

Earthquakes

This exercise was adapted from one created by Professor Tom Freeman of the University of Missouri-Columbia (Freeman, 1996).

1. From Figure 12-5 on the information sheet, determine the distance from the earthquake to a seismograph station that received the P and S waves 5.0 minutes apart:

_____ km

2. Using the nomogram in Figure 12-8, determine the earthquake magnitude for the three earthquakes listed below (A, B, and Q).

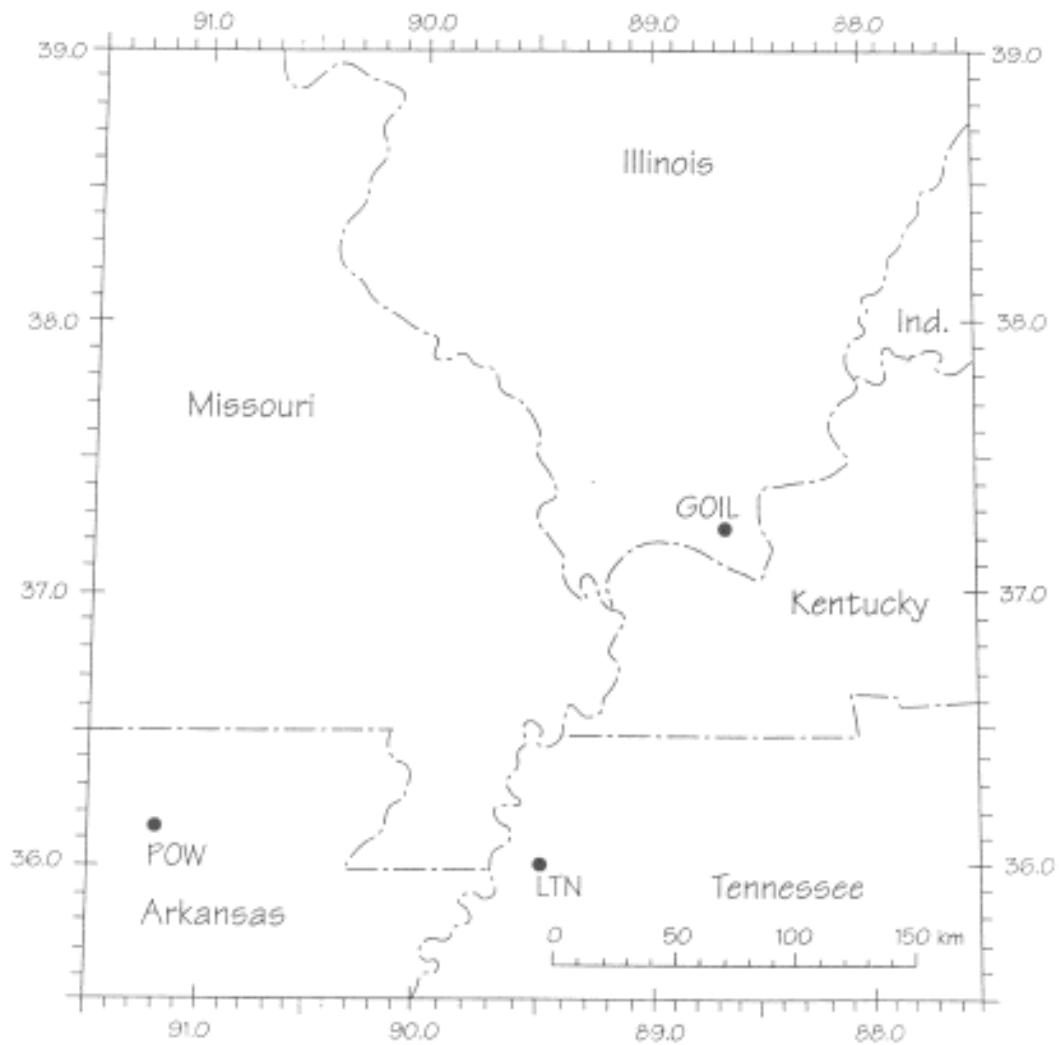
Earthquake	S-P Difference in Arrival Times	Amplitude of Deflection	Earthquake Magnitude
A	8 seconds	20 mm	
B	8 seconds	0.2 mm	
C	6 seconds	10 mm	

3. Use the three seismograms from the earthquake information sheet for a magnitude 3.0 earthquake that occurred in the Missouri region around 3:46 AM on June 19, 1987. Use these seismograms and the arrival time graph below it to complete the following table. This information was provided by Professor Brian J. Mitchell of Saint Louis University.

location	P arrival time (hours:minutes:seconds.tenths of seconds)	S arrival time (hr:min:sec.1/10 sec)	Difference in P & S arrivals (seconds.tenths of seconds)	Distance in kilometers
LTN				
GOIL				
POW				

4. Use the distances from the table above with Figure 12-9 below to determine the location of

the 1987 earthquake. Refer back to the earthquake information sheet of this exercise if you need



to review the method for determining earthquake locations.

Figure 12-9 is a map of the New Madrid seismic zone, showing three of the seismograph stations in the region: Powhatan, Arkansas (POW); Lennox, Tennessee (LTN); and Rosebud, Illinois (GOIL). Figure 12-9. Map of the New Madrid seismic zone showing three of the many seismograph stations in the region. Degrees north latitude and degrees west longitude are shown along the margins. Subdivisions of degrees are in tenths of a degree rather than in minutes.