

Earthquake Highlights

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with KGS earthquake catalog covering Jan 1-Dec 31, 2015

Issue 1

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Southern Kansas KCC/KGS Temporary Network Status Report

Escalation of earthquake activity in south-central Kansas that began in 2013 prompted the installation and continuous operation of a temporary network—six stations were installed and operated by the Kansas Geological Survey (KGS) with recording equipment contributed by the Kansas Corporation Commission (KCC). The network began operation in late 2014 and is oriented to focus on earthquakes with ground motion below magnitude 1 and epicenters generally within a 10-county area. Each earthquake's location (coordinates and depth) and key characteristics of that earthquake are archived and accessible to provide researchers and the public the most accurate, sensitive, and timely earthquake data possible. Some preliminary analysis and observations are included with the release of each quarter's data and are designed to inform decision makers and Kansas residents/taxpayers as to existing and/or emerging areas with felt earthquake activity or potential. This report will be published biannually by the Kansas Geological Survey.

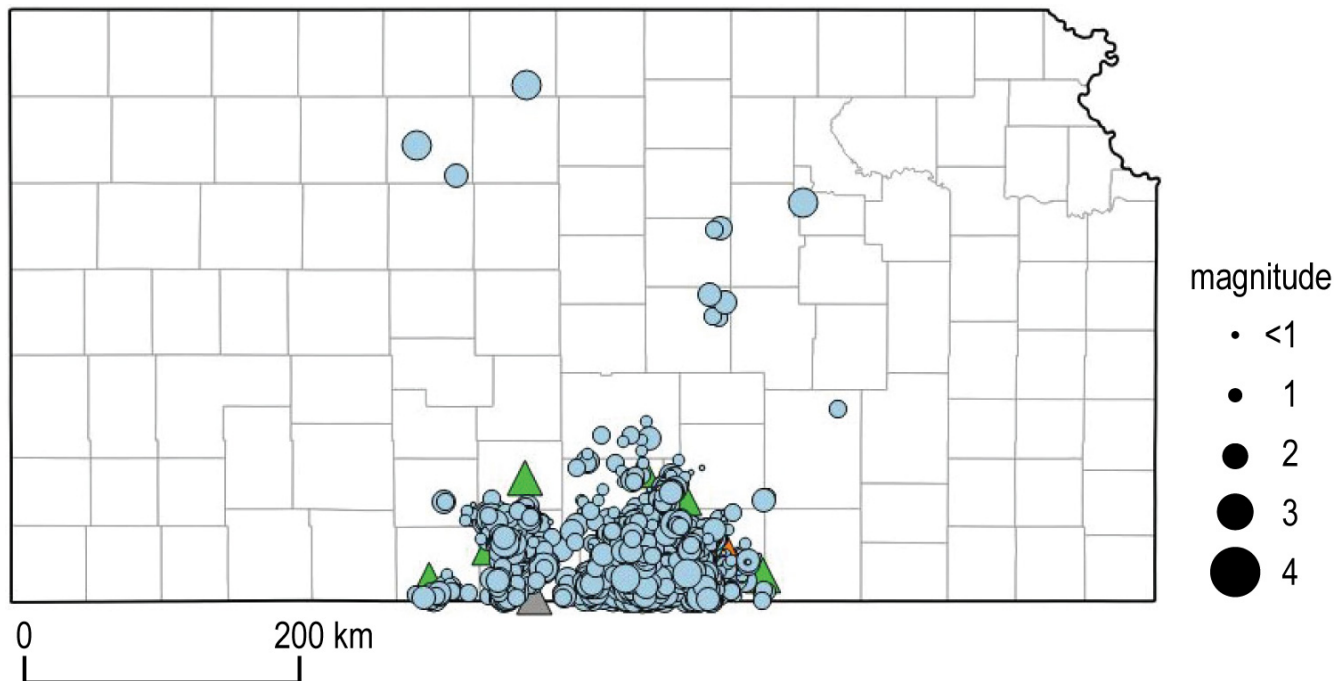


Figure 1. The KCC/KGS network recorded 4,785 earthquakes in 16 counties in 2015. Triangles indicate seismic monitoring stations.

Overview

Stations in the southern Kansas KCC/KGS temporary network have operated from January 1 to December 31, 2015, with better than a 98% continuous data stream and within designed operational sensitivity and signal-to-noise ranges. All cataloged earthquakes were located manually with a few initially located automatically but then followed by a manual confirmation/arrival upgrade. Earthquake locations are subtly augmented with data from other publicly available datasets. During this 12-month recording period, 4,785 earthquakes in 16 counties were recorded with duration magnitudes ranging from 0.0 to 3.7 (Figure 1, Appendix A). Several cluster areas were identified during the recording period in locations with no prior recorded earthquake activity outside historical trends. A few of those clusters are being studied and monitored with greater scrutiny. Clusters in Barber County, Comanche County, and additional areas of interest are briefly discussed in this status report.

Areas of Interest

Approximately 85% of the earthquakes recorded in Kansas during 2015 have epicenters in Harper and Sumner counties. Concentrated earthquake clusters that define areas with elevated levels of seismicity are evident and have been observed in these counties since early 2014. These seismically active areas have received considerable attention as part of other studies and have been subject to a wide range of associated analysis. Therefore, the primary target of discussion in this section will be earthquakes with unique spatial and/or temporal clustering outside these highly studied areas in Sumner and Harper counties.

Barber County

Barber County was the site of the largest earthquake recorded during the last 12 months in Kansas (5/23/15, M 3.7–4.0). As well, it has experienced several areas with elevated activity, some event groupings appearing to have clustering tendencies and others more widely distributed (Figure 2). The M 4.0 event is surrounded by a series of fore and aftershocks that possess a very well-defined geographically clustered, swarm-type appearance. Determining the catalysts for earthquakes making up this M 4.0 family (induced, triggered, or tectonic) cannot be done with confidence, however this event grouping does possess a degree of uniqueness (pattern, location, known basement structures) relative to most others in the region.

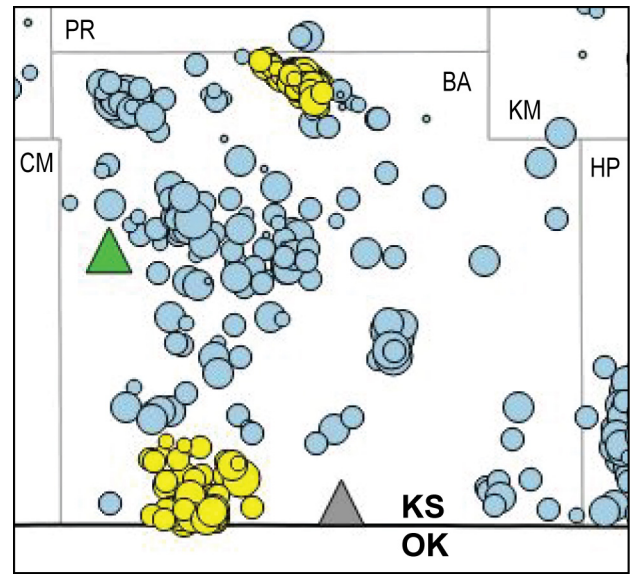


Figure 2. Earthquakes located in Barber County in 2015. Yellow indicates earthquakes listed in Table 1.

Two new clusters have emerged in north-central and southwestern Barber County that justify more detailed study and increased awareness. Combined, these two geographic and temporal clusters include more than 100 earthquakes that began in June (Table 1), more than 30 of which are M 2 or greater—the largest was M 2.5 (only reported by the KCC/KGS network) and occurred on October 17. The location variance within each cluster is approximately 5 km. Thirty-five of these events have a Seismic Action Score (SAS) exceeding 17, which indicates spatial and temporal clustering with other earthquakes that may suggest potentially induced seismicity (Induced Seismicity Task Force, 2015).

Comanche County

Comanche County received a seismograph station (relocated from the city of Hardtner) near the town of Buttermilk in April. After increasing the westward reach (broadening the azimuthal characteristics, aperture, and orientation) of the network, one or possibly two clusters emerged with vaguely linear character (Figure 3). The two dozen earthquakes that make up these clusters largely occurred during two separate less than five-day spans (Table 2). With the less-than-ideal azimuthal and station offsets before the Buttermilk station move, it is possible that some of the earthquakes in Comanche County outside this grouping could actually be from within the clusters.

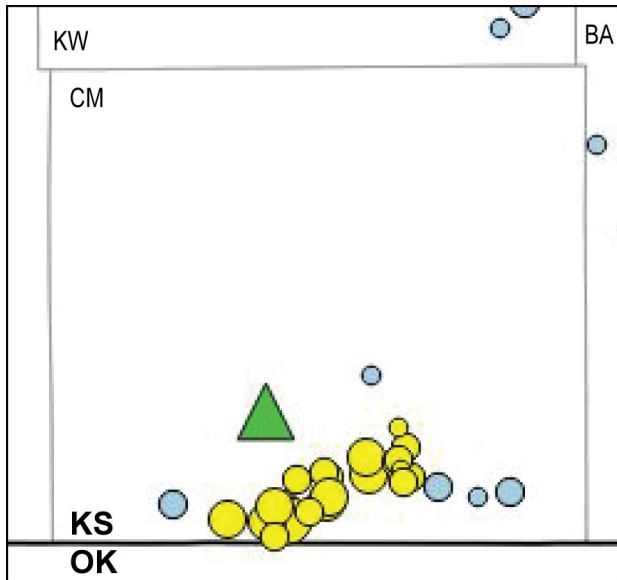


Figure 3. Earthquakes located in Comanche County in 2015. Yellow indicates earthquakes listed in Table 2.

Wellington Area

The Wellington area of Sumner County is of interest because it is at the edge of the apparent seismicity zone and it is the location of the KGS’s U.S. Department of Energy CO₂ sequestration project currently in the preparation and field development stages. As part of the monitoring, verification, and accounting (MVA) program at the CO₂ site, a 15-station Incorporated Research Institutions for Seismology (IRIS) earthquake network is installed and has been operating for more than 18 months to establish background seismicity and to monitor for any increase in earthquake frequency or magnitude once injection into the Arbuckle interval begins. The Wellington CO₂ site is at the northeastern fringe of the high seismicity zone currently the focus of the KCC/KGS 10-county temporary network. One of the stations from the IRIS network at Wellington (station WK05) is used in conjunction with the KCC/KGS temporary network. Therefore, the KCC/KGS temporary network has extremely high sensitivity at that site. Over the last 12 months there have been more than 100 located earthquakes within 5 miles of the Wellington CO₂ injection well (under development; no CO₂ has been injected as of December 2015) (Figure 4). The events range in size from M 0.0 to 2.4 (Table 3), most of which are well below the possible felt range. Considering the magnitude and distribution of earthquakes detected and located by the KCC/KGS temporary network in Sumner County, these events are consistent with an active

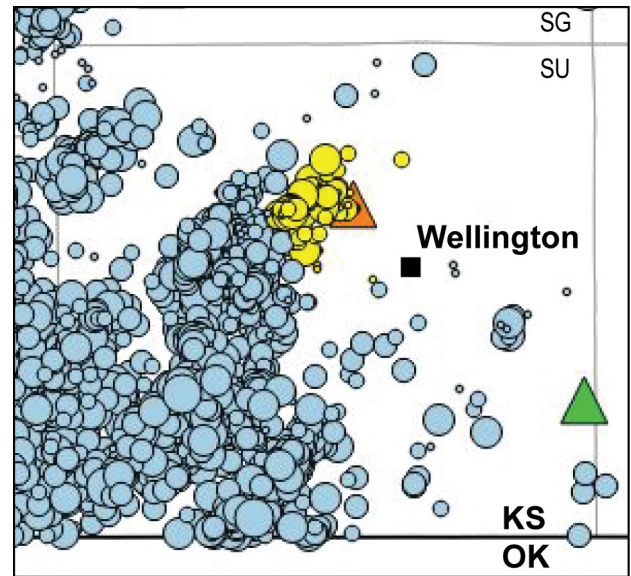


Figure 4. Earthquakes located within 5 miles of the DOE CO₂ sequestration site near Wellington in 2015. Yellow indicates earthquakes listed in Table 3.

fault zone that under the right conditions could produce a felt event. The Wellington field appears to be at the edge of what could be called the seismicity sensitive zone.

Cheney Area

The northern edge of the apparent high-seismicity zone extends into eastern Kingman and western Sedgwick counties near Cheney. Sensitivity of the KCC/KGS temporary network is high near Cheney due to the proximity of earthquakes to stations KM01 and SG01. Out of the more than 200 events recorded, all but 20 events were below M 2.0 (Figure 5, Table 4).

Caldwell Area

At the beginning of 2015, earthquakes were observed in a township size area east of Caldwell (Figure 6) with relatively low recurrence rates (about one per week). Following two M 4+ earthquakes in August located in Grant County, Oklahoma—which borders Sumner County to the south—frequency increased to several per day, on average (Table 5). It is uncertain whether there is a causal relationship between earthquakes in Caldwell and seismicity in neighboring Oklahoma, and whether the spatial and temporal relationship between these large-magnitude Oklahoma events and elevated seismic activity near Caldwell are coincidence.

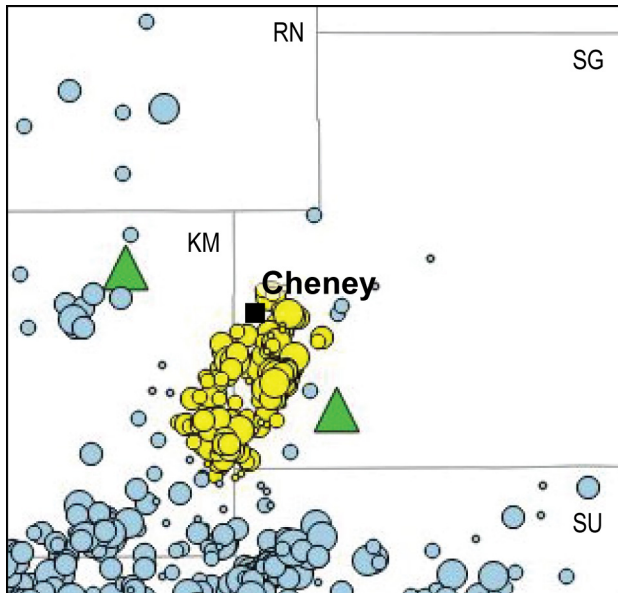


Figure 5. Earthquakes located near Cheney in Kingman (left) and Sedgwick (right) counties in 2015. Yellow indicates earthquakes listed in Table 4.

