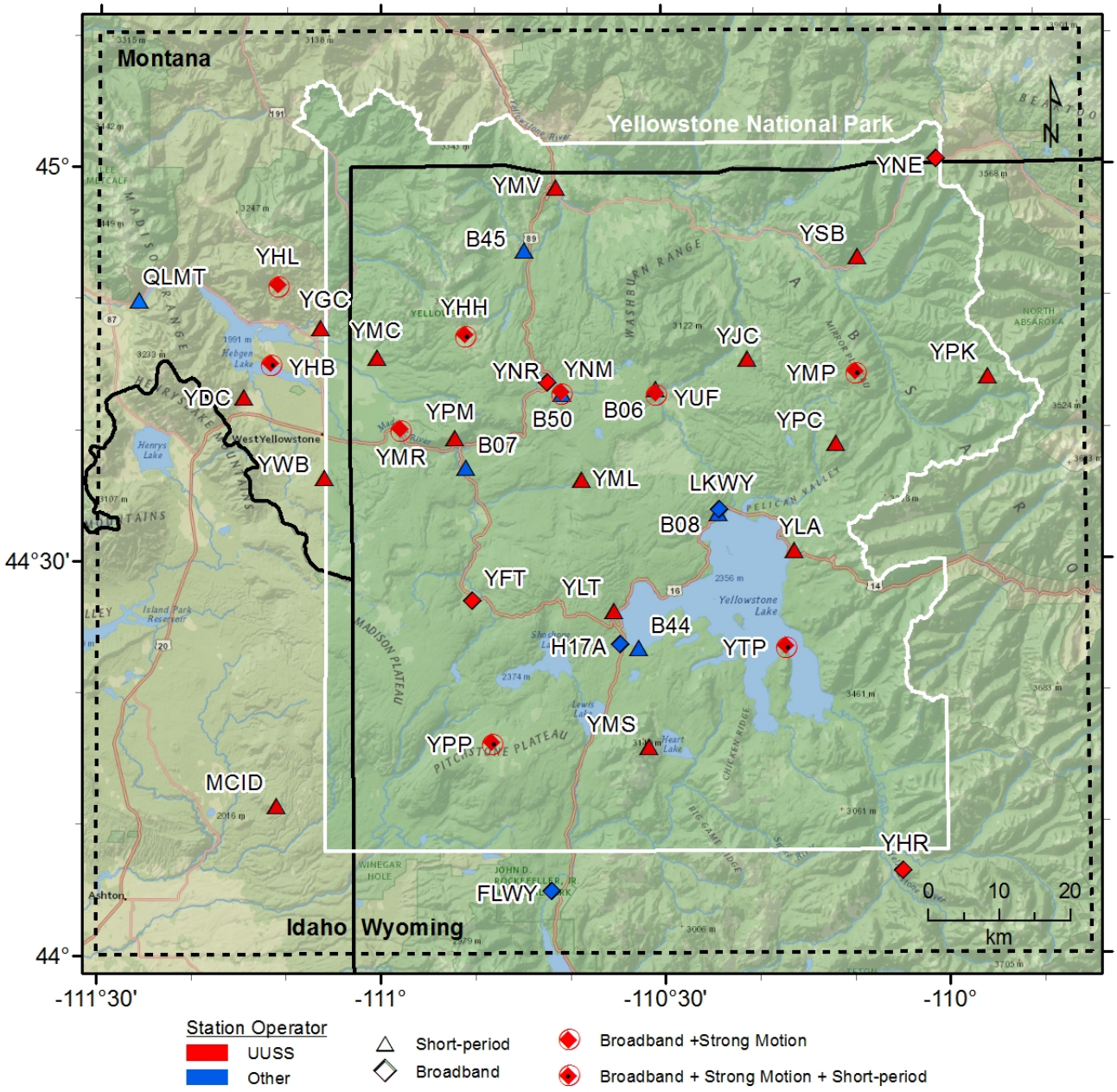

Figure 2

Table 2. Earthquakes in the Yellowstone Region: January 1–March 31, 2016

DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
160102	00:13:47.54	44º45.83'	111º11.74'	12.7	0.2	8	159	7	0.10
160103	07:56:01.46	44º44.90'	110º24.00'	2.2	1.2W	8	177	4	0.15
160104	02:21:02.35	44º47.89'	110º47.34'	5.9	0.9W	11	124	5	0.13
160104	18:14:36.44	44º31.56'	110º22.17'	3.1	1.5	6	129	5	0.22
160104	18:57:53.21	44º35.35'	110º22.91'	1.8	1.9	5	282	3	0.10
160104	20:38:02.79	44º20.01'	110º46.79'	2.5	1.1	8	144	7	0.07
160105	10:45:47.34	44º36.70'	110º23.57'	4.8	0.4	11	126	5	0.18
160105	13:50:00.05	44º42.61'	111º00.76'	8.1	1.1W	11	58	5	0.12
160106	07:34:11.42	44º43.41'	111º07.93'	10.7	2.0W	19	76	6	0.16
160106	07:34:11.60	44º43.00'	111º07.81'	8.8	2.0W	20	80	6	0.13
160106	07:39:00.52	44º18.30'	110º59.63'	11.1	1.6W	9	92	16	0.27
160106	07:39:00.87	44º18.42'	110º59.41'	6.3*	1.6W	13	68	15	0.31
160107	11:08:51.55	44º43.18'	111º07.58'	9.9	1.2	16	78	7	0.17
160108	04:15:19.98	44º44.54'	111º06.33'	6.3	0.7	8	100	6	0.11
160108	04:15:32.07	44º44.05'	111º06.29'	2.4	0.6	7	107	7	0.09
160108	16:33:49.14	44º02.92'	110º29.55'	6.9*	1.2	10	168	17	0.04
160110	17:17:57.28	44º28.72'	110º26.32'	4.8	1.5W	15	56	10	0.10
160110	20:42:42.16	44º26.57'	110º20.47'	7.9	1.2	16	105	7	0.14
160110	20:52:23.50	44º26.73'	110º21.16'	3.1	-0.1	8	111	8	0.06
160110	20:52:53.29	44º26.67'	110º21.32'	3.3	0.3	9	112	8	0.04
160111	01:14:18.20	44º45.49'	110º04.48'	15.8	1.2	8	150	7	0.16
