CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Aiden J. Aceves

Project Number
J0601

Project Title
From the Moon to the Earth: Does Our Nearest Neighbor Have Any Effect on Seismic Activity?

Abstract

Objectives/Goals
Earthquakes are naturally occurring phenomena that occur throughout the world with regularity. There is more than one mechanism for the generation of earthquakes, though the majority result from a build up of pressure between the major tectonic plates. The objective of my experiment is to survey earthquake records (a.k.a. catalogs) and search for correlations between earthquakes and lunar phenomena, such as distance, phase and the angle of the moon in relationship to an earthquakes epicenter.

Methods/Materials
Using the NOAA and USGS PDE earthquake catalogs I compared earthquake data with various lunar statistics such as distance, phase and physical geometry searching for patterns and correlations. I used computer programs such as Excel and Basic programming language to facilitate my study.

Results
My work found no relationship between earthquake magnitudes or frequency and lunar distance. However, my analysis shows that there may be a correlation between lunar angle (moon phase) and the location and frequency of magnitude 8.0 or greater earthquakes. As lunar position correlates with ocean tides, so too may there be a correlation between the moons position to the earth and earthquake location. My work also demonstrates that, for earthquakes magnitude 8.0 and greater, a disproportionate number occurred in early morning hours between 4 and 6 AM.

Conclusions/Discussion
My results showed no correlation between earthquakes and lunar distance. The possible relationship between lunar angle, time of day, and earthquake frequency shown by my results is not overwhelmingly strong. More time and effort needs to be applied with consideration of the inclusion of more (smaller magnitude) earthquakes in future trials. Future research should also look at seismically active locales and their earthquake correlations with lunar variables.

Summary Statement
The objective of my experiment is to survey earthquake records (a.k.a. catalogs) and search for correlations between earthquakes and lunar phenomena.

Help Received

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Brian B. Austin

Project Number
J0602

Project Title
Earth Cubed

Abstract

Objectives/Goals
To theorize what weather and climate would be like on a cubical earth.

Methods/Materials
Materials: A globe, a self-made cube,one-half a softball, gfood-coloring, a pencil, a plastic grid, use of an overhead.

Results
Theoritical conclusions

Conclusions/Discussion
Temperature on the surface would dramatically change as would wind patterns.

Summary Statement
My project is about theorizing what would happen to weather and climate on a cubical earth

Help Received
My father helped by making available an overhead projector and he sawed a softball in half.

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Jena Bailey; Erin Page

Project Number
J0603

Project Title
Using Lichenometry to Date Past Earthquakes

Abstract

Objectives/Goals
The objective of this project was to determine the accuracy of using lichenometry to find the dates of past earthquakes. As a result of the seismic shaking that takes place during earthquakes, rockfalls occur and fresh rock surfaces are exposed. Lichens colonize on fresh rock surfaces and, with the formulas that lichenometrists have created regarding the growth rates of specific lichen types, the age of the lichens and thus the age of the substrate can be determined. We hypothesized that after measuring Rhizocarpon lichens in three areas that experienced seismic shaking during the 1857 Fort Tejon earthquake, we would find that on average these lichens would be 147 years old, meaning we were successful in using the lichenometric method to find the accurate date of a past earthquake.

Methods/Materials
We first located three sites that experienced seismic shaking during the 1857 Fort Tejon earthquake and had microclimates that favored lichens. At each of these three sites, using the Fixed Area Largest Lichen method (meaning we only recorded the largest lichen on each rock), we measured as many crustose lichens as possible (preferably Rhizocarpon) and recorded the size of each lichen's longest axis. We then found the ages of these lichens using the average amount in milimeters that Rhizocarpon lichens grow per century.

Results
We determined that the expected size of lichens resulting from the 1857 Fort Tejon earthquake is 22.2 mm. Approximately 17% of the 85 lichens we measured at our third site were between 21 and 23mm. THis means that 17% of the lichens we found at this site were a result of the Fort Tejon earthquake which occurred 147 years ago.

Conclusions/Discussion
The results from the third site supported our hypothsis; although the lichens we measured at our first two sites did not have a strong correlation with the 1857 Fort Tejon earthquake, 14 our of 85 lichens at our third site did. We were not able to classify 84 out of the 85 lichens we measured at this site (we were able to classify the last lichen we measured as Rhizocarpon); however, we knew they were crustose lichens, and many times the growth rates of one type of crustose lichen are similar to the growth rates of another type of crustose lichen.