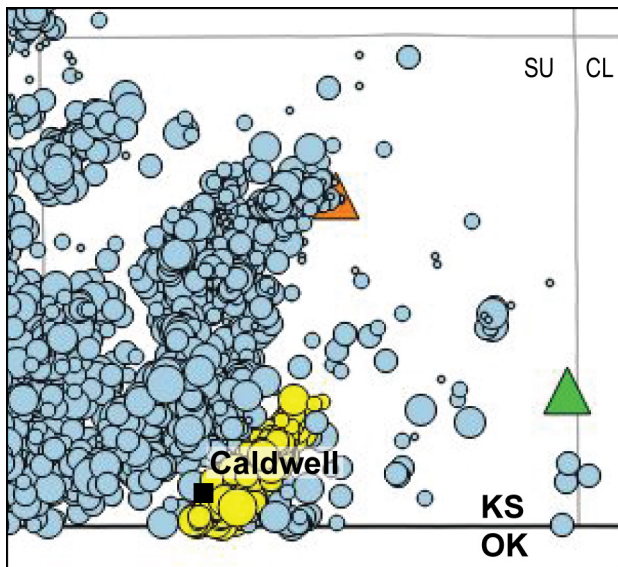


Figure 6. Earthquakes located near Caldwell in 2015. Yellow indicates earthquakes listed in Table 5.

McPherson County

An isolated and unique cluster of four events was recorded and located in northeastern McPherson County, in an area outside the network’s highest sensitivity and location accuracy (Figure 7, Table 6). These earthquakes are more than 70 miles outside the primary aperture of the seven-station network. Hence location accuracy is not as good as events in the 10-county focus area. Considering the complete lack of earthquake activity in this area, it is very

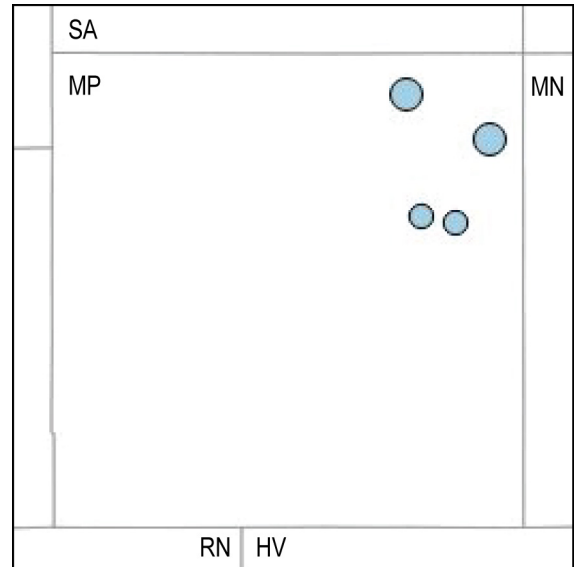


Figure 7. Earthquakes located in McPherson County in 2015 (Table 6).

likely these events are all from the same feature (not necessarily the same location). Both temporal and spatial proximity make this cluster worthy of increased awareness. With magnitudes between 1.9 and 2.2, it is very unlikely they would have been felt, but in the right setting it is possible to feel a M 2.2. These McPherson County events are in a structurally complex area at the conjunction of the Central Kansas Uplift and Nemaha Ridge. Identification of the earthquake source would not be advisable with just these four events and the location accuracy of the network for these events.

Summary

Based on the statistics tabulated in Appendix A, the elevated sensitivity and location accuracy (compared to existing catalogs) of the KCC/KGS network in this 10-county region has resulted in the logging of earthquakes well below the previously detectable level and in characterization of almost 5,000 events in one year. This increase in rate of more than two orders of magnitude (compared to the 37 years between 1977 and 2013) allows for new trends and areas with previously undetected but noteworthy seismicity to be identified and for researchers to reach well beyond current interpretations and understandings. Predicting trends in seismicity in this area must incorporate events well below felt magnitudes published in established earthquake catalogs.

Earthquakes recorded and located by the KCC/KGS temporary network consistently show an increased density and recursion principally within eight unique polygons (Figure 8). These clusters of

earthquakes form a combination of cloud and linear distribution with the exception of the cluster south of Conway Springs (in the dashed box in Figure 8), which has distinctly linear characteristics. This cluster tends to align along a NE direction more so than the other seven. However, it is generally true that these event clusters all have a lenticular nature with respect to their epicenter locations and associated groupings.

Of the nearly 5,000 earthquakes located by the KCC/KGS network in 2015, 209 were also located by the USGS and reported in the National Earthquake Information Center (NEIC) global earthquake bulletin (Preliminary Determination of Epicenters, PDE) (Table 7). Magnitudes estimated by the NEIC are calculated using different methods and are, on

average, 0.4 orders of magnitude larger than the duration magnitudes estimated by KGS. For the set of 209 earthquakes located by both the KCC/KGS and NEIC, SAS computed based on only NEIC data in 2015 are, on average, within 5-10% of SAS computed based on only KCC/KGS data.

Reference

Kansas Department of Health and Environment, Kansas Corporation Commission, and Kansas Geological Survey, 2015, Kansas Seismic Action Plan, September 24, 2014; Amended January 21, 2015, http://www.kgs.ku.edu/PRS/Seismicity/2015/Seismic_Action_Plan.pdf.

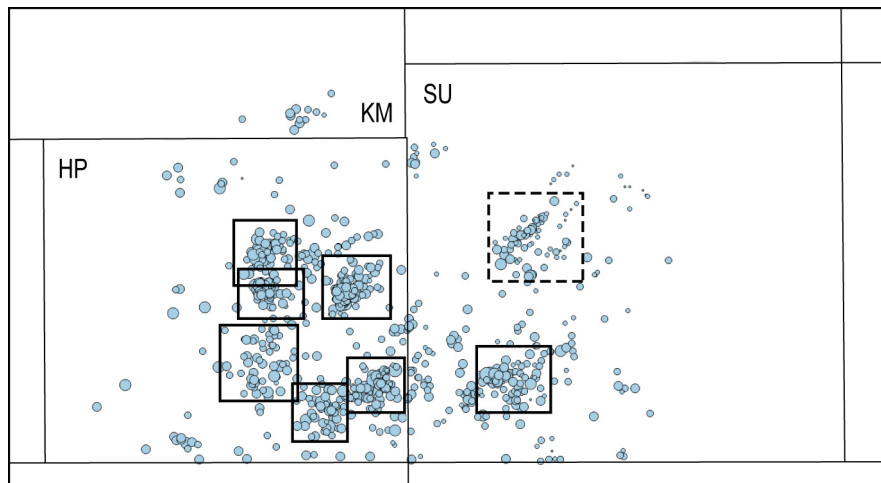


Figure 8. Microearthquakes recorded by the KGS network in Harper, Kingman, and Sumner counties from December 2014 to April 2015. Dashed box indicates linear earthquake alignment south of Conway Springs in Sumner County. Solid boxes indicate cloudblike earthquake swarms in other high seismicity zones.

Table 1. Earthquakes recorded by the Southern Kansas KCC/KGS Temporary Network in the north-central and southwest Barber County clusters in 2015. Yellow highlighting indicates SAS greater than 17, and green indicates earthquakes also reported in the NEIC global earthquake bulletin (Preliminary Determination of Epicenters, PDE).

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
2/21/2015 5:31	37.071	-98.874	1.2	4.5	5.1	4.4
6/10/2015 4:54	37.030	-98.840	2.3	2.0	1.0	8.3
6/12/2015 6:34	37.048	-98.824	1.8	1.9	1.4	8.2
6/15/2015 8:17	37.002	-98.807	1.7	3.0	1.9	10.9
6/16/2015 7:20	37.013	-98.843	1.6	2.0	1.4	12.6
6/19/2015 6:28	37.434	-98.693	1.4	1.2	1.9	7.0
6/19/2015 10:10	37.452	-98.704	1.7	1.7	1.8	11.9
6/23/2015 7:17	37.442	-98.695	1.4	1.7	1.8	14.0
6/23/2015 7:50	37.440	-98.675	1.4	1.9	2.3	16.0
6/23/2015 8:35	37.451	-98.705	1.1	1.4	1.8	15.2
6/24/2015 4:40	37.016	-98.825	1.9	2.5	1.5	14.6
6/26/2015 5:57	37.003	-98.846	2.4	1.8	1.0	17.8
6/26/2015 7:15	37.004	-98.851	1.8	1.9	1.4	16.2
6/26/2015 7:22	37.024	-98.857	1.7	2.2	1.5	15.9
6/26/2015 8:23	37.429	-98.690	1.6	1.7	1.8	13.6
6/26/2015 12:20	37.016	-98.855	1.9	2.0	1.8	17.6
6/28/2015 1:54	37.443	-98.699	2.0	1.2	1.2	16.0
6/28/2015 2:31	37.437	-98.694	2.2	1.7	2.1	16.8
6/28/2015 6:07	37.025	-98.842	1.8	2.2	1.3	14.2
6/29/2015 3:35	37.446	-98.682	1.8	1.4	1.3	14.2
6/30/2015 8:35	37.447	-98.730	1.5	1.1	1.4	13.3
7/3/2015 6:12	37.038	-98.866	2.2	1.5	0.9	15.8
7/4/2015 5:33	37.017	-98.841	2.2	3.7	2.5	16.8
7/7/2015 4:50	37.427	-98.702	1.9	1.7	1.9	18.6
7/7/2015 5:22	37.441	-98.697	2.2	0.8	0.9	18.8
7/8/2015 1:18	37.438	-98.700	1.9	1.9	1.8	18.6
7/8/2015 1:21	37.447	-98.709	1.7	1.9	2.0	16.9
7/9/2015 2:49	37.438	-98.678	2.0	1.0	1.0	15.0
7/13/2015 13:30	37.450	-98.708	2.0	0.7	0.8	16.0
7/13/2015 13:35	37.416	-98.679	1.7	1.7	1.8	14.9
7/15/2015 8:24	37.458	-98.743	2.0	1.0	1.4	19.0
7/15/2015 8:37	37.431	-98.683	1.8	1.2	1.2	18.2
7/15/2015 8:45	37.439	-98.704	2.0	1.4	1.6	19.0
7/15/2015 11:01	37.465	-98.743	1.9	0.7	0.8	18.6
7/15/2015 11:15	37.448	-98.712	2.1	1.5	1.5	19.4
7/15/2015 18:33	37.440	-98.692	2.0	2.0	2.0	19.0
7/16/2015 11:37	37.437	-98.700	1.9	1.2	1.2	16.6
7/16/2015 12:43	37.441	-98.694	2.1	1.5	1.5	17.4
7/16/2015 19:55	37.013	-98.862	2.0	2.5	1.7	15.0
7/18/2015 5:37	37.455	-98.696	1.8	4.0	4.5	14.2
7/20/2015 17:53	37.436	-98.704	1.5	1.4	1.6	13.3
7/22/2015 11:14	37.436	-98.692	1.6	1.3	1.3	16.6
7/22/2015 12:04	37.447	-98.723	2.1	1.5	1.7	17.4
7/22/2015 13:28	37.459	-98.737	1.5	1.6	2.0	14.3
7/22/2015 13:55	37.029	-98.810	1.7	4.0	2.1	13.9
7/22/2015 21:25	37.437	-98.687	2.1	1.3	1.3	17.4
7/23/2015 22:45	37.440	-98.677	1.6	1.5	1.4	17.6

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
7/24/2015 2:25	37.442	-98.686	1.9	1.3	1.3	17.6
7/24/2015 5:08	37.025	-98.811	1.8	3.4	2.0	15.2
7/24/2015 7:42	37.444	-98.701	1.3	2.0	2.4	14.7
7/24/2015 8:25	37.445	-98.695	1.7	1.6	1.6	17.9
7/24/2015 8:37	37.443	-98.692	1.9	0.7	1.2	17.6
7/25/2015 0:11	37.048	-98.796	1.7	3.2	2.0	14.9
7/31/2015 1:30	37.445	-98.710	2.0	1.1	1.2	16.0
7/31/2015 4:14	37.445	-98.696	2.0	1.9	1.9	16.0
8/4/2015 1:12	37.450	-98.713	1.9	0.7	0.9	14.6
8/5/2015 9:56	37.433	-98.680	1.4	2.5	2.4	17.0
8/5/2015 9:57	37.435	-98.690	1.9	2.0	1.9	18.6
8/5/2015 10:51	37.451	-98.704	1.8	2.3	2.2	18.2
8/5/2015 11:57	37.457	-98.737	1.6	1.3	1.7	17.6
8/5/2015 14:12	37.436	-98.704	2.0	1.7	1.6	19.0
8/6/2015 11:41	37.438	-98.700	1.9	1.3	1.2	18.6
8/6/2015 11:52	37.439	-98.700	1.9	1.6	1.5	18.6
8/6/2015 11:58	37.428	-98.675	1.1	1.2	1.3	13.2
8/6/2015 18:32	37.437	-98.692	2.1	1.8	1.7	18.4
8/6/2015 18:36	37.436	-98.700	1.7	1.8	1.7	17.9
8/7/2015 8:21	37.025	-98.847	1.8	1.7	1.2	14.2
8/9/2015 0:49	37.063	-98.793	1.5	5.9	3.6	13.3
8/14/2015 14:48	37.439	-98.684	1.9	1.1	1.1	15.6
8/15/2015 2:29	37.438	-98.707	2.0	1.1	1.3	16.0
8/16/2015 14:57	37.015	-98.869	1.9	3.4	2.2	16.6
8/17/2015 0:17	37.007	-98.839	1.9	3.0	1.6	16.6
8/17/2015 11:42	37.074	-98.840	1.4	4.1	3.4	15.0
8/20/2015 5:03	37.438	-98.692	1.5	0.8	1.0	16.3
8/20/2015 5:04	37.448	-98.724	1.8	1.4	1.8	17.2
8/20/2015 5:09	37.019	-98.815	1.4	2.1	2.5	13.0
8/20/2015 5:30	37.445	-98.712	1.3	1.0	1.3	16.7
8/20/2015 5:54	37.434	-98.702	1.3	1.2	1.5	16.7
8/23/2015 12:34	37.442	-98.683	1.9	1.2	1.3	15.6
8/23/2015 12:36	37.439	-98.691	1.4	0.8	0.8	14.0
8/26/2015 1:37	37.453	-98.699	1.4	2.5	3.1	13.0
8/27/2015 16:22	37.440	-98.692	1.8	1.9	1.8	14.2
9/1/2015 4:48	37.043	-98.851	1.9	3.1	1.9	14.6
9/1/2015 5:14	37.450	-98.696	2.1	2.1	2.1	15.4
9/1/2015 6:01	37.455	-98.730	1.3	1.5	1.9	13.7
9/2/2015 5:22	37.432	-98.681	1.8	1.9	1.9	17.2
9/2/2015 5:50	37.446	-98.693	1.9	2.3	2.1	16.6
9/2/2015 9:00	37.438	-98.686	1.9	2.0	2.0	16.6
9/9/2015 10:22	37.441	-98.717	1.6	2.0	4.7	13.6
9/10/2015 13:44	37.440	-98.689	1.7	1.2	1.4	14.9
9/15/2015 9:41	37.436	-98.683	1.6	2.4	2.3	15.6
9/15/2015 16:31	37.445	-98.696	1.6	1.2	1.3	15.6
9/19/2015 10:29	37.449	-98.714	1.6	1.8	2.0	13.6
9/19/2015 19:35	37.007	-98.808	2.0	4.5	3.5	11.0
9/21/2015 17:27	37.008	-98.887	1.9	4.1	3.6	10.6
9/26/2015 1:53	37.436	-98.696	1.9	1.5	1.5	14.6
10/5/2015 2:43	37.005	-98.871	1.7	4.6	2.0	10.9