160113	01:26:03.69	44º19.60'	110º32.68'	5.4	0.6	14	99	7	0.10
160113	01:36:26.88	44º19.82'	110º33.01'	5.8	1.2	10	95	7	0.06
160113	01:39:17.38	44º19.63'	110º32.79'	6.4	1.0	9	98	7	0.06
160113	01:43:08.07	44º19.44'	110º31.06'	-2.0	1.1	10	119	7	0.29
160113	01:54:06.39	44º19.74'	110º33.12'	6.3	1.5W	18	94	7	0.07
160114	13:22:37.89	44º14.47'	110º46.43'	3.1	1.5	12	100	4	0.15
160114	20:20:59.78	44º47.95'	111º26.44'	12.4	0.7	12	126	4	0.08
160117	17:24:45.54	44º48.68'	110º47.81'	6.8	0.9	13	223	5	0.11
160118	19:20:16.52	44º47.76'	110º49.28'	4.0	1.3W	15	132	2	0.13
160118	23:13:55.47	44º49.37'	111º22.87'	10.8	1.0	8	143	4	0.16
160123	17:47:09.27	44º13.81'	110º46.54'	5.2	1.9W	16	79	5	0.24
160123	20:02:43.84	44º10.30'	110º42.83'	-3.5*	1.6	6	256	13	0.10
160123	23:10:10.53	44º45.97'	111º11.76'	12.8	1.1	18	132	2	0.14
160125	08:53:48.10	44º35.38'	110º27.43'	2.0	1.9W	18	64	5	0.15
160125	12:54:12.52	44º43.85'	110º32.95'	5.3	1.0	12	179	3	0.08
160125	16:30:09.82	44º43.81'	110º32.95'	5.2	1.5W	10	177	3	0.06
160125	16:49:09.65	44º43.84'	110º33.00'	5.4	1.9W	15	179	3	0.14
160125	17:43:07.70	44º43.50'	110º32.54'	5.4	2.0W	17	143	3	0.14
160125	20:37:44.59	44º46.54'	111º13.70'	12.6	0.5	8	260	4	0.11
160125	23:41:58.70	44º43.83'	110º32.73'	5.4	1.8W	20	153	3	0.16
160126	12:59:51.60	44º43.77'	110º32.95'	5.3	2.0W	16	177	3	0.08
160126	17:33:07.75	44º44.31'	110º33.25'	4.3	1.8W	15	186	4	0.09
160126	23:31:24.27	44º43.28'	110º33.42'	3.9	1.9W	12	189	4	0.06
160127	10:56:39.39	44º43.52'	110º33.02'	5.0	2.0W	16	174	3	0.09