Summary Statement
Our project is about using the sizes of lichens growing in sites that experienced seismic shaking during the 1857 Fort Tejon earthquake to find the age of the substrate and thus date back to this earthquake.

Help Received
Geologist advised us and recommended specific lichen sites via e-mail; Erin's mother helped with the lichen age calculations and statistical analysis; geologist explained the Chi-squared Goodness-of Fit Test; Jena's father supervised lichen measuring.

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Madison V. Davis

Project Number
J0604

Project Title
The Weather Outside Is Frightful

Abstract

Objectives/Goals
The objective of this project is to determine if microclimates occur in the city of Brisbane and if the topography of the mountain causes these microclimates to occur. Brisbane is confined on the northeastern slope of San Bruno Mountain with a geographic boundary of about 2 miles.

Methods/Materials
I selected six sites in which to collect my data, which were divided into two grids. The sites represent a variety of altitudes and locations in proximity to the mountain and the nearby San Francisco Bay. These sites are within a radius zone of about 1-2 miles. I conducted my experiment by measuring barometric pressure, wind speed, and temperature for fifteen days at 8:00am and at 3:00pm each day. The data was added and averages were calculated for each site in each category.

Results
Microclimates do exist in Brisbane. Sometimes the temperature would vary from 2-10 degrees between sites and the wind speed would vary from 0-20 mph between sites. The location closest to the mountain was shielded by the wind but cast in its shadow, and the locations further away were windier but had warmer temperatuures The results of the warmest, coldest, windiest and calmest location varied slightly from my prediction.

Conclusions/Discussion
My conclusion is that the topography of the mountain creates microclimates within the city of Brisbane. I learned that our town is located on an amazing mountain with a variety of climates in a very small geographic area.

Summary Statement
The purpose of my project is to determine if microclimates exist in Brisbane and if the topography of the mountain creates these microclimates.

Help Received
My mother drove me to my selected sites to record data. Bob Dettmer, the volunteer science adviser, gave me advice on my project. Tim Tune from the planning department supplied me with topographical maps.

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Michael J. Fisher

Project Number
J0605

Project Title
Catch a Falling Star

Abstract

Objectives/Goals
To investiagate methods of collection and identifying micrometeorites.
To discover where micrometeorites collect the most; on a rooftop, a treetop, or on the ground.

Methods/Materials
Place collection pans outside on a rooftop and ground site, leaving the plant on the rooftop area. (To simulate the collection of micrometeorites on treetops) Collect the pans and plant after they have been left outside for 24 hours. Rinse down the sides of the Teflon coated pans with denatured alcohol. Move a filter paper coated magnet through the alcohol in the pan and collect metal particles that are magnetic. (All micrometeorites are magnetic, and by performing this procedure, there will be less debris to look through to discover the micrometeorites.) Allow the filter paper time to dry. and cut it up into a size that will fit on a microscope slide. Carefully examine the filter paper at 100x and 400x powers under the microscope. Identify any micrometeorites and other forms of debris left in the paper. The micrometeorites are identifiable by their perfectly spherical shape. Notice and record the other debris left on the filter paper, to discover what percentage of the metallic particles were really micrometeorites. Repeat the entire process 5 times for each of the three testing sites. Compare the results.

Results
The ground testing site collected the most amount of particles of the three testing sites

Conclusions/Discussion
The ground site collected the largest amount of micrometeorites because it had more sources for the particles to come from. I believe that the micrometeorites cascaded off the drip line of a large oak tree, into the ground site pan. Also, the micrometeorites fell off of the slant of my house, into the pan. The tree and the house acted like a funnel, sending all of the micrometeorites that they collected onto the ground testing site. I was surprised to see that the tree and the house together made a larger collection area for the pan on the ground, instead of blocking the ground site, as I had hypothesized.

Summary Statement
This project compared different locations for collecting micrometeorites.

Help Received
My dad instructed me on how to use the microscope, which was loaned to me by my school science department.

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Garen Gevorkian

Project Number
J0606

Project Title
Darcy's Law and Underground Water Flow

Abstract

Objectives/Goals
The purpose of my project is to calculate the flow rate of underground water using Darcy's formula. I also want to find the relation between the flow rate and head difference, and length of the flow path.