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
10/5/2015 10:27	37.050	-98.847	1.9	2.0	3.2	13.6
10/6/2015 1:37	37.435	-98.705	1.7	2.1	4.8	13.9
10/17/2015 12:48	37.045	-98.776	2.5	4.1	3.0	15.3
10/23/2015 23:42	37.059	-98.787	2.1	2.6	1.3	15.4
10/26/2015 0:06	37.029	-98.804	1.8	3.7	2.8	14.2
10/28/2015 19:06	37.030	-98.837	1.8	2.8	1.7	14.2
10/30/2015 9:05	37.065	-98.888	1.7	6.7	7.1	13.9
11/1/2015 9:29	37.044	-98.834	1.7	5.0	3.7	14.9
11/2/2015 4:50	37.077	-98.827	1.8	2.5	1.7	16.2
11/2/2015 21:01	37.006	-98.805	1.9	3.5	4.0	15.6
11/4/2015 4:16	37.014	-98.808	2.0	3.2	1.9	15.0
11/5/2015 3:34	37.029	-98.839	2.0	2.6	1.6	17.0
11/5/2015 7:43	37.006	-98.836	2.0	3.6	2.2	16.0
11/6/2015 18:27	37.015	-98.845	1.7	4.2	3.0	14.9
11/7/2015 5:49	37.005	-98.819	2.0	1.2	0.7	16.0
11/10/2015 10:30	37.060	-98.778	1.1	7.6	2.4	12.2
11/17/2015 10:15	37.432	-98.689	1.5	1.6	1.8	9.3
11/17/2015 10:18	37.449	-98.695	1.7	1.8	2.0	11.9
11/17/2015 10:33	37.440	-98.698	1.6	0.9	1.5	13.6
11/17/2015 10:41	37.449	-98.713	1.5	2.4	5.7	15.3
11/17/2015 11:27	37.441	-98.691	1.6	1.4	1.6	17.6
11/17/2015 12:04	37.436	-98.690	1.4	1.0	1.1	17.0
11/17/2015 13:05	37.439	-98.688	1.6	0.8	0.8	17.6
11/17/2015 13:29	37.441	-98.695	1.3	0.7	0.8	16.7
11/17/2015 13:38	37.444	-98.709	1.4	1.5	1.6	17.0
11/17/2015 13:43	37.439	-98.678	1.6	1.8	2.0	17.6
11/18/2015 19:57	37.441	-98.686	1.8	0.8	0.8	14.2
11/19/2015 5:44	37.064	-98.854	1.8	1.5	1.1	14.2
11/22/2015 17:56	37.013	-98.812	2.0	2.2	1.6	15.0
11/27/2015 12:52	37.432	-98.687	1.5	0.8	1.0	13.3
11/30/2015 23:40	37.043	-98.869	1.7	2.3	1.6	13.9
12/1/2015 6:44	37.422	-98.682	2.0	1.9	1.8	15.0
12/1/2015 10:08	37.462	-98.750	1.5	1.2	1.6	14.3
12/4/2015 12:48	37.083	-98.869	1.3	1.5	1.2	12.7
12/6/2015 3:53	37.430	-98.673	1.5	1.1	1.2	13.3
12/6/2015 8:50	37.017	-98.761	1.5	2.2	1.1	11.3
12/10/2015 4:55	37.079	-98.847	1.3	6.6	3.8	12.7
12/21/2015 18:31	37.062	-98.883	1.7	1.8	1.5	13.9

Table 2. Earthquakes recorded by the Southern Kansas KCC/KGS Temporary Network in the Comanche County cluster in 2015. Yellow highlighting indicates SAS greater than 17, and green indicates earthquakes also reported in the NEIC global earthquake bulletin (PDE).

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
1/4/2015 22:07	37.020	-99.313	2.1	2.7	3.7	9.4
1/4/2015 22:19	37.053	-99.262	1.9	2.5	4.1	9.6
2/1/2015 6:30	37.055	-99.220	2.0	2.0	3.3	11.0
4/26/2015 18:52	37.069	-99.224	2.4	4.8	2.0	8.8
4/27/2015 5:22	37.077	-99.183	1.8	6.2	2.3	11.2

4/27/2015 16:07	37.053	-99.179	1.7	5.3	2.4	13.9
4/28/2015 8:54	37.065	-99.193	1.5	6.0	2.0	15.3
4/30/2015 7:24	37.067	-99.192	1.8	4.2	1.9	14.2
4/30/2015 16:17	37.092	-99.190	1.2	6.6	3.4	12.4
6/19/2015 9:41	37.027	-99.310	2.0	9.9	6.8	7.0
7/8/2015 23:08	37.051	-99.294	1.9	3.4	1.9	12.6
7/8/2015 23:10	37.017	-99.306	2.4	3.2	2.3	16.8
7/9/2015 6:00	37.017	-99.303	2.7	2.5	1.7	17.3
7/9/2015 17:57	37.017	-99.325	2.0	3.8	3.0	19.0
7/9/2015 18:05	37.029	-99.316	2.0	3.2	2.4	19.0
7/9/2015 21:49	37.004	-99.317	1.5	2.4	1.8	16.3
9/2/2015 1:45	37.058	-99.188	1.1	5.4	2.5	4.2
9/3/2015 9:33	37.048	-99.187	1.7	3.3	1.5	7.9
9/10/2015 5:20	37.018	-99.365	1.6	6.2	6.6	5.6
10/13/2015 6:39	37.033	-99.263	2.2	3.3	1.6	7.8
10/13/2015 13:09	37.056	-99.267	1.5	5.5	2.2	7.3
10/24/2015 11:33	37.037	-99.260	2.2	3.4	2.0	11.8
10/25/2015 10:51	37.024	-99.282	1.6	3.3	1.8	11.6
12/31/2015 9:03	37.019	-99.365	2.2	1.7	2.1	7.8

Table 3. Earthquakes recorded by the Southern Kansas KCC/KGS Temporary Network within 5 miles of the DOE CO₂ sequestration site near Wellington in 2015. Yellow highlighting indicates SAS greater than 17.

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
1/31/2015 1:29	37.277	-97.484	0.9	1.4	1.8	9.8
2/4/2015 0:02	37.317	-97.440	0.8	3.3	4.2	8.6
2/4/2015 0:31	37.316	-97.439	0.3	3.2	4.0	8.1
2/4/2015 1:51	37.318	-97.440	0.9	3.0	3.9	10.8
3/3/2015 0:24	37.322	-97.470	0.6	2.5	2.9	12.4
3/30/2015 1:34	37.334	-97.491	1.0	2.7	2.9	11.0
3/30/2015 1:42	37.322	-97.499	1.4	1.2	1.1	14.0
4/18/2015 16:08	37.311	-97.449	0.7	2.3	2.8	10.5
4/18/2015 20:09	37.314	-97.459	0.3	1.3	1.4	12.1
4/23/2015 8:15	37.277	-97.488	0.6	0.6	0.8	11.4
4/30/2015 20:50	37.335	-97.464	0.7	8.2	9.7	11.5
5/20/2015 6:20	37.369	-97.449	1.4	4.4	6.1	13.0
5/24/2015 19:50	37.295	-97.499	1.1	2.0	2.2	12.2
6/22/2015 4:19	37.279	-97.523	1.4	2.2	2.3	16.0
7/5/2015 13:28	37.317	-97.456	0.5	1.9	2.3	7.3
7/8/2015 21:08	37.325	-97.466	1.7	2.5	3.0	13.9
7/8/2015 21:26	37.325	-97.470	1.7	2.7	3.2	15.9
7/8/2015 22:55	37.326	-97.468	1.1	2.7	3.4	16.2
7/9/2015 6:05	37.328	-97.469	2.4	2.2	2.3	16.8
7/9/2015 9:07	37.318	-97.454	1.0	2.5	2.9	16.0
7/9/2015 14:59	37.312	-97.451	0.8	2.0	2.1	15.6
7/9/2015 15:30	37.317	-97.453	1.8	1.9	2.3	16.2
7/9/2015 15:34	37.312	-97.456	0.7	2.0	2.2	15.5
7/9/2015 16:46	37.292	-97.515	0.7	1.7	1.8	15.5
7/10/2015 10:20	37.316	-97.460	0.9	2.7	3.0	14.8
7/13/2015 0:10	37.312	-97.461	1.0	2.6	2.8	13.0
7/22/2015 22:58	37.295	-97.515	1.2	3.0	3.0	15.4

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
7/31/2015 7:35	37.277	-97.503	2.0	2.2	1.8	16.0
7/31/2015 14:03	37.308	-97.469	0.5	4.8	5.9	14.3
7/31/2015 15:13	37.309	-97.474	1.0	4.9	5.8	14.0
7/31/2015 15:18	37.320	-97.451	0.4	2.3	2.4	13.2
7/31/2015 23:50	37.318	-97.461	0.9	5.7	6.5	14.8
8/3/2015 1:41	37.322	-97.511	1.4	3.3	3.8	14.0
8/3/2015 16:33	37.338	-97.498	1.4	3.7	4.4	15.0
8/3/2015 19:43	37.302	-97.501	0.4	3.9	4.5	11.2
8/4/2015 4:33	37.344	-97.496	2.0	1.7	1.5	16.0
8/4/2015 4:34	37.336	-97.493	1.9	2.2	2.1	16.6
8/6/2015 5:08	37.331	-97.501	1.2	2.6	3.0	13.4
8/7/2015 0:02	37.331	-97.505	1.2	2.5	2.9	16.4
8/7/2015 18:03	37.333	-97.511	1.5	2.9	3.4	16.3
8/7/2015 18:17	37.333	-97.501	1.2	2.7	3.2	16.4
8/7/2015 23:09	37.333	-97.501	1.4	2.2	2.4	17.0
8/8/2015 10:47	37.323	-97.515	0.9	2.0	2.3	14.8
8/9/2015 6:03	37.289	-97.517	1.5	1.5	1.7	14.3
8/9/2015 6:34	37.284	-97.510	1.3	1.6	2.0	14.7
8/11/2015 9:41	37.305	-97.528	1.0	3.3	3.7	13.0
8/11/2015 22:31	37.317	-97.488	1.0	3.8	4.1	13.0
8/14/2015 12:12	37.324	-97.478	1.8	2.1	2.0	18.2
8/15/2015 2:36	37.329	-97.476	0.8	8.5	9.7	15.6
8/15/2015 4:54	37.311	-97.502	1.6	2.4	2.1	17.6
8/15/2015 7:28	37.329	-97.474	2.2	1.5	1.4	17.8
8/15/2015 7:39	37.332	-97.462	1.0	11.0	13.1	16.0
8/15/2015 8:06	37.339	-97.459	1.3	6.3	8.2	16.7
8/15/2015 9:40	37.331	-97.489	0.9	6.2	6.9	15.8
8/15/2015 9:56	37.327	-97.487	1.8	3.5	3.3	18.2
8/15/2015 12:19	37.323	-97.490	0.7	3.2	3.3	15.5
8/15/2015 14:09	37.310	-97.483	1.1	2.2	2.6	16.2
8/15/2015 15:45	37.307	-97.483	0.2	2.1	2.5	13.0
8/15/2015 16:29	37.333	-97.447	0.5	3.1	3.9	15.3
8/16/2015 9:50	37.324	-97.483	2.3	0.9	0.8	19.3
8/16/2015 10:34	37.335	-97.464	1.8	5.3	6.3	17.2
8/16/2015 12:12	37.319	-97.480	2.1	2.0	1.9	17.4
8/16/2015 13:07	37.308	-97.477	1.0	5.8	6.2	15.0
8/17/2015 18:00	37.329	-97.472	0.4	8.6	9.6	11.2
8/17/2015 22:39	37.291	-97.491	1.1	1.4	1.7	14.2
8/18/2015 0:17	37.327	-97.486	1.4	6.0	6.6	15.0
8/18/2015 5:06	37.330	-97.473	1.2	8.5	9.7	14.4
8/23/2015 14:36	37.263	-97.487	0.8	3.1	4.7	11.6
8/24/2015 15:20	37.328	-97.506	1.1	2.5	2.9	13.2
8/24/2015 15:41	37.328	-97.515	0.8	5.0	5.0	12.6
8/25/2015 19:49	37.333	-97.500	1.4	3.5	3.9	15.0
8/25/2015 23:22	37.350	-97.475	1.2	7.2	9.5	15.4
8/26/2015 5:15	37.308	-97.513	0.8	2.4	2.5	15.6
8/26/2015 5:56	37.332	-97.502	1.1	1.3	1.2	16.2
8/27/2015 3:12	37.308	-97.509	0.8	1.6	1.7	15.6
8/27/2015 5:43	37.322	-97.483	0.7	3.3	3.9	13.5
8/28/2015 9:39	37.306	-97.524	1.5	5.2	5.4	17.3