Table 2. Earthquakes in the Yellowstone Region: January 1–March 31, 2016

DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
160127	12:54:07.95	44º43.50’	110º32.70’	5.7	0.9W	18	160	3	0.08
160127	18:09:42.29	44º45.17’	111º02.69’	8.4	1.6W	15	120	3	0.13
160129	07:07:58.17	44º27.28’	110º54.98’	12.5	2.1W	23	62	19	0.18
160129	07:11:47.07	44º27.02’	110º53.10’	5.8*	0.9	8	154	19	0.12
160131	05:13:45.75	44º29.93’	110º22.39’	1.9	1.0	9	95	7	0.35
160131	05:16:52.45	44º28.81’	110º26.02’	2.2	1.2	8	120	9	0.09
160131	05:17:01.43	44º29.11’	110º25.98’	2.7	0.8	7	129	9	0.12
160131	05:20:27.58	44º28.94’	110º26.23’	2.7	1.5	8	119	9	0.10
160131	05:21:25.60	44º28.76’	110º26.05’	2.1	1.3	8	121	9	0.09
160131	05:48:57.30	44º28.81’	110º26.22’	4.4	1.0	10	121	9	0.06
160131	06:11:59.36	44º28.74’	110º25.95’	5.7	2.3W	21	56	9	0.13
160131	06:15:07.77	44º29.00’	110º26.19’	2.0	1.7	11	117	9	0.19
160131	06:18:12.18	44º28.67’	110º25.71’	4.5	2.5W	23	56	9	0.17
160131	06:32:48.63	44º28.76’	110º25.97’	3.6	0.9	7	125	9	0.11
160131	06:42:26.65	44º28.84’	110º25.81’	1.7	1.7	9	103	9	0.24
160131	06:45:22.90	44º28.86’	110º26.07’	1.9	1.6	7	120	9	0.06
160131	07:06:47.28	44º29.09’	110º26.11’	2.3	1.1	8	117	9	0.08
160131	07:09:02.04	44º28.94’	110º26.32’	2.5	0.6	8	130	9	0.15
160131	07:21:38.07	44º48.07’	110º54.18’	7.1	0.9	7	227	4	0.05
160131	07:53:43.01	44º28.84’	110º26.05’	4.2	1.0	7	120	9	0.07
160131	08:20:23.88	44º28.88’	110º26.10’	4.1	0.6	8	120	9	0.05
160131	08:20:45.65	44º28.70’	110º26.01’	2.7	0.2	8	125	9	0.12
160131	15:40:10.03	44º47.01’	110º57.24’	4.6	1.9W	16	125	5	0.18
160201	13:23:11.36	44º31.64’	111º22.50’	16.4	1.2	17	196	23	0.12
160201	18:57:35.69	44º31.51’	111º21.14’	13.1	1.1	10	247	22	0.11
160203	01:08:03.65	44º51.52’	111º29.35’	10.1	0.9	13	105	6	0.17
160204	07:05:22.84	44º40.15’	110º25.72’	4.1	0.0	12	135	8	0.07
160204	07:05:27.97	44º42.98’	110º28.12’	2.4	0.9	5	199	3	0.01
160204	13:49:34.62	44º29.26’	110º26.43’	2.1	1.3	13	88	9	0.14
160206	07:09:59.16	44º46.79’	111º10.97’	13.4	1.1	12	146	3	0.13
160208	23:17:01.04	44º36.24’	110º54.60’	8.9	0.2	12	258	5	0.02
160210	04:09:59.01	44º37.14’	111º08.86’	9.5	2.4W	24	103	4	0.22
160210	11:43:16.08	44º37.30’	111º08.54’	7.5	0.7	12	211	4	0.16
160213	12:14:12.07	44º44.43’	111º01.07’	6.9	0.7	15	108	2	0.11
160215	19:31:28.41	44º44.48’	111º14.10’	13.0	0.7	14	127	3	0.14
160215	20:03:41.28	44º44.08’	111º14.15’	13.6	1.3W	15	118	3	0.17
160216	00:10:11.48	44º44.69’	111º09.24’	3.7	0.0	7	160	3	0.09
160216	16:23:28.22	44º37.15’	110º20.55’	5.7	0.1	10	124	8	0.13
160220	12:04:45.22	44º49.11’	110º41.73’	2.2*	1.3W	11	126	12	0.10
160220	19:55:04.65	44º44.37’	111º14.57’	14.0	0.7	11	134	3	0.13
160220	21:33:50.55	44º43.62’	111º07.45’	10.6	0.9	14	110	6	0.16
160221	06:17:16.29	44º36.41’	111º05.95’	12.5	0.4	10	120	0	0.13
160222	18:47:45.85	44º42.15’	110º59.47’	4.9	1.5	13	76	4	0.17
160223	01:23:16.45	44º44.16’	111º08.84’	12.1	0.4	12	129	4	0.13
160224	07:04:23.62	44º36.55’	110º17.81’	4.7	1.2	8	106	9	0.15