Methods/Materials
I made an apparatus using two bottles to simulate the underground water flow path. I used one bottle for inlet and one for outlet. I filled inlet with sand. Put the inlet underneath a faucet with the water running for the whole duration of experiment to maintain a constant water level and pressure in the inlet.(15 minutes each experiment). By moving the outlet's position up and down, I made head differences and calculate flow rate (Q). In second set of experiments I changed flow path length by changing the length of the sand filled in the inlet bottle, and calculated (Q).
I used Darcy's formula $Q = K.A.(h2-h1)/L$ to calculate the flow rate.
h1: inlet head h2: outlet head A: cross sectional Area
K: permeability coefficient

Results
I learned that Darcy's law does not work with turbulent flow of water,it applies only to calm water. I learned from my experiments that the relation between head difference and flow rate is linear, and flow rate is inversely related to length of flow path.

Conclusions/Discussion
Through the research I learned that Darcy's Law has other applications. The formula could be used in petroleum industry to calculate the flow rate of underground petroleum.

Summary Statement
Calculate the flow rate of underground water using Darcy's formula.

Help Received
My Dad helped me to build the apparatus, and my Uncle provided me resources (books) for my research.

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Marie E. Jenkins

Project Number
J0607

Project Title
Factors that Affect the Transfer of Force through Saturated Soil

Abstract

Objectives/Goals
The purpose of my project was to determine what effect additives have on the transfer of weight through saturated soil. The reason I performed this investigation was to try to establish if the effects of liquefaction can be prevented or lessened by adding elements to the soil.

Methods/Materials
I utilized a 3 foot long by 10 inch in diameter PVC pipe with four holes drilled into it vertically. I filled the pipe with soil (sandy loam) and different additives: bark, dried leaves, polymers, and styrofoam popcorn. I saturated the soil with water as I filled the pipe and inserted wooden dowels into the holes at the four various levels. Weights were added to the top. After waiting an hour for the soil to settle, I hit the pipe evenly around all surfaces to simulate the shaking of an earthquake. I then pulled the dowels out with a force measuring device and determined if the added elements helped to prevent compaction.

Results
The wet soil control with no additives resulted in the weights sinking 5 inches below the top edge of the pipe. None of the dowels could be removed because of the severe compaction. The bark additive trial resulted in the weights sinking 2 inches below the top. Only the bottom dowel could be removed. The dried leaves trial was similar to the bark trial. The styrofoam trial was slightly better in that the weights sank only 1 1/2 inches approximately, but still only the bottom dowel could be removed. The polymers proved to be most effective. The bottom 2 dowels could be removed, and the top weight sank only 1 inch below the edge of the pipe.

Conclusions/Discussion
It was clear from my experimental control results that water definitely made the soil unstable. The addition of the weights and the simulated earthquake shaking clearly demonstrated the effects of liquefaction when the weights sank down into the pipe. However, the additives did seem to lessen the effects of liquefaction. The polymers in particular helped to prevent soil compaction. My data suggests that the addition of polymer type materials to soil in earthquake-prone areas could lessen the devastating effects of liquefaction.

Summary Statement
The purpose of my project is to determine if the effects of liquefaction can be prevented or lessened by adding elements to saturated soil.

Help Received
Mother helped to type report and format graphs. Work colleagues of my mother helped to analyze soil types and prepare the PVC pipe.

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Patrick W. McCracken

Project Number
J0608

Project Title
Soil Liquefaction: Comparing Various Soils and Amount of Water Necessary to Compromise the Integrity of the Foundation

Abstract

Objectives/Goals
I want to find which soil foundation can withstain the most water before liquifaction occurs.

Methods/Materials
I am going use 4 different types of soils. Sand, Clay, Loam, and Valley Soil. I am going to put these soils into a 7 inch container. I will then add 3and a half inch block builiding onto the top of the soil. I then added 4oz of water into the soil. For every minute of passing time that the building did not show any indication of movement, I added two more ounces of water. For every three minutes, I added 3 oz of weight to the building. I recored any movement of the building. This would indicate when liquifaction occured.

Results
Sand lasted the longest. 14.9 minutes before liquifaction occured.
Loam lasted 9.2 minutes before liquifaction occued
Clay lasted 2.5 minutes
valley Soil lasted 2.2 minutes

Conclusions/Discussion
My experiment allowed me to see which soil stayed stable the longest. Sand did surprinsingly well. It took the longest to liquify. I learned that sand would be stable in keeping buildings stable when the soil is subjected to large amounts of water due to earthquakes in regions such as coastal areas.

Summary Statement
Finding when liquifaction occurs in different types of soil, and which soil will remain stable in this event.

Help Received
Dad helped set up project.