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
8/28/2015 10:10	37.340	-97.494	1.1	6.0	6.7	13.2
8/28/2015 14:39	37.328	-97.508	1.8	2.8	2.9	17.2
8/31/2015 9:22	37.333	-97.462	0.2	10.2	12.3	13.0
8/31/2015 9:50	37.319	-97.494	0.9	7.1	7.4	15.8
9/2/2015 6:42	37.306	-97.515	1.0	2.8	3.2	16.0
9/5/2015 8:13	37.325	-97.497	1.3	2.3	2.6	14.7
9/9/2015 2:35	37.312	-97.526	0.9	6.9	6.5	15.8
9/9/2015 5:10	37.320	-97.526	0.5	4.9	5.2	13.3
9/9/2015 10:28	37.328	-97.516	1.2	3.6	3.9	16.4
9/9/2015 14:48	37.328	-97.503	1.9	2.1	1.9	15.6
9/9/2015 14:52	37.326	-97.513	1.4	2.3	2.3	17.0
9/10/2015 3:20	37.259	-97.487	0.9	1.8	2.3	15.8
9/10/2015 3:52	37.312	-97.512	1.3	1.6	1.3	16.7
9/10/2015 15:33	37.328	-97.471	1.0	4.6	5.1	14.0
9/19/2015 15:26	37.293	-97.485	1.0	2.6	3.4	12.0
9/23/2015 2:53	37.317	-97.518	1.5	1.0	1.1	14.3
9/27/2015 19:38	37.328	-97.475	1.7	1.4	1.5	13.9
10/2/2015 6:05	37.317	-97.526	1.3	0.9	1.2	16.7
10/3/2015 6:27	37.315	-97.529	1.3	1.4	1.8	16.7
10/3/2015 17:13	37.316	-97.527	1.4	1.8	2.5	17.0
10/4/2015 3:40	37.313	-97.530	1.0	0.7	1.8	16.0
10/4/2015 3:46	37.322	-97.514	1.2	1.6	2.8	16.4
10/4/2015 6:56	37.317	-97.536	0.6	1.5	2.4	12.4
10/4/2015 7:41	37.311	-97.533	2.0	2.9	3.5	18.0
10/4/2015 14:30	37.309	-97.536	1.5	1.3	1.8	17.3
10/4/2015 17:33	37.315	-97.524	1.9	0.6	1.0	18.6
10/4/2015 18:46	37.320	-97.517	1.6	1.3	1.8	17.6
10/4/2015 19:22	37.311	-97.523	2.0	2.1	2.6	18.0
10/6/2015 16:21	37.330	-97.506	2.1	1.6	1.9	18.4
10/6/2015 16:53	37.354	-97.462	1.1	4.4	6.0	15.2
10/7/2015 0:39	37.316	-97.521	2.3	2.2	2.2	17.3
10/7/2015 2:37	37.317	-97.518	1.2	0.8	1.3	16.4
10/7/2015 2:39	37.292	-97.514	1.0	1.4	1.7	16.0
10/7/2015 3:31	37.318	-97.518	1.6	0.8	1.2	17.6
10/7/2015 5:01	37.319	-97.522	1.8	0.6	1.0	17.2
10/7/2015 18:33	37.315	-97.536	0.6	1.2	1.8	15.4
10/7/2015 22:38	37.318	-97.524	1.1	1.5	2.0	16.2
10/8/2015 17:54	37.365	-97.386	1.3	5.1	6.3	10.7
10/10/2015 11:36	37.288	-97.509	1.1	0.7	0.9	12.2
10/27/2015 17:09	37.249	-97.420	0.8	4.5	4.0	12.6
10/30/2015 12:09	37.317	-97.528	1.3	1.0	1.4	12.7
11/15/2015 8:41	37.312	-97.517	2.2	0.8	1.0	16.8
11/15/2015 9:22	37.310	-97.531	0.6	2.0	3.3	11.4
11/15/2015 11:52	37.316	-97.513	1.9	0.7	0.9	15.6
11/18/2015 5:17	37.317	-97.532	1.1	2.7	3.6	13.2
12/3/2015 9:11	37.312	-97.531	0.9	1.3	2.1	12.8
12/13/2015 8:06	37.365	-97.477	2.0	2.8	2.8	15.0
12/14/2015 3:52	37.292	-97.502	1.2	4.1	2.5	12.4
12/28/2015 6:59	37.317	-97.523	1.4	1.7	1.7	13.0

Table 4. Earthquakes recorded by the Southern Kansas KCC/KGS Temporary Network in the Cheney area in 2015. Yellow highlighting indicates SAS greater than 17, and green indicates earthquakes also reported in the NEIC global earthquake bulletin (PDE).

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
2/9/2015 5:55	37.577	-97.752	1.5	1.9	1.5	6.3
2/9/2015 6:09	37.584	-97.746	1.3	3.3	2.3	7.7
3/15/2015 8:23	37.650	-97.766	1.3	5.5	4.3	5.7
3/15/2015 9:29	37.651	-97.755	1.2	6.4	4.6	7.4
3/15/2015 10:29	37.563	-97.833	0.5	3.2	2.2	3.3
3/26/2015 19:36	37.515	-97.827	0.9	2.1	2.4	5.8
3/28/2015 5:58	37.613	-97.747	1.5	4.9	3.8	11.3
3/31/2015 18:44	37.648	-97.762	2.0	6.7	5.9	13.0
4/23/2015 19:26	37.578	-97.753	1.9	4.3	3.2	12.6
4/23/2015 19:35	37.551	-97.758	1.2	2.3	2.1	10.4
5/8/2015 2:43	37.626	-97.733	1.0	5.2	4.2	9.0
5/8/2015 10:52	37.614	-97.741	1.2	2.6	2.0	11.4
5/11/2015 17:06	37.634	-97.750	1.0	5.1	4.6	12.0
5/13/2015 2:49	37.484	-97.789	1.6	3.6	4.2	7.6
5/21/2015 2:54	37.566	-97.782	1.2	4.1	3.7	12.4
6/1/2015 15:58	37.507	-97.837	1.5	2.9	3.4	9.3
6/7/2015 1:10	37.601	-97.756	1.7	1.7	1.3	12.9
6/7/2015 5:28	37.592	-97.760	1.0	3.0	2.6	12.0
6/12/2015 15:06	37.503	-97.851	1.7	1.7	2.1	11.9
6/14/2015 8:51	37.548	-97.831	1.5	1.8	2.0	13.3
6/15/2015 14:51	37.590	-97.774	0.8	2.4	1.9	11.6
7/1/2015 20:32	37.627	-97.727	1.6	3.0	2.5	11.6
7/9/2015 0:25	37.511	-97.853	0.4	3.1	3.1	7.2
7/9/2015 15:56	37.522	-97.878	1.2	3.3	2.9	10.4
7/9/2015 19:53	37.575	-97.824	1.8	2.6	2.4	15.2
7/9/2015 22:06	37.627	-97.732	1.5	3.1	2.5	9.3
7/10/2015 5:00	37.575	-97.777	2.3	2.0	1.3	16.3
7/11/2015 0:19	37.551	-97.837	0.6	2.4	2.3	11.4
7/11/2015 7:42	37.592	-97.820	1.5	4.5	3.9	13.3
7/14/2015 8:19	37.609	-97.790	1.5	4.2	3.5	13.3
7/24/2015 12:07	37.579	-97.765	1.5	6.3	5.6	14.3
7/24/2015 21:17	37.540	-97.805	1.0	2.2	2.1	13.0
7/27/2015 5:15	37.576	-97.779	2.0	1.7	1.2	16.0
7/27/2015 5:54	37.576	-97.790	1.7	2.8	1.8	14.9
8/3/2015 9:06	37.577	-97.774	2.0	1.8	1.2	15.0
8/6/2015 10:41	37.518	-97.776	1.9	2.1	1.6	14.6
8/7/2015 22:46	37.607	-97.697	1.8	1.9	1.7	15.2
8/7/2015 23:20	37.553	-97.757	2.0	1.8	1.8	17.0
8/8/2015 6:38	37.514	-97.806	1.3	1.8	1.9	13.7
8/8/2015 8:30	37.529	-97.766	1.5	1.8	1.8	15.3
8/9/2015 16:46	37.613	-97.752	1.8	2.4	1.8	14.2
8/11/2015 13:08	37.569	-97.816	1.7	2.9	2.0	13.9
8/12/2015 23:25	37.601	-97.824	1.8	9.5	2.8	14.2
8/15/2015 22:43	37.579	-97.812	1.4	3.0	2.9	13.0
8/17/2015 5:44	37.481	-97.792	1.4	3.2	3.0	14.0
8/18/2015 12:07	37.563	-97.757	1.3	2.4	1.9	12.7
8/18/2015 12:11	37.512	-97.784	0.7	2.8	2.3	11.5

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
8/22/2015 3:51	37.514	-97.818	0.8	2.5	2.5	12.6
8/22/2015 22:48	37.513	-97.819	1.2	3.1	2.8	13.4
8/24/2015 5:10	37.520	-97.767	0.9	3.2	2.6	11.8
8/25/2015 10:18	37.520	-97.800	0.8	5.3	4.5	12.6
8/25/2015 10:21	37.584	-97.776	0.6	3.7	4.1	12.4
8/27/2015 1:13	37.562	-97.829	1.7	2.5	2.6	14.9
8/27/2015 4:02	37.531	-97.840	1.3	3.5	3.7	13.7
8/30/2015 14:39	37.656	-97.744	0.4	7.2	6.2	11.2
8/31/2015 1:16	37.551	-97.845	0.8	1.9	1.8	15.6
8/31/2015 3:07	37.511	-97.835	0.5	4.3	3.8	15.3
8/31/2015 4:56	37.563	-97.789	0.8	3.4	3.2	15.6
8/31/2015 11:06	37.520	-97.869	1.6	5.3	6.6	16.6
9/1/2015 3:34	37.482	-97.820	0.4	1.4	1.5	15.2
9/1/2015 10:26	37.515	-97.801	0.6	2.1	1.9	15.4
9/1/2015 11:17	37.475	-97.823	1.3	1.5	1.5	16.7
9/1/2015 11:18	37.467	-97.830	1.1	1.3	1.6	15.2
9/1/2015 11:20	37.511	-97.798	0.6	1.5	1.7	15.4
9/1/2015 11:37	37.492	-97.802	1.7	3.3	3.1	15.9
9/3/2015 9:23	37.492	-97.816	0.9	1.4	1.4	12.8
9/7/2015 4:19	37.496	-97.849	1.3	3.0	3.1	14.7
9/7/2015 10:17	37.518	-97.865	1.3	6.6	7.6	14.7
9/9/2015 7:07	37.623	-97.757	1.3	3.9	3.3	13.7
9/9/2015 17:02	37.616	-97.753	1.0	9.6	8.5	13.0
9/10/2015 10:57	37.613	-97.764	1.7	1.8	1.7	13.9
9/12/2015 1:28	37.588	-97.770	1.5	2.3	1.8	13.3
9/12/2015 4:18	37.476	-97.825	0.8	5.2	6.4	14.6
9/12/2015 7:50	37.519	-97.816	0.3	3.6	3.2	13.1
9/13/2015 3:10	37.602	-97.772	1.2	2.9	2.8	14.4
9/13/2015 4:06	37.593	-97.767	1.4	1.0	1.5	15.0
9/15/2015 23:58	37.523	-97.754	1.4	2.1	2.2	13.0
9/18/2015 6:15	37.482	-97.825	1.9	0.6	0.7	14.6
9/20/2015 6:16	37.478	-97.827	0.6	1.9	2.2	12.4
9/21/2015 2:41	37.543	-97.775	1.3	3.9	3.1	12.7
9/21/2015 9:42	37.571	-97.819	0.6	0.8	0.9	11.4
9/23/2015 10:44	37.509	-97.827	1.0	1.2	1.4	12.0
9/24/2015 0:20	37.613	-97.804	1.4	2.0	2.0	14.0
9/24/2015 13:01	37.563	-97.746	1.9	2.4	2.7	15.6
9/29/2015 20:13	37.522	-97.780	1.3	2.8	2.8	12.7
10/1/2015 2:01	37.554	-97.770	1.9	3.3	2.4	16.6
10/1/2015 9:11	37.560	-97.748	1.6	1.1	1.1	15.6
10/1/2015 14:28	37.523	-97.808	1.5	1.9	1.5	16.3
10/2/2015 12:24	37.528	-97.792	1.3	1.8	1.7	13.7
10/6/2015 0:53	37.497	-97.835	2.2	1.8	1.7	16.8
10/6/2015 6:02	37.484	-97.820	1.8	1.6	1.9	15.2
10/7/2015 13:19	37.518	-97.855	1.1	1.9	1.8	12.2
10/8/2015 5:43	37.512	-97.820	2.1	3.0	3.1	15.4
10/8/2015 14:06	37.515	-97.797	1.5	1.4	1.5	16.3
10/8/2015 14:08	37.501	-97.807	1.7	1.9	2.1	16.9
10/8/2015 19:40	37.516	-97.819	1.2	1.4	1.4	15.4
10/9/2015 17:39	37.565	-97.751	0.9	1.5	1.7	12.8

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
10/11/2015 4:26	37.582	-97.814	2.2	2.3	2.7	15.8
10/12/2015 6:15	37.582	-97.807	2.0	3.2	2.2	16.0
10/13/2015 4:50	37.523	-97.813	1.8	2.4	2.0	16.2
10/13/2015 19:53	37.559	-97.749	1.7	1.2	1.1	15.9
10/14/2015 6:27	37.601	-97.754	2.0	1.2	1.2	17.0
10/15/2015 4:23	37.630	-97.738	2.1	1.7	2.2	16.4
10/18/2015 6:02	37.654	-97.771	1.2	3.5	2.9	12.4
10/23/2015 1:50	37.590	-97.804	1.8	2.2	1.7	16.2
10/23/2015 1:55	37.536	-97.845	1.2	2.8	2.7	14.4
10/23/2015 5:56	37.547	-97.838	1.5	1.4	1.0	16.3
10/23/2015 7:20	37.650	-97.759	1.3	5.9	4.1	14.7
10/24/2015 2:05	37.574	-97.811	1.7	3.3	3.7	15.9
10/24/2015 20:44	37.608	-97.761	0.5	1.5	1.6	11.3
10/28/2015 6:09	37.572	-97.750	2.0	1.7	1.8	15.0
10/28/2015 7:00	37.603	-97.702	1.2	4.4	5.0	13.4
10/29/2015 1:03	37.572	-97.743	0.4	1.7	2.0	15.2
10/29/2015 1:04	37.563	-97.749	0.4	1.6	1.7	15.2
10/29/2015 3:49	37.560	-97.747	0.8	1.0	1.0	15.6
10/29/2015 4:16	37.511	-97.791	1.0	2.3	2.5	16.0
10/29/2015 6:58	37.575	-97.741	1.8	1.4	1.6	18.2
10/29/2015 8:22	37.565	-97.745	0.7	3.1	3.0	15.5
10/29/2015 8:48	37.558	-97.757	1.9	1.6	1.4	18.6
10/29/2015 11:01	37.573	-97.738	1.7	1.6	1.7	17.9
10/29/2015 11:32	37.574	-97.740	0.5	1.5	1.4	15.3
10/29/2015 12:54	37.563	-97.749	1.1	0.8	0.9	16.2
10/29/2015 13:13	37.565	-97.757	1.3	2.0	2.2	16.7
10/29/2015 14:14	37.561	-97.747	1.2	1.2	1.1	16.4
10/30/2015 0:52	37.576	-97.739	2.0	1.4	1.6	19.0
10/30/2015 2:25	37.559	-97.747	1.6	1.7	1.4	17.6
10/30/2015 2:32	37.559	-97.759	1.5	1.7	1.6	17.3
10/30/2015 4:02	37.559	-97.741	1.7	2.2	1.9	17.9
10/30/2015 7:59	37.563	-97.749	1.1	0.8	0.8	16.2
10/30/2015 8:36	37.555	-97.758	0.8	1.7	1.6	15.6
10/30/2015 12:08	37.561	-97.738	1.3	1.6	1.7	16.7
10/31/2015 1:16	37.557	-97.747	0.8	2.1	2.3	15.6
10/31/2015 3:47	37.563	-97.750	1.2	1.1	1.1	16.4
10/31/2015 5:25	37.561	-97.750	1.5	1.1	1.1	17.3
10/31/2015 5:28	37.566	-97.748	1.3	1.0	1.0	16.7
10/31/2015 9:43	37.558	-97.756	1.7	2.1	2.3	17.9
10/31/2015 19:32	37.567	-97.744	2.0	1.4	1.3	17.0
11/1/2015 8:52	37.561	-97.753	1.0	1.1	1.2	16.0
11/1/2015 18:44	37.564	-97.747	1.3	1.0	1.1	16.7
11/2/2015 5:06	37.545	-97.862	1.8	2.8	2.0	16.2
11/2/2015 13:42	37.574	-97.739	0.8	1.7	1.5	13.6
11/2/2015 14:27	37.566	-97.844	1.3	7.1	7.2	15.7
11/3/2015 20:28	37.567	-97.744	0.4	0.9	1.0	11.2
11/3/2015 22:05	37.562	-97.842	1.4	2.4	2.8	14.0
11/4/2015 11:32	37.557	-97.750	1.0	1.0	1.0	13.0
11/6/2015 10:51	37.542	-97.762	1.0	0.9	0.9	12.0
11/9/2015 2:43	37.572	-97.739	1.6	1.9	2.1	13.6