Table 2. Earthquakes in the Yellowstone Region: January 1–March 31, 2016

DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
160224	16:40:36.30	44º45.93'	111º10.24'	10.7	0.3	13	126	3	0.17
160225	07:54:07.41	44º38.64'	110º23.55'	11.5	0.5	9	124	9	0.16
160225	16:38:29.05	44º37.77'	110º23.08'	3.8	--	7	179	7	0.06
160225	16:38:32.01	44º37.20'	110º16.96'	11.7	1.0	7	200	11	0.07
160225	19:45:27.86	44º45.57'	111º09.43'	8.4	0.1	12	151	3	0.18
160225	20:28:07.12	44º37.81'	110º20.79'	6.7	1.5W	15	74	8	0.11
160225	20:31:17.36	44º28.43'	111º02.93'	6.0*	0.1	8	155	15	0.06
160227	06:06:17.93	44º46.65'	111º08.14'	13.2	0.1	9	275	10	0.06
160227	18:43:43.55	44º42.19'	110º59.34'	3.0	0.9	10	164	4	0.19
160228	05:24:34.88	44º43.79'	111º10.40'	9.8	0.6	15	90	3	0.15
160228	05:24:35.04	44º43.84'	111º10.75'	8.3	0.5	11	63	3	0.14
160228	18:40:00.21	44º27.08'	110º56.70'	4.9	0.7W	6	202	9	0.31
160229	05:21:46.04	44º31.43'	110º35.43'	2.0	1.7W	17	57	10	0.12
160301	03:15:18.87	44º44.44'	110º53.15'	8.6	1.0W	16	104	6	0.17
160301	06:23:18.13	44º43.68'	111º10.20'	9.5	0.1	12	72	3	0.16
160301	08:06:36.46	44º33.80'	110º45.34'	9.6	0.3	13	125	10	0.17
160301	13:10:40.65	44º46.17'	111º09.68'	14.1	0.0	9	181	3	0.14
160301	13:10:50.94	44º45.68'	111º09.13'	13.1	0.3	10	151	4	0.17
160301	13:10:58.06	44º44.00'	111º09.75'	11.5	0.3	7	193	3	0.20
160304	06:37:51.79	44º38.21'	110º10.29'	3.5	1.3	8	149	2	0.04
160304	14:09:42.46	44º41.34'	110º11.86'	3.5	1.0	7	207	5	0.14
160307	12:34:16.03	44º22.83'	110º33.50'	2.3	0.9	12	92	2	0.06
160307	12:34:50.64	44º22.88'	110º33.68'	2.0	0.6	8	152	2	0.09
160307	12:44:53.24	44º22.77'	110º33.37'	2.6	--	11	114	1	0.06
160307	20:01:24.24	44º37.31'	110º32.14'	2.1	0.6	11	136	9	0.29
160308	20:38:22.81	44º38.31'	110º52.53'	5.8	-0.3	10	161	3	0.04
160308	20:57:28.39	44º35.01'	110º44.88'	3.3	0.9	11	224	9	0.09
160312	22:12:40.39	44º43.70'	110º38.87'	4.8	1.9W	11	149	3	0.14
160313	03:58:04.32	44º20.32'	110º32.15'	2.9	0.9	11	132	6	0.15
160314	04:03:13.94	44º38.69'	110º27.14'	2.2	1.5W	15	121	9	0.13
160314	04:03:31.08	44º38.64'	110º27.45'	2.3	1.6W	14	118	9	0.11
160315	13:02:00.63	44º43.65'	111º01.90'	5.1	0.6	9	186	4	0.09
160316	03:40:45.23	44º46.38'	111º11.32'	10.2	-0.1	15	157	3	0.13
160317	04:02:42.18	44º27.40'	110º55.29'	4.6	0.6	9	165	7	0.12
160317	17:40:24.41	44º39.92'	109º59.88'	13.2	1.9	10	178	10	0.16
160317	22:49:13.30	44º47.83'	110º57.48'	2.0	0.0	10	233	6	0.07
160318	20:59:15.47	44º48.89'	110º55.21'	7.2	2.0W	32	119	6	0.14
160318	21:10:29.79	44º48.20'	110º55.17'	4.6	0.6	16	181	6	0.10
160320	21:23:10.60	44º37.41'	110º01.58'	7.5	1.5	14	151	13	0.19
160321	12:12:13.24	44º50.67'	111º26.36'	14.7	1.0	13	106	2	0.13
160321	15:19:36.02	44º39.87'	110º01.08'	10.7	1.5	9	171	11	0.20
160321	19:46:28.03	44º36.58'	110º26.61'	4.7	1.4W	12	170	6	0.11
160322	00:03:41.55	44º39.93'	109º59.67'	13.1	1.9	10	181	9	0.16
160324	21:34:34.91	44º40.59'	110º27.12'	2.0	0.7	12	119	6	0.18
160325	05:04:41.42	44º32.77'	110º57.57'	8.1	1.6W	20	96	12	0.20

