

Summary of Earthquake Activity in Arizona for 1988

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The trend of increasing earthquake activity in Arizona during 1987 continued through 1988 (Brumbaugh, 1988). Eighteen events with a local magnitude equal to or exceeding 2.0 ($M_L \geq 2.0$) were recorded in 16 locations. This higher level of activity was also accompanied by an increase of events of $M_L \geq 3.0$. The first and largest of these was on January 2 near Pipe Spring National Monument (Table 1). This event was registered as an M_L of 3.6 at the National Earthquake Information Center (NEIC) in Golden, Colo. This area in northwest Arizona near the Utah border has seen significant activity in the past, including the M_L 5.7 event at Fredonia in 1959. A second event occurred in this area on May 22 near Colorado City. This event was somewhat smaller, with an M_L of 3.13, recorded by the Arizona Earthquake Information Center (AEIC). On July 15 an M_L 3.15 event occurred on Black Mesa near the Peabody Coal Company strip mines. A similar event with an M_L of 3.0 occurred in this area on October 20, 1987. It may be that years of strip-mining activity are releasing stress in this normally aseismic area.

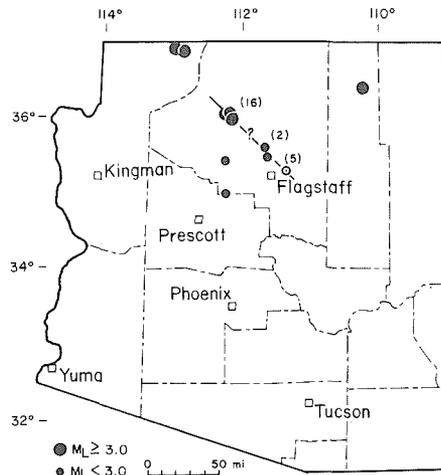


Figure 1. Earthquake activity in Arizona in 1988. Numbers in parentheses indicate number of earthquakes located by the AEIC in each area. Open circle with dot represents a swarm in January 1985 near Sunset Crater. Queried dashed line represents possible seismically active fault system.

Three events of $M_L \geq 3.0$ were part of a swarm of earthquakes that occurred September 6 to 11 near Grand Canyon Village at the South Rim of the canyon. Locations were determined for 16 events, the largest of which were felt at the village and at Phantom Ranch in the bottom of the canyon. Unsubstantiated

reports of landslide activity were also received accompanying the largest event on September 7. On September 10 and 11, the AEIC conducted an on-site survey with portable recorders. Nine of the 16 events were located during this survey and had calculated magnitudes of $M_L < 2.0$.

Other activity in the State included microearthquakes in the Perkinsville area (August 21) and north of San Francisco Mountain (February 13 and 14; Table 1).

The Grand Canyon swarm seems to be aligned along a northwest trend similar to that of several mapped surface faults in the area, such as the Phantom-Grandview system. The February events north of San Francisco Mountain and a swarm of events in 1985 near Sunset Crater also line up with the Grand Canyon swarm on a single northwest trend. This activity may represent a northwest-trending fault system that is not well exposed at the surface (Figure 1).

Reference

- Brumbaugh, D.S., 1988, Arizona Earthquake Information Center, 1987 progress report: Arizona Bureau of Geology and Mineral Technology Fieldnotes, v. 18, no. 1, p. 6-7.

Table 1. Arizona earthquakes ($M_L \geq 2.0$) detected in 1988 by the AEIC network.

Date	Latitude	Longitude	Depth (km)	Origin Time (UTC)*	M_L **	Epicenter
1-2	36.890° N	112.900° W	1(?)	23:10:51	3.6	Pipe Spring
2-13	35.602° N	111.641° W	3	08:29:53	2.2	San Francisco Mtn.
2-13	35.592° N	111.657° W	1	17:58:12	2.2	San Francisco Mtn.
2-14	35.488° N	111.628° W	13	07:39:49	2.9	San Francisco Mtn.
4-11	57 km from Flagstaff		--	17:34:09	--	?
5-22	36.943° N	112.973° W	17	19:22:47	3.1	Colorado City
6-1	115 km from Flagstaff		--	08:31:58	2.8	?
7-15	36.440° N	110.270° W	1	00:38:10	3.2	Black Mesa
8-21	34.989° N	112.221° W	31	23:24:03	2.6	Perkinsville
9-6	36.031° N	112.174° W	9.5	09:44:00	3.0	S. Rim, Grand Cyn.
9-6	36.002° N	112.196° W	6.8	14:41:26	2.8	S. Rim, Grand Cyn.
9-7	36.007° N	112.142° W	11.7	01:17:40	3.1	S. Rim, Grand Cyn.
9-7	36.021° N	112.199° W	4	01:23:25	2.3	S. Rim, Grand Cyn.
9-7	36.027° N	112.191° W	6.4	03:22:07	3.0	S. Rim, Grand Cyn.
9-7	36.019° N	112.149° W	5	04:15:47	2.1	S. Rim, Grand Cyn.
9-8	35.986° N	112.099° W	5	09:04:08	2.0	S. Rim, Grand Cyn.
10-3	35.426° N	112.245° W	4.1	02:02:50	2.0	north of Williams
10-3	36.021° N	112.199° W	5	15:14:12	2.5	S. Rim, Grand Cyn.

* UTC = Universal Time Coordinated
** M_L = Local magnitude

STAFF NOTES

Larry D. Fellows gave a talk on the geologic aspects of radon in Arizona to the Society of Mining Engineers meeting, held in Las Vegas from February 27 to March 2.

Thomas G. McGarvin gave a talk, titled *What the Rocks Can Tell Us: A Geological History of Arizona*, to 25 persons at the Arizona Historical Society in Tucson on March 1.

Stephen J. Reynolds led a field trip February 9-15 to the Buckskin, Vulture, and South Mountains for faculty members and graduate students from Arizona State University and from Monash and La Trobe Universities in Melbourne, Australia.

Jon E. Spencer coauthored an article, titled *Role of Crustal Flexure in Initiation of Low-Angle Normal Faults and Implications for Structural Evolution of the Basin and Range Province*, which was published in the February issue (v. 94) of the *Journal of Geophysical Research*.

Pamelia J. West joined the Arizona Geological Survey on March 15 as a clerical assistant. She has worked for Tucson Medical Center, Sun Tran, and Pima Community College and is working on a B.A. in secretarial sciences.