



CALIFORNIA STATE SCIENCE FAIR 2005 PROJECT SUMMARY

Name(s) Rachel E. Schmidt	Project Number J0630
Project Title Locating Epicenters	
Objectives/Goals To determine the location of earthquakes by using the time differential for P and S waves.	
Abstract Methods/Materials A. Locate the Stations: 1)I Looked at USGS Web site to see the 21 stations that report seismogram data; 2)The Berkeley Seismograph Network has precise coordinates for all of the stations; 3)The station coordinates were entered into Topozone. The location of the station was shown by a red target; 4)Stations were plotted on a 1:500,000 series map; 5)To locate the stations I would locate points on the Topozone map and then find them on my actual map. Some of these points were: highways and roads, mountain peaks, rivers, county lines, parks, cities and towns. B. Locating the Epicenter: 1)I collected seismograms for earthquake events from Nov 1, 2004 to Jan 18, 2005. Data was retrieved from the USGS Northern California Seismic Network; 2)I determined the time difference between the P waves and S waves using the times scale at the bottom of each seismogram. P waves travel at 7 km per second, S waves travel at 4 km per second, so the difference is 3 km per second; 3)I converted the time difference into km using (time difference x 3 = distance an epicenter is from a station); 4)Using a piece of wire, a pushpin and a sharp pencil, I drew a circle around the station at the distance determined; 5)I repeated the steps to get a location where three circles intersected; the earthquake's epicenter.	
Results Out of the seismograph data for the 5 incidents, one came up with a good location, two came up with location where the epicenter could be estimated within 30km, and 2 had no 3-way intersections	
Conclusions/Discussion Though it was easy to see when a P wave started, it was not always easy to find the spike or pulse that usually shows the beginning of the S wave. Reflection and refraction can produce false S wave spikes. During my visit to the USGS, Lynn Dietz, a geophysicist, explained how determining the time distance in most cases can only be accomplished accurately using some of the tools that they have that allow the time to be stretched out, or can increase or decrease the amplitude of the waveform. To determine the time differentials of P and S waves using the seismograms, Lynn suggested I use only big events. Many smaller events could not be located using this technique because the S wave could not be identified on most of the seismograms.	
Summary Statement The purpose of this project was to determine the location of earthquakes by using the time differential for P waves and S waves.	
Help Received Lynn Diets, USGS, gave me a tour of the USGS and showed me how to interpret P waves and S waves. Father helped me collect data. Mom edited report. My teacher,Shama Hinard,helped guide me through my research.	