Table 2. Earthquakes in the Yellowstone Region: January 1–March 31, 2016

DATE	ORIGIN TIME	LATITUDE	LONGITUDE	DEPTH	MAG	NO	GAP	DMN	RMS
160325	05:07:40.10	44º32.01’	110º58.29’	8.0	0.5	7	179	13	0.11
160325	05:09:33.67	44º32.50’	110º57.91’	6.8	1.0	10	99	13	0.16
160325	05:11:06.58	44º32.68’	110º57.72’	6.2	1.3W	15	97	12	0.17
160325	06:35:19.51	44º32.32’	110º57.81’	4.9*	0.7	9	100	13	0.16
160325	07:17:53.56	44º32.88’	110º58.01’	8.9	--	11	98	12	0.15
160325	07:17:57.63	44º33.23’	110º58.16’	8.3	1.8W	12	163	12	0.10
160325	07:23:28.01	44º32.73’	110º57.74’	10.0	1.5W	17	97	12	0.19
160325	09:59:45.00	44º48.63’	110º34.08’	5.1*	1.7W	11	249	12	0.15
160325	15:06:17.85	44º49.46’	110º33.96’	6.8	1.9W	14	124	13	0.21
160326	04:25:09.64	44º47.96’	110º34.08’	5.5*	1.2W	12	131	11	0.10
160326	08:07:30.02	44º32.23’	110º58.28’	9.9	0.9	10	176	13	0.10
160326	08:28:34.44	44º49.24’	110º33.90’	10.2	2.3W	19	85	13	0.23
160327	16:52:47.77	44º37.28’	110º23.30’	5.0	1.6W	18	68	6	0.10
160327	19:02:34.19	44º48.15’	110º34.50’	5.1*	1.4W	19	99	11	0.16
160329	08:33:12.35	44º22.89’	110º33.34’	3.0	0.4	10	99	1	0.14
160330	01:45:06.57	44º44.89’	111º19.11’	16.6	0.6	11	147	8	0.15
160330	13:51:15.38	44º38.94’	110º26.18’	4.3	2.2W	25	48	9	0.18

number of earthquakes = 152
* indicates poor depth control
W indicates Wood-Anderson data used for magnitude calculation