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Jordan Lachelle Mead

Project Number
J0609

Project Title
Does Particle Size Affect Settling Rates and Turbidity?

Abstract

Objectives/Goals
To understand and observe the effect particle size of soil samples has on the settling rates and the turbidity of water. Why are some lakes and streams clearer than others?

Methods/Materials
Twelve two-liter old soda bottles were filled with the same amount of water and labeled. Three soil samples from four different areas and soil types were collected and equal amounts of all were measured. The measured samples of soil were funneled into the two-liter soda bottles and shook up well. The bottles were left undisturbed and turbidity was described and recorded daily by observation and description. At the end of one week, layers of sediment could be observed and measured and particle size described and noted.

Results
Results of turbidity showed the soil samples which contained the most of the smallest size particles of silt had the greatest turbidity (cloudiness). Results of sediment rates showed the biggest particle size of sand to be on the bottom layer having the fastest settling rate.

Conclusions/Discussion
My conclusion is particle size does have an effect on settling rates and turbidity. The greater the amount of silt in the samples the greater the turbidity. The larger the particles size the faster the settling rate. The sand was always on the bottom and the silt was always on the top.

Summary Statement
To simulate and observe what effect particle size of soil samples has on settling rates and turbidity of water.

Help Received
My mom took the pictures of me and helped with my research.

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Travis R. Meyer

Project Number
J0610

Project Title
Factors that Affect Soil Conductivity for Use in Measuring Water Content

Abstract

Objectives/Goals
My objective was to determine if it was reasonable to use electric conductivity as a measure of soil water content for use in watering plants.

Methods/Materials
Eight insulated trays were set up, and laid down with two wires were spaced equally spaced apart in each. A large quantity of dirt was prepared by mixing soil to homogenize the soil. Plain dirt was put it in two sample trays, then some mixed with sand and that was put in two trays, then the same with wood chippings and with potting soil. A cup of water was added to one of each kind of soil mix. The conductivity was measured, one sample soil mixture serving as a reference for the soil type. Sampling was first conducted every half hour, then hour, and then two hours and so on they were measured. The time of measuring totaled over 180 hours.

Results
It was found that after the water was added, the conductivity went up, and then for all of the samples but one, kept rising over a few hours. It became apparent ions were being dissolved into the water, making it easier for the electric current to travel through. The base conductivity and the change in the conductivity are dependent upon the quantity of dissolving salts, and the permeability of the soil.

Conclusions/Discussion
In conclusion, it is possible are able to measure the water content indirectly to know when to water it. However, the soil properties differ which makes it necessary to establish a baseline by another method.

Summary Statement
Using a soil's conductivity to find out how much water is in it.

Help Received
Father helped getting experimental supplies; Mother helped getting board supplies.; Specialist advised on chemistry.

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Adam G. Mussell

Project Number
J0611

Project Title
Liquefaction in Action: A Tale of Two Bays

Abstract

Objectives/Goals
The purpose of this project is to find out which areas in the Monterey and San Francisco Bays are most dangerous during an earthquake (the danger being due to liquefaction, the process by which loose, sandy soils lose their stability and turn to liquid during an earthquake). I inquired as to which soils from Monterey and San Francisco Bays would turn to liquids the easiest, and how do their soil compositions differ.I thought San Francisco would be the most susceptible to liquefaction.

Methods/Materials
To test my hypothesis, I took a total of 26 samples from both bays, and shook them on a shake table. I used a brick with a ruler to measure the depth that a #building# that size would sink, and used that to gauge the susceptibility (to liquefaction) of the soil. The one with the most sinkage would be the most susceptible. I also subjected my soils to a uniformity test, because fine, uniform soils tend to liquefy more easily.

Results
Soils in San Francisco Bay consistently caused the brick to sink 4 to 5 cm when water was added to the soil, whereas, in Monterey Bay soils, the sinkage varied from 0 to 5 cm, coming to a lower average than San Francisco Bay soils.

Conclusions/Discussion
I eventually figured out that my hypothesis was correct: soils from San Francisco Bay, particularly the Marina District, are the most susceptible to liquefaction, and generally fairly uniform. Past incidents have shown ample evidence for the danger of liquefaction, such as the 6 billion dollar property cost of the Loma Prieta quake in 1989, and various collapsing bridges around both bay areas. The data suggests that it is more dangerous to build in San Francisco, primarily in the San Francisco Marina.

