

S
14.65
Geo 4
C.2

ILLINOIS GEOLOGICAL
SURVEY LIBRARY

ILLINOIS STATE GEOLOGICAL SURVEY
Urbana, Illinois 61801

GEOGRAM 4
October 1975



WHEN THE EARTH SHAKES IN ILLINOIS

Myrna M. Killey

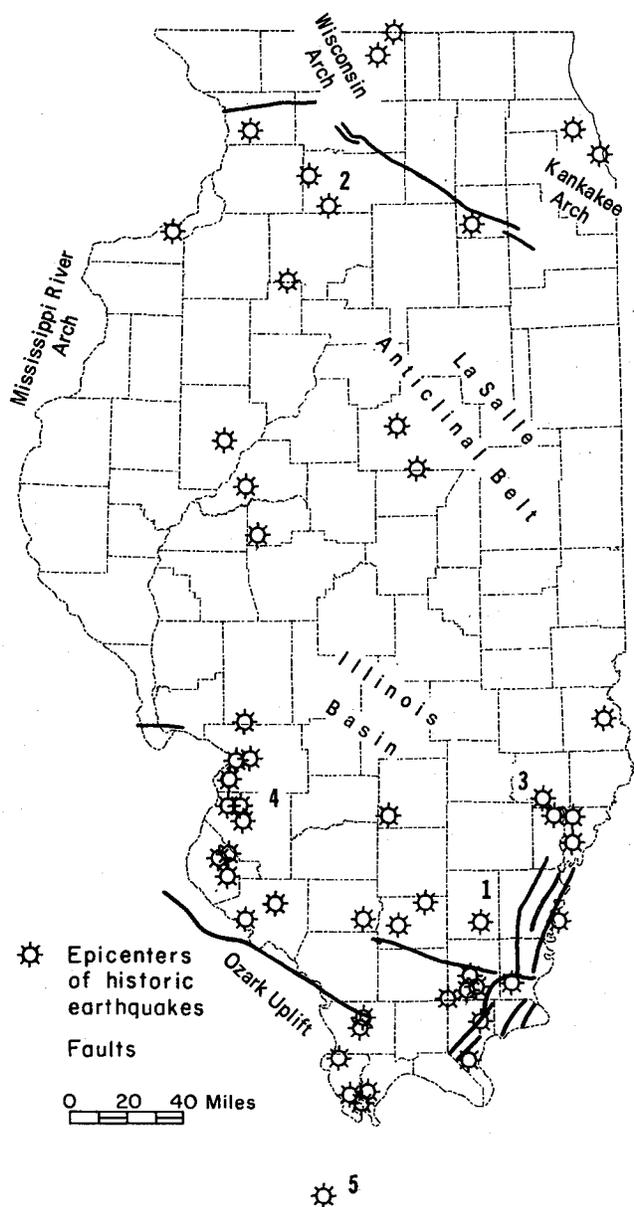
From time to time people in Illinois have reported feeling the earth shake. They may have heard rumbling noises like those made by heavy trucks passing by or have seen various objects mysteriously moving about—pictures swinging on the walls, dishes dancing on shelves, or parked cars rocking. People recognize these shakings as earthquakes and may wonder why earthquakes occur in Illinois.

The answer to that question is a complicated one. Essentially, earthquakes result from the build-up of great stresses in various parts of the earth. These stresses take the form of pulling, pushing, and shearing forces. Why such stresses build up is still not clearly understood and is the subject of much study and discussion among geologists and geophysicists. However, it is generally believed that these forces stretch the rocks and finally cause them to break. The breaks are called *faults* when the blocks of rock on either side of the break are displaced in relation to each other. In Illinois, the amount of displacement along faults observed in rocks near the surface is from a few inches to more than 3,000 feet. The faulting relieves the stress in the rocks and is the immediate cause of earthquakes. Sometimes faulting takes place at the earth's surface, but more often it occurs at great depth and cannot be seen on the land surface. In either case, faulting occurs where the rocks are weakest and offer the least resistance to stress. By noting places where faults can be seen at the surface and where long arches (*anticlines*) and troughs (*synclines*) occur in the rocks near the surface, geologists can pinpoint past zones of weakness in the rocks. These zones are the most likely places for future earthquakes to take place. They may extend for hundreds of miles.

When faulting takes place, the great amount of strain that had built up in the rocks is released suddenly and a series of vibrations, called seismic waves, radiates away from the fault. Although the release of stress is sudden, shaking may occur for some distance and has been known to last for hours. The nature of the rocks and the complicated paths along which seismic waves travel determine the extent and duration of the shaking.

The point at which faulting starts and from which seismic-wave energy radiates is called the *focus* of an earthquake. The *epicenter* is the point on the earth's surface directly above the focus. The map (turn page) shows epicenters of earthquakes that have occurred during historical times in Illinois. It also shows some geologic structures that indicate possible zones of weakness in rocks near the land surface.

You may remember some of the more recent earth tremors in Illinois. On the morning of November 9, 1968, an earthquake, centered near Broughton (1 on map) in Hamilton County, shook a large area of the central and southeastern United States. A less powerful quake was felt over a seven-state area in the central United States shortly after midnight on September 15, 1972. It was centered just south of Amboy in Lee County (2 on map) in northern Illinois. A third quake, felt



at 6 o'clock on April 3, 1974, was centered near Olney in Richland County (3 on map). Still another quake occurred early in the morning of June 5, 1974, in the Belleville area near St. Louis (4 on map).

As alarming as these quakes might have been, they by no means compare with the series of earthquakes that shook Illinois and the central United States from December 1811 through February 1812. The area around New Madrid, Missouri (5 on map), just south of Illinois along the Mississippi River, was the site of three consecutive quakes, each much larger than any other recorded earthquake in Illinois. A repeat of such events today would cause great loss of property and, possibly, life.

At the present time, geologists are working to find ways to predict when, where, and how large any future earthquakes will be. This information is vitally important to engineers, architects, and planners who design and build homes, hospitals, highways, dams, office buildings, factories, and other important structures. Although we cannot yet predict when and where the next earthquake will occur in Illinois, we can design structures to withstand the damaging effects of the earthquakes.