Table 3
UNIVERSITY OF UTAH YELLOWSTONE SEISMIC NETWORK
Operating Seismograph Stations
March 31, 2016

UURSN Code	Location	SEED Station	SEED Channel	No. of Channels	Network Code	Latitude	Longitude	Elevation (meters)	Sensor	Digitizer	Telemetry	Sponsor
B206*	Canyon206bwy2008, Yellowstone, WY	B206	EH[ZEN]	3	PB	44° 46.66′	110° 30.70′	2400	IESE-S2	Q330	Digital	PBO
B207*	Madisn207bwy2007, Yellowstone, WY	B207	EH[ZEN]	3	PB	44° 37.14′	110° 50.91′	2182	IESE-S2	Q330	Digital	PBO
B208*	Lakejn208bwy2008, Yellowstone, WY	B208	EH[ZEN]	3	PB	44° 33.61′	110° 24.09′	2406	IESE-S2	Q330	Digital	PBO
B944*	Grantt944bwy2008, Yellowstone, WY	B944	EH[ZEN]	3	PB	44° 23.38′	110° 32.63′	2365	IESE-S2	Q330	Digital	PBO
B945*	Panthr944swy2008, Yellowstone, WY	B945	EH[ZEN]	3	PB	44° 53.64′	110° 44.65′	2249	IESE-S2	Q330	Digital	PBO
B950*	Norris950bwy2013, Yellowstone, WY	B950	EH[ZEN]	3	PB	44° 42.77′	110° 40.71′	2328	IESE-S2	Q330	Digital	PBO
FLWY*	Flagg Ranch, WY	FLWY	BH[ZEN]	3	IW	44° 04.96′	110° 41.96′	2078	3ESP	RT-130	Digital	ANSS
H17A*	Grant Junction, Yellowstone, WY	H17A	BH[ZEN]	3	TA	44° 24.00′	110° 34.80′	2400	STS-2	Q330	Digital	NSF
IMW	Indian Meadows, WY	IMW	BH[ZEN]	3	IW	43° 53.58′	110° 56.58′	2670	3ESP	RT-130	Digital	ANSS
LKW*	Lake, WY	LKWY	BH[ZEN]	3	US	44° 33.91′	110° 24.00′	2424	STS-2	Q330	Digital	USGS
LOHW*	National Elk Refuge, WY	LOHW	BH[ZEN]	3	IW	43° 36.76′	110° 36.30′	2245	3ESP	RT-130	Digital	ANSS
MCID	Moose Creek, ID	MCID	EHZ	1	WY	44° 11.45′	111° 11.03′	2137	L4C	PSN	Analog	USGS
MOOW*	Moose Ponds, WY	MOOW	BH[ZEN]	3	IW	43° 44.92′	110° 44.69′	2128	3ESP	RT-130	Digital	ANSS
QLMZ*	Earthquake Lake, MT	QLMT	EHZ	1	MB	44° 49.84′	111° 25.80′	2064	L4C	-	Analog	MBMT
REDW*	Red-Top Meadows, WY	REDW	BH[ZEN]	3	IW	43° 21.74′	110° 51.18′	2322	3ESP	RT-130	Digital	ANSS
SNOW*	Snow King Mountain, WY	SNOW	BH[ZEN]	3	IW	43° 27.75′	110° 45.31′	2390	3ESP	RT-130	Digital	ANSS
TPAW*	Teton Pass, WY	TPAW	BH[ZEN]	3	IW	43° 29.41′	110° 57.04′	2512	3ESP	RT-130	Digital	ANSS
TPMZ*	Teepe Creek, MT	TPMT	EHZ	1	MB	44° 43.79′	111° 39.94′	2518	L4C	-	Analog	MBMT
YDC	Denny Creek, MT	YDC	EHZ	1	WY	44° 42.51′	111° 14.60′	2025	L4C	PSN	Analog	USGS
YFT	Old Faithful (YNP), WY	YFT	HH[ZEN]	3	WY	44° 27.05′	110° 50.24′	2292	Compact	Taurus	Digital	USGS
			EHZ	1					L4C	None	None	
YGC	Grayling Creek, MT	YGC	EHZ	1	WY	44° 47.77′	111° 06.45′	2075	L4C	PSN	Analog	USGS
YHB	Horse Butte, MT	YHB	EHZ	1	WY	44° 45.07′	111° 11.71′	2157	L4C	PSN	Analog	USGS
			HH[ZEN]	3					40T	ANSS-130	Digital	
			EN[ZEN]	3					Titan			
YHH	Holmes Hill (YNP), WY	YHH	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			