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
11/10/2015 6:22	37.576	-97.737	1.8	1.3	1.3	14.2
11/11/2015 10:46	37.562	-97.755	1.9	1.2	1.1	16.6
11/11/2015 12:18	37.566	-97.746	1.1	0.8	0.8	16.2
11/11/2015 13:03	37.566	-97.745	1.3	1.3	1.4	15.7
11/11/2015 13:16	37.571	-97.759	2.3	1.8	1.9	17.3
11/11/2015 16:42	37.594	-97.720	0.6	2.2	2.6	14.4
11/12/2015 5:18	37.565	-97.748	1.3	1.0	1.1	16.7
11/12/2015 5:22	37.564	-97.748	1.5	0.9	0.9	17.3
11/12/2015 5:54	37.565	-97.747	0.4	1.8	2.0	13.2
11/12/2015 5:55	37.565	-97.745	0.7	2.8	3.1	15.5
11/12/2015 14:49	37.568	-97.745	1.0	1.0	1.0	16.0
11/13/2015 4:10	37.563	-97.751	1.9	1.5	1.6	15.6
11/13/2015 4:24	37.562	-97.748	1.0	1.5	1.6	16.0
11/16/2015 19:44	37.502	-97.860	1.3	1.6	1.5	12.7
11/17/2015 8:11	37.568	-97.745	0.9	1.5	1.6	11.8
11/17/2015 15:15	37.571	-97.740	1.8	1.2	1.2	14.2
11/18/2015 9:32	37.565	-97.747	1.1	0.8	0.9	13.2
11/19/2015 4:21	37.597	-97.761	1.2	1.4	1.4	13.4
11/19/2015 5:14	37.618	-97.745	0.5	1.3	1.5	11.3
11/19/2015 6:29	37.480	-97.841	0.4	2.0	2.6	11.2
11/20/2015 4:46	37.513	-97.839	1.7	3.0	1.7	13.9
11/23/2015 1:20	37.599	-97.759	1.1	1.1	1.2	12.2
11/23/2015 16:32	37.593	-97.766	0.3	1.5	1.5	11.1
11/26/2015 9:19	37.490	-97.829	1.2	1.8	2.2	16.4
11/26/2015 13:28	37.559	-97.753	1.8	1.5	1.2	18.2
11/26/2015 13:29	37.521	-97.773	0.7	1.1	1.1	15.5
11/26/2015 14:57	37.465	-97.807	0.8	2.1	2.7	14.6
11/26/2015 15:52	37.546	-97.852	1.4	3.0	2.4	17.0
11/27/2015 0:14	37.539	-97.747	0.6	3.2	3.1	15.4
11/27/2015 4:14	37.550	-97.758	1.8	1.8	1.4	18.2
11/27/2015 6:18	37.566	-97.747	1.1	0.9	1.0	16.2
11/27/2015 6:47	37.560	-97.752	1.4	4.9	4.6	17.0
11/27/2015 7:01	37.564	-97.752	1.4	2.8	2.7	17.0
11/27/2015 7:07	37.586	-97.731	2.0	2.1	2.4	18.0
11/27/2015 8:23	37.570	-97.740	1.9	1.4	1.7	18.6
11/27/2015 8:26	37.574	-97.741	1.9	1.5	1.5	18.6
11/27/2015 9:06	37.541	-97.766	0.9	0.9	0.9	15.8
11/27/2015 9:40	37.545	-97.756	1.7	2.1	2.1	17.9
11/27/2015 12:31	37.557	-97.751	0.7	0.8	0.8	15.5
11/27/2015 13:21	37.563	-97.745	0.4	1.0	1.0	15.2
11/27/2015 14:09	37.561	-97.743	1.5	1.3	1.3	17.3
11/27/2015 22:04	37.558	-97.746	0.8	1.2	1.2	15.6
11/28/2015 12:26	37.568	-97.753	2.3	2.0	2.0	15.3
11/28/2015 12:27	37.560	-97.748	1.3	0.8	0.9	16.7
11/28/2015 12:39	37.469	-97.799	0.0	3.1	3.8	13.0
11/28/2015 13:17	37.567	-97.740	1.4	1.3	1.2	17.0
11/28/2015 13:20	37.513	-97.781	0.8	2.0	2.1	15.6
11/28/2015 13:25	37.566	-97.746	1.6	1.0	1.0	17.6
11/29/2015 6:24	37.557	-97.751	1.2	1.1	0.9	16.4
11/29/2015 9:42	37.565	-97.742	1.2	1.4	1.4	16.4

11/29/2015 9:45	37.568	-97.745	1.4	2.1	1.4	17.0
12/2/2015 3:56	37.572	-97.742	1.8	1.6	1.7	14.2
12/4/2015 6:10	37.494	-97.830	0.2	4.2	4.1	11.0
12/4/2015 7:25	37.554	-97.766	2.0	2.3	1.9	14.0
12/9/2015 17:43	37.615	-97.747	0.8	1.7	1.9	11.6
12/11/2015 4:28	37.501	-97.828	0.4	1.2	1.5	11.2
12/11/2015 22:57	37.523	-97.854	1.4	1.7	2.1	15.0
12/12/2015 17:02	37.565	-97.823	1.4	0.8	1.1	15.0
12/13/2015 9:02	37.494	-97.809	1.8	1.2	1.4	17.2
12/13/2015 11:43	37.513	-97.802	2.0	2.3	2.7	16.0
12/13/2015 19:40	37.525	-97.826	1.6	3.3	1.3	17.6
12/14/2015 18:06	37.524	-97.847	1.5	1.7	1.5	15.3
12/15/2015 17:11	37.494	-97.814	1.5	1.1	1.3	15.3
12/16/2015 8:39	37.505	-97.818	1.5	1.9	1.9	16.3
12/16/2015 17:51	37.570	-97.747	1.9	2.8	1.8	15.6
12/17/2015 2:00	37.500	-97.822	1.8	2.4	1.9	16.2
12/17/2015 12:44	37.500	-97.813	1.6	1.4	1.3	14.6
12/20/2015 6:08	37.544	-97.760	1.8	1.5	1.3	14.2
12/29/2015 19:55	37.545	-97.827	1.4	1.6	1.8	13.0
12/31/2015 9:44	37.560	-97.755	2.1	1.8	1.4	14.4

Table 5. Earthquakes recorded by the Southern Kansas KCC/KGS Temporary Network in the Caldwell area in 2015. Yellow highlighting indicates SAS greater than 17, and green indicates earthquakes also reported in the NEIC global earthquake bulletin (PDE).

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
1/11/2015 3:26	37.107	-97.489	1.8	1.2	1.1	8.2
2/6/2015 2:47	37.027	-97.587	1.4	1.8	1.5	14.0
2/11/2015 18:24	37.025	-97.603	1.6	5.1	4.9	13.6
2/24/2015 16:23	37.054	-97.524	2.2	1.3	1.0	15.8
2/27/2015 14:49	37.018	-97.609	1.0	2.6	2.7	12.0
2/27/2015 14:49	37.011	-97.589	1.6	3.6	3.5	15.6
3/8/2015 4:48	37.012	-97.587	0.9	3.3	2.8	11.8
3/13/2015 3:11	37.002	-97.574	1.8	2.0	1.2	16.2
3/13/2015 3:27	37.003	-97.582	1.3	2.2	1.5	13.7
3/27/2015 6:40	37.090	-97.487	2.4	2.2	1.7	14.8
4/13/2015 0:34	37.002	-97.591	1.8	1.8	1.2	14.2
4/17/2015 4:22	37.000	-97.604	1.7	1.8	1.5	11.9
4/20/2015 21:30	37.011	-97.602	1.7	2.4	1.9	13.9
4/21/2015 2:04	37.013	-97.590	2.2	2.7	2.3	15.8
4/22/2015 12:03	37.003	-97.589	2.2	2.0	1.6	15.8
5/2/2015 11:36	37.017	-97.570	1.5	2.7	2.7	13.3
5/20/2015 1:08	37.037	-97.588	2.1	4.2	1.3	15.4
5/31/2015 22:23	37.046	-97.561	2.1	2.5	1.5	19.4
5/31/2015 22:43	37.037	-97.569	1.7	3.7	2.4	17.9
6/1/2015 1:49	37.043	-97.561	2.0	1.4	0.8	19.0
6/1/2015 2:04	37.040	-97.571	1.7	1.9	1.1	17.9
6/1/2015 3:41	37.032	-97.566	1.2	1.4	0.8	16.4
6/2/2015 2:57	37.025	-97.560	2.2	3.5	2.1	16.8
6/4/2015 21:30	37.062	-97.545	1.7	2.0	2.1	13.9
6/9/2015 0:35	37.002	-97.614	2.0	1.7	1.1	15.0

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
7/2/2015 10:32	37.072	-97.556	1.4	1.8	1.9	13.0
7/6/2015 17:55	37.063	-97.507	1.6	1.4	1.0	14.6
7/10/2015 23:18	37.001	-97.617	1.9	2.5	1.9	14.6
7/13/2015 23:37	37.010	-97.566	2.4	1.0	0.7	15.8
7/18/2015 2:39	37.005	-97.568	2.0	1.1	0.8	15.0
7/22/2015 0:04	37.007	-97.616	2.0	2.9	2.0	15.0
7/28/2015 8:57	37.017	-97.587	1.2	1.6	1.6	14.4
7/28/2015 12:01	37.021	-97.590	1.1	1.7	1.7	14.2
7/28/2015 12:57	37.006	-97.603	2.0	2.0	1.4	15.0
7/29/2015 4:21	37.042	-97.597	1.3	2.8	2.2	14.7
7/29/2015 8:08	37.115	-97.479	1.4	1.9	1.9	14.0
8/4/2015 21:56	37.094	-97.516	1.5	7.8	6.8	15.3
8/7/2015 16:35	37.010	-97.580	2.0	2.3	1.6	18.0
8/7/2015 20:21	37.010	-97.565	2.0	2.8	1.9	18.0
8/7/2015 23:33	37.010	-97.564	2.2	2.4	1.8	18.8
8/8/2015 0:27	37.044	-97.549	2.2	2.5	2.1	19.8
8/11/2015 5:07	37.083	-97.517	1.9	2.1	1.4	15.6
8/11/2015 5:27	37.069	-97.522	1.5	1.7	1.1	15.3
8/12/2015 7:25	37.006	-97.604	2.4	2.7	1.8	18.8
8/12/2015 7:39	37.080	-97.524	1.1	2.0	2.0	14.2
8/12/2015 8:16	37.067	-97.531	2.1	1.9	1.4	19.4
8/12/2015 14:24	37.013	-97.608	1.8	2.4	1.7	18.2
8/12/2015 21:29	37.018	-97.594	2.1	1.9	1.3	19.4
8/12/2015 23:04	37.072	-97.520	1.7	1.4	1.1	17.9
8/13/2015 3:58	37.022	-97.587	1.8	2.6	1.6	18.2
8/14/2015 21:55	37.022	-97.563	2.2	1.9	1.4	16.8
8/14/2015 22:30	37.045	-97.533	1.6	1.9	1.8	15.6
8/15/2015 14:10	37.035	-97.564	2.0	2.5	1.9	18.0
8/16/2015 12:49	37.078	-97.506	2.1	1.4	1.1	19.4
8/16/2015 17:29	37.077	-97.520	1.6	2.2	2.2	17.6
8/16/2015 17:31	37.087	-97.509	1.6	1.8	1.8	17.6
8/17/2015 11:35	37.067	-97.526	1.3	1.7	1.7	15.7
8/18/2015 12:33	37.049	-97.557	0.6	1.7	1.7	11.4
8/18/2015 15:52	37.073	-97.514	2.1	1.6	1.5	16.4
8/19/2015 10:19	37.005	-97.576	1.6	5.5	3.4	15.6
8/20/2015 8:53	37.066	-97.535	1.7	2.3	2.0	16.9
8/20/2015 15:20	37.026	-97.595	2.0	3.4	2.3	16.0
8/22/2015 9:10	37.064	-97.537	2.2	2.5	2.1	18.8
8/22/2015 22:02	37.073	-97.522	2.0	1.4	1.2	19.0
8/23/2015 3:17	37.065	-97.526	2.0	3.6	3.1	19.0
8/23/2015 4:05	37.055	-97.539	2.1	2.6	2.0	19.4
8/23/2015 16:17	37.113	-97.507	1.4	7.6	6.1	17.0
8/24/2015 0:08	37.073	-97.518	1.7	1.9	1.9	17.9
8/24/2015 9:45	37.082	-97.513	1.4	7.9	6.2	17.0
8/24/2015 10:20	37.022	-97.563	2.3	1.6	1.3	18.3
8/24/2015 11:42	37.034	-97.535	2.1	4.0	3.3	19.4
8/24/2015 23:07	37.068	-97.521	1.8	1.6	1.2	18.2
8/25/2015 1:16	37.066	-97.529	1.3	2.5	2.2	16.7
8/25/2015 20:47	37.036	-97.573	1.6	3.1	2.7	17.6
8/26/2015 3:39	37.066	-97.528	1.9	2.2	1.8	18.6