UURSN Code	Location	SEED Station	SEED Channel	No. of Channels	Network Code	Latitude	Longitude	Elevation (meters)	Sensor	Digitizer	Telemetry	Sponsor
YHL	Hebgen Lake, MT	YHL	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	YHR	HH[ZEN]	3	WY	44° 06.36′	110° 04.90′	2976	Trillium 120	Q330	Digital	USGS
YJCZ	Joseph′s Coat (YNP), WY	YJC	EH[ZEN]	3	WY	44° 45.33′	110° 20.95′	2684	S13	PSN	Analog	USGS
YLAZ	Lake Butte (YNP), WY	YLA	EHZ	1	WY	44° 30.76′	110° 16.12′	2580	L4C	PSN	Analog	USGS
YLT	Little Thumb Creek (YNP), WY	YLT	EHZ	1	WY	44° 26.25′	110° 35.28′	2439	L4C	PSN	Analog	USGS
YMC	Maple Creek (YNP), WY	YMC	EH[ZEN]	3	WY	44° 45.53′	111° 00.41′	2073	S13	PSN	Analog	USGS
YML	Mary Lake (YNP), WY	YML	EH[ZEN]	3	WY	44° 36.20′	110° 38.63′	2653	L4C	PSN	Analog	USGS
YMP	Mirror Plateau (YNP), WY	YMP	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	YMR	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	YMS	EHZ	1	WY	44° 15.84′	110° 31.67′	3106	L4C	PSN	Analog	USGS
YMV	Mammoth Vault (YNP), WY	YMV	EHZ	1	WY	44° 58.42′	110° 41.33′	1829	L4C	PSN	Analog	USGS
YNE	Northeast Entrance (YNP), WY	YNE	HH[ZEN]	3	WY	45° 00.46′	110° 00.48′	2343	Compact	ANSS-130	Digital	USGS
YNM	Norris Museum (YNP), WY	YNM	HH[ZEN]	3	WY	44° 43.59′	110° 42.22′	2311	Trillium 240	Q330	Digital	USGS
YNR	Norris Junction (YNP), WY	YNR	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	YPC	EHZ	1	WY	44° 38.88′	110° 11.55′	2932	L4C	PSN	Analog	USGS
YPK	Parker Peak (YNP), WY	YPK	EH[ZEN]	3	WY	44° 43.91′	109° 55.32′	2897	L4C	PSN	Analog	USGS
YPM	Purple Mountain (YNP), WY	YPM	EHZ	1	WY	44° 39.43′	110° 52.12′	2582	L4C	PSN	Analog	USGS
YPP	Pitchstone Plateau (YNP), WY	YPP	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	YSB	EHZ	1	WY	44° 53.04′	110° 09.06′	2072	L4C	PSN	Analog	USGS
YTP	The Promontory (YNP), WY	YTP	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	YUF	HH[ZEN]	3	WY	44° 42.76′	110° 30.71′	2394	Compact	ANSS-130	Digital	USGS
			EN[ZEN]	3					Titan			
YWB	West Boundary (YNP), WY	YWB	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: 142 data channels from 45 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
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)

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 JANUARY 1-MARCH 31, 2016

None