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
8/26/2015 12:35	37.046	-97.552	1.1	4.6	3.8	16.2
8/26/2015 15:30	37.120	-97.462	1.2	4.9	4.4	16.4
8/27/2015 3:04	37.059	-97.525	1.4	2.3	2.2	17.0
8/27/2015 5:21	37.062	-97.520	1.9	2.1	1.4	18.6
8/27/2015 5:25	37.073	-97.515	2.0	2.1	1.5	19.0
8/27/2015 6:18	37.066	-97.529	2.4	2.5	1.8	20.8
8/27/2015 6:49	37.068	-97.528	2.1	2.1	1.5	19.4
8/27/2015 7:06	37.078	-97.508	1.5	3.5	2.5	17.3
8/27/2015 7:29	37.063	-97.525	1.7	1.7	1.3	17.9
8/27/2015 16:03	37.083	-97.509	1.8	3.2	2.7	18.2
8/27/2015 17:17	37.076	-97.515	1.7	4.1	3.4	17.9
8/27/2015 23:20	37.058	-97.539	2.7	1.9	1.4	19.3
8/27/2015 23:30	37.068	-97.530	2.2	2.1	1.5	19.8
8/27/2015 23:39	37.070	-97.521	1.4	6.7	5.2	17.0
8/28/2015 0:23	37.081	-97.521	1.6	3.2	2.6	17.6
8/28/2015 1:39	37.023	-97.554	1.4	5.2	4.0	17.0
8/28/2015 11:43	37.074	-97.525	2.0	2.1	1.9	19.0
8/28/2015 12:18	37.093	-97.513	1.6	3.0	2.4	17.6
8/28/2015 20:40	37.070	-97.522	2.0	1.9	1.5	19.0
8/28/2015 21:58	37.094	-97.518	1.6	4.8	4.1	17.6
8/28/2015 22:42	37.069	-97.525	1.5	1.9	1.8	17.3
8/29/2015 3:15	37.063	-97.543	1.9	1.8	1.2	18.6
8/29/2015 4:39	37.062	-97.543	1.1	7.5	6.0	16.2
8/29/2015 5:25	37.085	-97.512	1.6	4.7	3.7	17.6
8/29/2015 8:53	37.058	-97.543	2.2	2.2	1.6	19.8
8/29/2015 8:56	37.059	-97.525	1.7	2.7	2.1	17.9
8/29/2015 9:22	37.096	-97.500	1.3	4.8	3.8	16.7
8/29/2015 10:43	37.086	-97.508	2.1	3.5	2.5	19.4
8/29/2015 13:02	37.069	-97.521	1.5	2.6	2.3	17.3
8/29/2015 14:39	37.062	-97.537	2.7	1.5	1.2	21.3
8/29/2015 15:30	37.094	-97.502	1.9	3.6	2.9	18.6
8/29/2015 19:36	37.081	-97.521	2.3	2.5	1.9	20.3
8/29/2015 19:46	37.067	-97.528	1.8	1.7	1.4	18.2
8/29/2015 19:46	37.090	-97.504	2.3	5.6	4.2	20.3
8/29/2015 21:57	37.084	-97.519	1.9	6.8	5.4	18.6
8/29/2015 22:16	37.054	-97.540	1.9	3.2	2.8	18.6
8/29/2015 22:34	37.103	-97.510	1.6	3.4	3.0	17.6
8/29/2015 23:03	37.068	-97.525	1.8	1.8	1.5	18.2
8/29/2015 23:24	37.070	-97.521	1.5	2.8	2.5	17.3
8/30/2015 1:19	37.064	-97.525	2.0	1.8	1.5	19.0
8/30/2015 1:22	37.084	-97.512	1.8	5.7	4.6	18.2
8/30/2015 1:32	37.069	-97.527	2.0	1.7	1.3	19.0
8/30/2015 4:46	37.061	-97.543	1.9	4.3	3.5	18.6
8/30/2015 4:48	37.066	-97.537	2.0	2.3	1.7	19.0
8/30/2015 4:54	37.096	-97.511	1.4	3.3	2.8	17.0
8/30/2015 5:36	37.048	-97.548	2.5	2.9	2.0	20.3
8/30/2015 6:03	37.067	-97.526	2.4	2.3	1.7	20.8
8/30/2015 6:38	37.068	-97.524	2.1	3.2	2.3	19.4
8/30/2015 12:49	37.086	-97.505	2.1	2.1	1.5	19.4
8/30/2015 21:12	37.069	-97.527	2.3	2.4	1.7	20.3

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
8/30/2015 21:28	37.054	-97.541	2.2	1.3	1.2	19.8
8/30/2015 22:02	37.078	-97.516	1.5	3.6	2.8	17.3
8/30/2015 23:48	37.072	-97.524	1.6	2.7	2.3	17.6
8/31/2015 2:19	37.071	-97.519	1.2	2.3	2.6	16.4
8/31/2015 3:07	37.087	-97.495	1.4	5.4	4.6	17.0
8/31/2015 4:58	37.052	-97.578	1.5	4.2	4.4	17.3
8/31/2015 7:57	37.079	-97.519	1.6	1.6	1.6	17.6
8/31/2015 8:55	37.041	-97.541	1.7	2.0	1.6	17.9
8/31/2015 12:05	37.055	-97.542	1.4	3.1	2.6	17.0
8/31/2015 15:25	37.072	-97.521	1.4	2.8	2.5	17.0
8/31/2015 18:05	37.056	-97.541	1.8	2.0	1.7	18.2
8/31/2015 19:51	37.079	-97.514	1.5	1.8	1.8	17.3
9/1/2015 1:36	37.071	-97.526	2.2	2.9	2.2	19.8
9/1/2015 4:29	37.072	-97.526	2.0	2.2	1.6	19.0
9/1/2015 9:03	37.074	-97.531	1.6	1.8	1.8	17.6
9/1/2015 11:41	37.062	-97.522	2.5	2.3	1.7	20.3
9/1/2015 11:49	37.066	-97.534	1.8	1.7	1.2	18.2
9/1/2015 11:55	37.072	-97.518	1.5	1.7	1.7	17.3
9/1/2015 12:01	37.105	-97.500	1.4	3.6	2.8	17.0
9/1/2015 12:39	37.111	-97.511	0.9	2.5	2.3	15.8
9/1/2015 12:40	37.072	-97.514	1.2	1.7	1.7	16.4
9/1/2015 12:55	37.060	-97.529	1.7	2.6	2.2	17.9
9/1/2015 13:15	37.062	-97.530	0.9	2.3	1.9	15.8
9/1/2015 13:49	37.060	-97.530	1.9	2.5	1.9	18.6
9/1/2015 14:28	37.067	-97.536	1.2	2.0	2.0	16.4
9/1/2015 15:21	37.086	-97.505	1.3	2.6	2.2	16.7
9/1/2015 20:41	37.085	-97.517	1.5	2.0	1.7	17.3
9/1/2015 21:07	37.057	-97.545	1.1	2.1	1.8	16.2
9/2/2015 2:20	37.023	-97.578	1.3	3.5	2.6	16.7
9/2/2015 5:11	37.034	-97.549	1.6	2.8	2.7	17.6
9/2/2015 10:06	37.065	-97.524	1.6	2.5	1.9	17.6
9/3/2015 10:47	37.063	-97.536	1.8	1.6	1.6	15.2
9/5/2015 2:53	37.070	-97.520	1.4	2.2	1.9	14.0
9/5/2015 23:00	37.079	-97.511	2.1	3.3	2.3	18.4
9/5/2015 23:52	37.065	-97.532	1.9	1.7	1.2	18.6
9/6/2015 0:24	37.067	-97.539	2.3	3.2	2.3	19.3
9/6/2015 8:02	37.010	-97.575	1.9	5.2	3.2	18.6
9/6/2015 12:24	37.083	-97.493	1.5	5.7	4.9	16.3
9/7/2015 3:20	37.072	-97.517	1.6	4.1	4.0	16.6
9/7/2015 8:52	37.018	-97.555	1.3	4.5	3.2	14.7
9/9/2015 7:13	37.017	-97.586	1.6	2.5	1.8	17.6
9/9/2015 8:38	37.017	-97.559	1.9	4.2	3.5	18.6
9/9/2015 8:54	37.042	-97.582	1.6	1.7	1.4	17.6
9/9/2015 20:15	37.071	-97.521	1.2	4.9	3.8	16.4
9/9/2015 20:15	37.084	-97.514	1.6	2.8	2.1	17.6
9/9/2015 20:20	37.076	-97.530	1.6	2.2	1.4	17.6
9/10/2015 3:12	37.087	-97.502	1.2	1.7	1.7	16.4
9/12/2015 17:40	37.051	-97.535	0.7	3.4	2.8	12.5
9/12/2015 17:40	37.059	-97.534	1.9	2.0	1.4	18.6
9/12/2015 17:45	37.064	-97.532	2.2	1.5	1.0	19.8

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
9/12/2015 17:59	37.075	-97.513	1.4	8.6	7.0	17.0
9/12/2015 18:21	37.074	-97.525	1.5	5.9	4.7	17.3
9/12/2015 23:19	37.109	-97.496	1.5	3.3	2.5	17.3
9/13/2015 4:16	37.066	-97.531	2.5	2.5	1.6	19.3
9/13/2015 4:56	37.067	-97.532	1.1	4.4	3.5	16.2
9/13/2015 5:04	37.010	-97.578	1.5	3.4	3.0	17.3
9/13/2015 8:36	37.059	-97.534	2.1	2.9	2.1	19.4
9/13/2015 8:46	37.078	-97.523	2.0	2.2	1.4	19.0
9/13/2015 12:32	37.068	-97.523	1.8	2.4	1.7	18.2
9/13/2015 14:14	37.089	-97.508	1.4	1.8	1.6	17.0
9/14/2015 8:00	37.100	-97.493	1.2	3.5	2.6	14.4
9/14/2015 13:02	37.072	-97.529	1.9	2.5	1.6	18.6
9/14/2015 21:34	37.064	-97.535	1.9	3.0	2.0	18.6
9/14/2015 22:04	37.066	-97.533	1.2	2.4	1.5	16.4
9/15/2015 5:29	37.095	-97.495	2.1	4.5	3.2	19.4
9/15/2015 13:35	37.064	-97.528	1.5	3.5	2.2	17.3
9/15/2015 15:23	37.075	-97.523	1.0	2.1	1.8	16.0
9/15/2015 17:22	37.086	-97.515	1.3	4.1	3.2	16.7
9/15/2015 17:24	37.074	-97.523	2.0	2.4	1.6	19.0
9/15/2015 19:49	37.061	-97.516	1.3	4.2	4.1	16.7
9/16/2015 3:46	37.115	-97.485	1.2	6.4	5.0	16.4
9/16/2015 9:39	37.072	-97.529	1.1	3.9	2.8	16.2
9/17/2015 3:49	37.018	-97.564	1.3	7.3	5.6	15.7
9/18/2015 2:54	37.063	-97.532	1.2	3.3	3.0	16.4
9/18/2015 3:04	37.078	-97.513	1.4	2.1	1.9	17.0
9/18/2015 10:53	37.076	-97.522	1.5	3.4	2.9	17.3
9/18/2015 14:53	37.074	-97.525	1.4	3.2	2.7	17.0
9/19/2015 4:04	37.078	-97.518	1.8	2.7	2.5	18.2
9/19/2015 9:44	37.031	-97.570	0.9	3.8	3.7	13.8
9/19/2015 15:43	37.005	-97.586	1.7	2.1	1.5	17.9
9/19/2015 17:13	37.012	-97.591	1.7	1.4	1.2	17.9
9/19/2015 21:48	37.016	-97.589	1.9	1.9	1.3	18.6
9/19/2015 22:13	37.066	-97.517	1.3	2.6	2.3	16.7
9/20/2015 12:47	37.034	-97.558	2.0	5.0	2.7	19.0
9/20/2015 21:31	37.073	-97.519	1.7	3.4	2.8	17.9
9/20/2015 22:13	37.089	-97.520	1.5	4.7	2.8	17.3
9/21/2015 4:59	37.049	-97.554	1.3	5.5	3.9	14.7
9/21/2015 16:00	37.042	-97.562	1.9	3.9	3.3	18.6
9/22/2015 7:55	37.046	-97.540	2.2	3.9	3.3	16.8
9/22/2015 7:57	37.061	-97.524	1.3	2.4	2.2	15.7
9/22/2015 8:04	37.071	-97.513	1.5	2.8	3.7	17.3
9/23/2015 3:05	37.057	-97.521	1.4	3.6	3.2	17.0
9/23/2015 4:51	37.062	-97.517	1.4	3.1	2.7	17.0
9/23/2015 15:52	37.029	-97.553	1.2	6.2	6.5	14.4
9/24/2015 20:24	37.083	-97.509	1.8	6.3	4.4	17.2
9/25/2015 10:40	37.071	-97.542	2.1	4.0	2.9	19.4
9/25/2015 12:55	37.072	-97.519	1.4	3.0	2.4	17.0
9/25/2015 20:55	37.076	-97.513	1.6	1.2	1.0	17.6
9/26/2015 1:09	37.060	-97.532	1.7	3.4	1.8	17.9
9/27/2015 23:29	37.088	-97.515	1.9	1.9	1.6	18.6

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
9/27/2015 23:29	37.082	-97.514	1.8	1.8	1.5	18.2
9/28/2015 1:39	37.080	-97.524	2.3	2.5	1.8	20.3
9/28/2015 1:56	37.090	-97.509	1.6	2.3	1.8	17.6
9/28/2015 2:03	37.057	-97.534	1.9	4.6	3.6	18.6
9/28/2015 2:05	37.083	-97.522	1.8	2.6	2.2	18.2
9/28/2015 4:18	37.088	-97.521	2.0	2.1	1.7	19.0
9/28/2015 10:37	37.083	-97.524	1.6	3.0	2.0	17.6
9/28/2015 10:39	37.071	-97.531	2.1	3.1	2.3	19.4
9/28/2015 10:48	37.082	-97.517	1.9	2.9	2.1	18.6
9/28/2015 10:50	37.065	-97.533	1.7	2.0	1.7	17.9
9/29/2015 4:36	37.051	-97.540	2.0	4.4	3.5	19.0
10/1/2015 3:45	37.073	-97.527	2.1	1.8	1.4	19.4
10/1/2015 5:22	37.097	-97.499	1.7	2.6	1.8	17.9
10/1/2015 6:08	37.074	-97.520	2.1	3.0	1.7	19.4
10/1/2015 6:13	37.056	-97.531	1.8	1.3	0.9	18.2
10/1/2015 6:20	37.083	-97.513	1.7	3.2	2.9	17.9
10/1/2015 12:07	37.016	-97.575	1.7	4.8	4.1	17.9
10/1/2015 21:10	37.065	-97.530	1.8	4.0	3.1	18.2
10/2/2015 22:18	37.085	-97.503	1.8	3.0	2.6	18.2
10/3/2015 1:39	37.050	-97.546	1.4	3.0	3.1	17.0
10/3/2015 2:43	37.067	-97.536	1.8	3.4	3.2	18.2
10/3/2015 7:13	37.080	-97.508	1.9	2.4	2.0	18.6
10/3/2015 9:38	37.060	-97.531	1.6	2.3	2.2	17.6
10/3/2015 9:40	37.103	-97.481	1.2	3.4	2.8	16.4
10/3/2015 9:42	37.058	-97.538	1.4	2.3	1.9	17.0
10/3/2015 9:46	37.064	-97.527	2.6	1.7	1.5	16.8
10/3/2015 22:17	37.069	-97.505	1.7	1.4	0.8	17.9
10/4/2015 3:48	37.069	-97.523	1.9	3.9	3.2	18.6
10/6/2015 6:12	37.088	-97.507	1.9	1.8	1.3	14.6
10/7/2015 10:00	37.076	-97.514	1.2	2.4	1.9	16.4
10/7/2015 10:01	37.072	-97.514	2.4	2.1	1.5	17.8
10/7/2015 10:03	37.071	-97.527	1.1	2.7	2.6	16.2
10/7/2015 11:15	37.071	-97.531	2.2	2.6	1.5	16.8
10/7/2015 12:01	37.087	-97.506	1.2	2.6	2.3	16.4
10/8/2015 6:26	37.092	-97.528	1.6	3.4	2.9	17.6
10/8/2015 10:06	37.065	-97.530	1.5	2.0	1.8	16.3
10/8/2015 11:18	37.083	-97.537	1.0	3.1	2.8	14.0
10/9/2015 14:27	37.086	-97.541	1.2	2.0	2.0	14.4
10/11/2015 21:24	37.069	-97.524	2.3	1.5	1.3	19.3
10/11/2015 21:36	37.086	-97.523	1.9	3.7	3.3	18.6
10/11/2015 22:04	37.069	-97.522	1.8	2.3	1.6	18.2
10/12/2015 0:56	37.038	-97.546	2.2	3.8	3.3	19.8
10/12/2015 5:24	37.075	-97.510	1.7	2.2	1.9	17.9
10/13/2015 12:41	37.024	-97.585	2.2	3.1	2.2	17.8
10/13/2015 13:17	37.068	-97.528	1.9	2.4	1.9	18.6
10/14/2015 13:16	37.071	-97.524	1.7	1.9	1.4	17.9
10/14/2015 14:17	37.076	-97.524	2.2	2.3	1.8	19.8
10/14/2015 14:19	37.073	-97.522	2.6	3.5	2.5	19.8
10/14/2015 14:24	37.072	-97.526	2.0	3.0	2.6	19.0
10/14/2015 15:16	37.076	-97.518	1.8	3.3	2.8	18.2

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
10/14/2015 17:20	37.089	-97.511	1.9	2.9	2.6	18.6
10/14/2015 17:56	37.064	-97.528	1.6	2.1	1.8	17.6
10/14/2015 18:13	37.079	-97.510	1.6	4.7	4.1	17.6
10/14/2015 19:27	37.070	-97.527	2.2	3.0	2.6	19.8
10/14/2015 19:27	37.076	-97.523	1.4	5.2	4.4	17.0
10/14/2015 20:25	37.051	-97.543	1.9	6.1	5.3	18.6
10/14/2015 21:53	37.066	-97.526	2.1	1.9	1.6	19.4
10/14/2015 21:55	37.074	-97.518	1.3	2.6	2.4	16.7
10/15/2015 5:06	37.066	-97.530	1.9	1.3	1.0	18.6
10/15/2015 6:18	37.086	-97.511	1.8	3.9	3.4	18.2
10/16/2015 0:43	37.020	-97.575	1.9	2.3	1.9	17.6
10/16/2015 10:43	37.065	-97.521	1.6	1.7	1.3	16.6
10/16/2015 10:43	37.076	-97.516	1.2	2.3	2.1	14.4
10/17/2015 15:14	37.046	-97.553	1.3	3.1	2.1	13.7
10/17/2015 15:52	37.055	-97.540	2.2	2.8	2.0	19.8
10/17/2015 18:28	37.058	-97.517	2.0	3.6	3.2	19.0
10/17/2015 20:25	37.053	-97.532	2.4	2.3	1.6	20.8
10/18/2015 2:25	37.063	-97.522	1.6	2.1	1.8	17.6
10/18/2015 7:08	37.069	-97.529	2.5	2.4	1.7	20.3
10/18/2015 8:51	37.027	-97.550	2.1	5.1	3.5	19.4
10/18/2015 17:37	37.063	-97.529	1.9	1.6	1.1	18.6
10/21/2015 5:44	37.080	-97.519	1.8	3.0	2.3	15.2
10/21/2015 18:20	37.072	-97.514	2.0	2.1	1.9	16.0
10/23/2015 0:04	37.074	-97.522	1.9	2.3	1.5	15.6
10/23/2015 7:28	37.081	-97.513	2.1	2.4	1.7	16.4
10/27/2015 1:59	37.115	-97.484	1.0	5.7	4.6	14.0
10/27/2015 9:05	37.003	-97.621	1.7	2.3	1.2	14.9
10/28/2015 1:38	37.084	-97.508	1.5	2.4	2.1	17.3
10/28/2015 4:44	37.058	-97.534	2.1	1.3	1.1	16.4
10/28/2015 12:08	37.060	-97.534	1.4	1.8	1.3	17.0
10/28/2015 17:48	37.012	-97.590	1.5	2.1	2.1	17.3
10/29/2015 12:43	37.065	-97.529	1.6	1.1	1.0	16.6
10/29/2015 16:06	37.083	-97.512	1.9	2.1	1.6	16.6
10/29/2015 17:11	37.069	-97.530	1.8	1.4	1.1	18.2
10/30/2015 19:42	37.083	-97.513	1.4	2.5	2.1	16.0
10/30/2015 19:43	37.054	-97.532	1.8	2.1	1.6	18.2
10/30/2015 20:03	37.061	-97.538	2.4	1.9	1.4	20.8
10/31/2015 4:29	37.068	-97.521	1.1	2.3	1.9	16.2
10/31/2015 13:42	37.001	-97.585	2.0	2.4	2.2	19.0
10/31/2015 15:06	37.004	-97.595	2.3	2.0	1.2	20.3
10/31/2015 16:23	37.015	-97.601	2.2	1.1	0.8	19.8
10/31/2015 16:39	37.002	-97.591	1.5	1.2	1.0	17.3
10/31/2015 17:14	37.002	-97.592	2.3	2.1	1.4	20.3
10/31/2015 23:55	37.082	-97.517	1.5	3.2	2.7	17.3
11/1/2015 0:43	37.008	-97.581	1.4	2.2	2.1	17.0
11/1/2015 1:51	37.006	-97.586	1.8	1.3	0.9	18.2
11/1/2015 5:55	37.016	-97.591	1.9	2.2	1.4	18.6
11/1/2015 8:51	37.008	-97.585	1.8	2.4	1.5	18.2
11/1/2015 16:37	37.010	-97.605	1.6	2.2	2.3	17.6
11/2/2015 5:15	37.067	-97.518	1.9	1.3	1.0	18.6

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
11/2/2015 7:26	37.057	-97.537	1.7	1.4	1.2	17.9
11/2/2015 8:27	37.055	-97.536	1.5	2.9	2.5	17.3
11/2/2015 8:45	37.068	-97.521	1.8	2.0	1.8	18.2
11/2/2015 8:48	37.078	-97.527	1.2	2.7	2.6	16.4
11/2/2015 8:55	37.060	-97.532	1.7	1.8	1.2	17.9
11/2/2015 8:56	37.070	-97.535	1.7	1.7	1.5	17.9
11/2/2015 9:04	37.068	-97.518	1.5	2.4	2.2	17.3
11/2/2015 9:05	37.053	-97.542	0.7	2.4	2.3	15.5
11/2/2015 11:08	37.079	-97.522	1.5	1.6	1.3	17.3
11/2/2015 11:08	37.076	-97.521	1.3	2.2	2.0	16.7
11/2/2015 11:10	37.082	-97.526	1.9	2.7	2.1	18.6
11/2/2015 11:16	37.058	-97.535	1.9	1.5	1.1	18.6
11/2/2015 11:19	37.071	-97.514	2.0	2.0	1.4	19.0
11/2/2015 11:39	37.108	-97.496	1.5	2.0	1.3	17.3
11/2/2015 11:49	37.095	-97.504	0.8	5.8	4.6	15.6
11/2/2015 11:58	37.069	-97.526	1.3	3.5	2.7	16.7
11/2/2015 12:07	37.069	-97.526	2.2	0.9	0.7	19.8
11/2/2015 14:37	37.074	-97.503	1.2	7.3	6.3	16.4
11/2/2015 15:00	37.073	-97.523	1.3	2.4	2.1	16.7
11/2/2015 16:40	37.087	-97.514	1.9	2.3	2.1	18.6
11/2/2015 18:38	37.068	-97.526	1.9	2.6	2.4	18.6
11/2/2015 22:54	37.072	-97.516	2.0	2.0	1.8	19.0
11/2/2015 23:53	37.059	-97.543	1.5	2.4	2.3	17.3
11/3/2015 3:58	37.070	-97.541	1.5	1.5	1.3	17.3
11/3/2015 4:01	37.071	-97.521	0.9	2.0	1.8	15.8
11/3/2015 4:16	37.062	-97.540	1.5	2.5	2.4	17.3
11/3/2015 4:20	37.058	-97.537	1.0	2.7	2.5	16.0
11/3/2015 4:20	37.068	-97.529	1.5	2.2	2.0	17.3
11/3/2015 4:47	37.075	-97.527	1.8	1.7	1.5	18.2
11/3/2015 5:02	37.063	-97.531	1.8	2.0	1.8	18.2
11/3/2015 5:25	37.056	-97.546	2.0	2.0	1.8	19.0
11/3/2015 5:43	37.036	-97.559	1.0	2.4	2.2	16.0
11/3/2015 7:11	37.052	-97.544	1.3	2.9	2.5	16.7
11/3/2015 8:24	37.063	-97.548	2.0	1.5	1.2	19.0
11/3/2015 10:15	37.063	-97.534	1.6	3.0	2.6	17.6
11/3/2015 14:20	37.070	-97.523	1.2	1.9	1.7	16.4
11/3/2015 19:33	37.080	-97.517	1.8	1.9	1.4	18.2
11/3/2015 21:28	37.068	-97.528	1.9	1.4	1.0	18.6
11/3/2015 22:03	37.089	-97.499	1.4	3.2	2.8	17.0
11/4/2015 2:38	37.069	-97.525	1.9	1.7	1.5	18.6
11/4/2015 14:33	37.055	-97.539	1.0	2.9	2.8	13.0
11/7/2015 4:35	37.069	-97.539	2.1	2.0	1.5	16.4
11/8/2015 4:32	37.042	-97.544	1.1	5.9	3.3	12.2
11/10/2015 0:10	37.049	-97.544	2.3	2.8	2.1	20.3
11/10/2015 0:14	37.075	-97.533	1.7	4.2	3.9	17.9
11/10/2015 0:31	37.063	-97.533	2.1	1.8	1.3	19.4
11/10/2015 1:49	37.070	-97.525	1.9	3.4	2.9	18.6
11/10/2015 5:14	37.069	-97.534	0.7	3.4	2.8	14.5
11/10/2015 6:19	37.059	-97.529	1.2	3.6	3.1	15.4
11/10/2015 10:46	37.061	-97.532	2.4	1.7	1.3	20.8

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
11/11/2015 1:19	37.008	-97.603	1.8	8.4	4.1	14.2
11/11/2015 2:34	37.070	-97.560	1.2	2.1	2.3	14.4
11/12/2015 11:42	37.064	-97.533	2.0	1.9	1.5	17.0
11/12/2015 13:30	37.122	-97.496	2.1	4.2	3.1	16.4
11/15/2015 2:55	37.060	-97.527	1.5	1.1	0.8	17.3
11/15/2015 7:40	37.060	-97.537	1.8	1.6	1.2	18.2
11/15/2015 9:55	37.055	-97.525	1.6	2.6	2.4	17.6
11/15/2015 10:01	37.118	-97.471	1.4	4.8	3.2	17.0
11/15/2015 17:33	37.063	-97.541	1.1	4.0	3.2	16.2
11/16/2015 15:26	37.022	-97.545	1.6	2.5	1.9	14.6
11/18/2015 0:45	37.096	-97.500	1.4	2.3	2.0	15.0
11/18/2015 9:47	37.072	-97.523	1.6	1.1	0.9	16.6
11/19/2015 5:12	37.000	-97.608	1.4	2.2	2.3	13.0
11/22/2015 6:19	37.080	-97.509	1.7	6.5	3.7	14.9
11/23/2015 11:26	37.054	-97.569	2.2	3.6	2.4	16.8
11/26/2015 22:55	37.044	-97.596	1.9	3.4	1.8	15.6
11/27/2015 14:51	37.049	-97.555	1.6	3.3	1.9	17.6
11/28/2015 9:07	37.078	-97.517	1.6	3.3	2.6	17.6
11/28/2015 14:00	37.072	-97.527	1.9	2.2	1.4	18.6
11/28/2015 14:11	37.054	-97.530	1.2	2.7	1.5	14.4
11/28/2015 14:12	37.064	-97.527	1.9	1.7	1.1	18.6
11/28/2015 14:20	37.018	-97.591	2.0	1.7	1.1	19.0
11/28/2015 21:55	37.021	-97.592	2.1	1.9	1.3	19.4
11/29/2015 15:08	37.024	-97.582	2.2	3.9	2.6	16.8
12/6/2015 8:17	37.074	-97.555	1.4	3.2	1.8	17.0
12/7/2015 3:33	37.004	-97.615	2.3	1.2	0.9	17.3
12/7/2015 14:35	37.005	-97.619	2.4	1.3	1.0	17.8
12/7/2015 14:41	37.002	-97.615	1.4	2.2	2.1	14.0
12/8/2015 5:36	37.008	-97.612	1.8	4.3	3.0	15.2
12/14/2015 1:21	37.103	-97.511	1.4	5.1	3.4	14.0
12/14/2015 3:55	37.045	-97.524	1.5	2.0	1.0	14.3
12/14/2015 6:11	37.056	-97.523	2.1	2.7	1.7	15.4
12/21/2015 14:30	37.017	-97.565	2.6	2.8	1.7	16.8
12/25/2015 0:19	37.082	-97.517	1.8	3.2	2.1	15.2
12/25/2015 9:13	37.069	-97.534	2.3	2.6	1.8	17.3

Table 6. Earthquakes recorded by the Southern Kansas KCC/KGS Temporary Network in McPherson County in 2015.

date and time (UTC)	latitude	longitude	magnitude	latitude error (km)	longitude error (km)	SAS
5/17/2015 23:37	38.454	-97.452	1.9	3.5	4.4	8.6
5/18/2015 4:14	38.460	-97.491	1.9	2.0	2.1	9.6
5/18/2015 10:19	38.530	-97.412	2.2	6.5	6.5	10.8
11/15/2015 3:04	38.572	-97.510	2.2	3.9	5.4	7.8

Table 7. Earthquakes recorded in 2015 by both the Southern Kansas KCC/KGS Temporary Network and by the USGS (reported in the NEIC global earthquake bulletin (PDE)). Yellow highlighting indicates SAS greater than 17.

date and time (UTC)	KGS		USGS	
	magnitude	SAS	magnitude	SAS
1/4/15 10:55	2.5	22.3	3.5	23.25
1/4/15 23:57	2.0	19.0	2.6	18.76
1/5/15 12:57	2.3	11.3	3.0	13.00
1/5/15 21:54	2.5	21.3	2.9	20.41
1/8/15 11:47	1.9	17.6	2.2	12.84
1/8/15 19:23	2.1	18.4	2.3	17.29
1/8/15 21:50	2.4	19.8	2.2	17.84
1/10/15 16:36	2.3	20.3	3.2	23.24
1/11/15 0:05	2.7	22.3	2.9	21.41
1/15/15 16:01	2.3	16.3	2.7	15.29
1/15/15 16:04	2.5	20.3	2.9	12.41
1/19/15 9:54	2.8	21.8	3.5	23.25
1/20/15 4:10	2.1	16.4	2.6	10.76
1/23/15 4:00	2.5	20.3	3.7	16.69
1/23/15 6:31	2.0	19.0	2.1	9.41
1/25/15 1:35	2.3	18.3	2.7	15.29
1/27/15 5:28	2.3	20.3	3.1	21.61
1/27/15 7:38	2.4	20.8	3.4	25.56
1/27/15 9:28	2.5	20.3	2.9	22.41
1/28/15 17:42	2.3	20.3	3.0	21.00
1/29/15 3:33	2.4	19.8	3.1	22.61
1/29/15 5:58	2.1	19.4	3.1	22.61
1/29/15 20:21	2.4	20.8	3.4	23.56
2/1/15 0:00	2.0	15.0	2.5	12.25
2/3/15 22:19	3.0	21.0	3.4	23.56
2/4/15 13:20	2.6	21.8	3.4	23.56
2/5/15 10:32	2.5	19.3	2.9	14.41
2/9/15 3:14	2.4	17.8	2.4	12.76
2/10/15 7:32	3.3	22.9	3.6	23.96
2/12/15 14:48	3.0	22.0	2.7	15.29
2/14/15 18:09	3.1	20.6	3.0	19.00
2/15/15 17:39	2.8	21.8	2.9	20.41
2/15/15 18:27	3.5	23.3	3.6	23.96
2/16/15 1:44	2.1	19.4	2.0	15.00
2/18/15 22:23	2.0	19.0	2.9	20.41
2/19/15 10:51	1.7	14.9	2.3	16.29
2/22/15 5:55	2.6	19.8	2.5	14.25
2/24/15 0:27	1.7	13.9	2.0	15.00
2/28/15 0:38	2.4	20.8	2.5	19.25
2/28/15 8:44	2.7	19.3	2.8	20.84
3/1/15 2:47	3.0	21.0	3.5	23.25
3/3/15 5:10	2.6	18.8	2.8	17.84
3/3/15 15:56	2.8	18.8	3.8	23.44
3/5/15 1:46	2.5	17.3	2.9	20.41
3/5/15 6:03	2.7	18.3	2.6	18.76
3/5/15 13:16	1.9	17.6	1.9	10.61
3/5/15 16:19	2.2	17.8	2.6	16.76

date and time (UTC)	KGS		USGS	
	magnitude	SAS	magnitude	SAS
3/7/15 16:19	2.2	17.8	2.1	15.41
3/11/15 13:05	2.6	18.8	2.9	20.41
3/13/15 21:16	1.6	17.6	2.1	15.41
3/16/15 5:48	3.2	23.2	3.5	19.25
3/16/15 6:13	2.9	20.4	2.8	17.84
3/17/15 5:50	2.8	18.8	3.2	22.24
3/19/15 0:00	2.0	16.0	2.1	16.41
3/19/15 1:25	2.7	19.3	2.6	19.76
3/21/15 9:29	2.7	19.3	2.5	14.25
3/23/15 1:45	1.6	17.6	2.0	15.00
3/24/15 15:31	2.9	21.4	3.7	18.69
3/24/15 15:36	2.8	20.8	3.2	17.24
3/25/15 1:59	2.4	18.8	2.3	14.29
3/25/15 6:23	2.3	18.3	2.3	16.29
3/26/15 13:44	2.4	16.8	2.7	11.29
3/27/15 12:04	2.2	18.8	2.1	11.41
3/27/15 20:20	2.1	16.4	3.1	21.61
3/27/15 21:15	2.2	17.8	2.3	10.29
3/29/15 23:26	2.2	16.8	2.3	16.29
4/1/15 7:53	0.9	11.8	2.2	15.84
4/4/15 17:47	2.1	19.4	2.6	18.76
4/6/15 1:33	2.4	18.8	3.0	17.00
4/19/15 22:34	2.6	17.8	2.6	17.76
4/21/15 2:04	2.2	15.8	2.1	7.41
4/22/15 13:48	2.4	18.8	2.8	19.84
4/28/15 22:19	2.9	19.4	3.6	24.96
4/29/15 7:02	2.5	18.3	2.5	18.25
5/2/15 8:30	3.0	21.0	2.7	13.29
5/4/15 7:36	2.4	16.8	2.9	16.41
5/6/15 9:12	1.8	18.2	2.5	11.25
5/6/15 9:12	2.6	19.8	3.0	17.00
5/6/15 10:05	2.8	20.8	3.2	19.24
5/6/15 15:38	2.3	20.3	2.7	15.29
5/7/15 20:01	2.3	19.3	3.0	21.00
5/10/15 2:36	1.7	15.9	2.0	15.00
5/11/15 9:59	2.1	19.4	1.7	13.89
5/14/15 10:04	2.7	18.3	3.3	22.89
5/21/15 6:34	2.3	20.3	2.2	15.84
5/22/15 16:43	2.6	18.8	2.3	16.29
5/23/15 15:11	2.9	18.4	3.3	14.89
5/23/15 18:44	3.7	24.7	4.0	21.00
5/24/15 21:49	3.1	22.6	3.4	15.56
5/28/15 16:44	3.2	22.2	2.5	14.25
5/30/15 11:21	2.9	23.4	3.6	22.96
5/30/15 21:10	2.3	20.3	3.2	23.24
6/2/15 0:58	1.7	17.9	3.0	21.00
6/5/15 22:52	1.4	17.0	2.8	18.84
6/5/15 22:53	2.8	21.8	3.2	24.24
6/5/15 23:12	2.7	22.3	3.6	25.96

date and time (UTC)	KGS		USGS	
	magnitude	SAS	magnitude	SAS
6/5/15 23:12	3.1	24.6	4.1	26.81
6/8/15 4:28	2.9	21.4	3.4	23.56
6/15/15 19:49	2.3	20.3	3.4	23.56
6/30/15 14:28	1.9	18.6	2.3	10.29
7/1/15 9:12	2.6	17.8	2.5	16.25
7/2/15 22:45	1.9	18.6	2.6	12.76
7/3/15 19:59	2.0	17.0	2.9	21.41
7/4/15 6:10	2.2	17.8	2.7	20.29
7/5/15 13:54	2.3	16.3	2.5	10.25
7/8/15 18:37	2.0	15.0	2.3	10.29
7/8/15 23:08	1.9	12.6	2.6	12.76
7/8/15 23:10	2.4	16.8	2.7	15.29
7/9/15 6:00	2.7	17.3	2.6	16.76
7/10/15 5:00	2.3	16.3	2.8	11.84
7/12/15 1:28	2.3	18.3	2.5	14.25
7/13/15 2:44	2.1	19.4	2.7	17.29
7/14/15 15:33	2.5	16.3	2.6	16.76
7/19/15 8:53	2.5	19.3	2.8	11.84
7/20/15 7:56	2.3	20.3	2.8	17.84
7/21/15 21:58	1.9	18.6	2.5	20.25
7/22/15 3:17	2.6	19.8	2.9	22.41
7/22/15 17:21	2.4	20.8	2.8	21.84
7/23/15 17:34	2.5	20.3	2.5	18.25
7/27/15 3:43	2.2	18.8	2.9	20.41
7/29/15 13:39	2.3	20.3	2.5	18.25
8/4/15 16:31	2.3	17.3	2.5	18.25
8/8/15 13:57	2.3	20.3	3.2	21.24
8/20/15 13:18	2.6	17.8	3.4	22.56
8/22/15 17:35	1.7	17.9	2.3	14.29
8/27/15 23:20	2.7	19.3	2.8	11.84
8/29/15 12:14	2.2	17.8	2.6	14.76
8/29/15 14:39	2.7	21.3	3.1	15.61
8/30/15 6:03	2.4	20.8	2.5	15.25
8/30/15 21:12	2.3	20.3	2.7	19.29
9/1/15 11:41	2.5	20.3	3.1	22.61
9/1/15 12:21	2.1	18.4	2.4	16.76
9/2/15 6:04	2.2	16.8	2.6	12.76
9/3/15 7:21	2.3	17.3	2.7	11.29
9/4/15 9:00	2.2	17.8	2.6	10.76
9/5/15 4:04	2.6	9.8	2.6	10.76
9/6/15 0:24	2.3	19.3	2.5	18.25
9/7/15 1:30	2.6	17.8	2.4	8.76
9/7/15 20:13	1.8	18.2	1.6	7.56
9/11/15 16:39	1.7	17.9	2.5	16.25
9/12/15 0:55	2.1	19.4	3.3	22.89
9/12/15 13:12	2.1	15.4	2.5	14.25
9/12/15 17:45	2.2	19.8	2.5	19.25
9/13/15 4:16	2.5	19.3	2.5	19.25
9/14/15 21:34	1.9	18.6	2.9	20.41

date and time (UTC)	KGS		USGS	
	magnitude	SAS	magnitude	SAS
9/18/15 2:12	2.9	13.4	3.4	15.56
9/20/15 11:17	2.4	16.8	3.0	21.00
9/28/15 1:39	2.3	20.3	2.5	18.25
9/30/15 9:05	2.6	17.8	2.6	16.76
10/3/15 5:12	3.0	21.0	3.4	15.56
10/3/15 17:33	2.6	16.8	2.9	12.41
10/4/15 11:35	2.4	16.8	2.5	10.25
10/10/15 1:23	2.5	20.3	3.0	16.00
10/10/15 1:25	2.9	19.4	3.3	19.89
10/10/15 3:03	2.0	14.0	2.2	13.84
10/11/15 21:02	2.1	19.4	2.5	15.25
10/11/15 23:46	2.9	19.4	3.0	17.00
10/12/15 10:23	2.6	20.8	3.0	22.00
10/14/15 14:17	2.2	19.8	2.6	12.76
10/15/15 5:10	1.3	16.7	2.9	20.41
10/15/15 5:10	2.2	19.8	2.8	21.84
10/15/15 21:24	2.2	17.8	2.5	18.25
10/15/15 21:48	2.3	20.3	2.6	20.76
10/17/15 12:12	3.1	22.6	3.4	24.56
10/17/15 13:20	3.0	22.0	3.4	24.56
10/18/15 7:08	2.5	20.3	2.6	14.76
10/18/15 14:20	2.2	19.8	2.4	18.76
10/18/15 19:16	2.3	20.3	2.8	21.84
10/18/15 21:42	2.4	20.8	2.7	21.29
10/19/15 0:08	2.3	17.3	3.0	15.00
10/19/15 3:14	2.3	20.3	2.8	20.84
10/19/15 11:09	2.3	20.3	2.8	20.84
10/21/15 20:02	2.2	17.8	2.6	14.76
10/23/15 20:21	2.3	19.3	2.7	19.29
10/24/15 16:27	2.3	16.3	3.0	21.00
10/27/15 2:21	2.7	19.3	3.3	21.89
10/27/15 3:06	2.5	19.3	3.6	24.96
10/27/15 7:53	2.0	19.0	2.5	19.25
10/27/15 12:27	2.5	19.3	2.6	19.76
10/28/15 4:44	2.1	16.4	2.0	11.00
10/29/15 0:00	2.0	16.0	2.6	18.76
10/30/15 4:37	2.7	17.3	3.4	23.56
10/30/15 20:03	2.4	20.8	2.6	18.76
10/31/15 4:17	2.7	18.3	2.6	12.76
10/31/15 15:06	2.3	20.3	2.2	16.84
10/31/15 17:14	2.3	20.3	2.9	21.41
11/1/15 2:22	2.1	19.4	2.4	16.76
11/5/15 3:34	2.0	17.0	2.5	10.25
11/7/15 6:59	2.4	16.8	2.9	12.41
11/8/15 22:20	2.0	15.0	2.3	8.29
11/9/15 22:42	3.2	20.2	3.6	23.96
11/9/15 23:35	2.0	19.0	2.6	18.76
11/10/15 0:31	2.1	19.4	2.6	18.76
11/11/15 4:17	2.3	17.3	2.0	15.00

date and time (UTC)	KGS		USGS	
	magnitude	SAS	magnitude	SAS
11/14/15 3:47	2.3	20.3	2.8	19.84
11/15/15 3:10	2.0	18.0	2.0	15.00
11/15/15 16:48	2.5	9.3	2.6	13.76
11/18/15 0:05	2.4	16.8	2.2	15.84
11/28/15 18:06	2.4	16.8	2.6	11.76
11/29/15 12:39	2.4	19.8	2.8	14.84
12/1/15 14:29	2.2	19.8	2.7	20.29
12/7/15 0:43	2.4	16.8	2.5	17.25
12/7/15 0:51	2.3	17.3	2.7	20.29
12/12/15 17:24	2.4	19.8	2.2	11.84
12/14/15 22:09	2.7	10.3	2.5	10.25
12/23/15 23:03	2.2	17.8	2.5	10.25
12/29/15 17:46	2.3	19.3	2.7	11.29
12/31/15 14:16	2.2	16.8	2.6	15.76
12/31/15 16:31	2.5	17.3	2.8	18.84

Appendix A (online only). Earthquakes located by the Southern Kansas KCC/KGS Temporary Network in 2015. Yellow highlighting indicates SAS greater than 17, green indicates earthquakes also reported in the NEIC global earthquake bulletin (PDE), and blue indicates the earthquake with the largest magnitude detected by the KCC/KGS network.

Because of the length of the appendix it was not included in the January 2016 *Earthquake Highlights* report. The appendix may be accessed online at http://www.kgs.ku.edu/Geophysics/Earthquakes/Newsletter/EQ_Highlights_Issue_1_Jan2016_Appendix_A.pdf.