Summary Statement
My project compares the soils from San Francisco and Monterey Bays and tests them for liquefaction potential to determine which area is more dangerous during an earthquake.

Help Received
Weber and Associates Engineers company gave vials for uniformity test, Parents helped gather samples, mom helped with shake test data gathering.

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Daniel P. Phene

Project Number
J0612

Project Title
How Does Soil Texture Affect Infiltration?

Abstract

Objectives/Goals
My goal was to learn the infiltration rates of a wide range of soils. I wanted to find out what types of soils would be best for farming.

Methods/Materials
Materials: 9 soil samples, Marriote` Bottle, stopwatch, backup stopwatch, water, soil container (0.6 cubic feet), 250 ml beaker. Methods: Make a constant head with Marriote` bottle device, calibrate device so that the visual tube will be in mm of water applied to the soil, collect soil samples, dry, roll, and sieve soil samples (3 soil types and 3 samples of each), pack soil tank with one of the types of soils, fill Marriote` bottle with water, start applying water to soil and time application of each mm of water and record times, make a graph of the infiltration rate of water versus time; this represents the infiltration of water in the soil sample, repeat procedure steps 5 - 8 for each soil sample and each soil, collect data, analyze results, draw a conclusion, and communicate results.

Results
The data shows that the larger the soil particles, as in the Indio Sand, the faster the infiltration rate. The one exception is in the 1st run with the Hanford Sandy Loam, which was not properly packed. When the soil was not properly packed, it had a very fast infiltration rate. The Indio Sand was somewhat inconsistent in the beginning of each run. This most likely happened because larger soil particles often have a wider range of size and so it had a variable infiltration rate. Towards the end of the first run on the Indio Sand, the infiltration rate went down really fast. At the very end of the run though, it turned out to be similar to the rest of the Indio Sands. Thus at the end of each run on the Indio Sand, the results were similar.

Conclusions/Discussion
The resuts show that the soils definitely varied in infiltration rates. Th clay had the slowest infiltration rate, then the fine sandy loam, and the sand had the fastest infiltration rate. Therefore, the larger particles had a faster infiltration rate.

Summary Statement
My project tests the infiltration of 3 types of soils.

Help Received
Mother and father helped with Marriote` Bottle

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Jaskeerit K. Purewal

Project Number
J0613

Project Title
What from Space?

Abstract

Objectives/Goals
The objective of my experiment is to ascertain which method of collecting extraterrestrial particles called micrometeorites is more effective. In my experiment I concentrated on two methods, roof and bucket method and the tarp method. I believe that using a tarp will be a better method of collecting micrometeorites than the roof and bucket method.

Methods/Materials
To begin my experiment I built a raised perimeter around the tarp in order to help prevent the particle from getting blown away, and fastened down the tarp with stakes. I then washed my roof thoroughly and placed a bucket with a magnet in it at the base of the gutter. At the completion of 2 weeks I went outdoors and inspected the tarp carefully and ran a magnet over the surface in order to collect iron filings, and did the same with the bucket beneath the gutter. By inspecting the iron filings under the microscope, and calculating the amount of micrometeorites collected per square foot I was able to draw a conclusion as to the efficacy of each system.

Results
Results showed that in both tests the gutter and bucket method accumulated more micrometeorites than the tarp method. When I calculated the micrometeorites collected per square foot I found that the gutter had 0.01301 micrometeorites per sq. ft. and the tarp had 0.00322 micrometeorites per sq. ft.

Conclusions/Discussion
My conclusion is that the roof and bucket method of collecting micrometeorites was more effective than the tarp method. These results were derived from conducting two tests. Both in number and in micrometeorites per square foot the roof and bucket method proved to be a more effective and efficient method of collection of these extraterrestrial particles. Further tests and data are being compiled to substantiate the conclusion that I arrived at.

Summary Statement
My project is about which method of collecting micrometeorites is most effective.

Help Received
Father helped wash roof; Mother helped assemble board; Science Advisor for the help and guidance

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Kyle R. Rothschild-Mancinelli

Project Number
J0614

Project Title
Ground-Truthing THEMIS Using Infrared Readings

Abstract

Objectives/Goals
The objectve was to ground-truth THEMIS an infrared spectrometer on the Mars orbiter Odyssey. To see if you could find out the size and composition of rocks using thermal inertia.

Methods/Materials
I choose 12 different kinds of rocks for the study. I then took 10 readings with a infrared thermomiter for each rock in the field. Then I took on bag home of each kind of rock to test the thermal inertia. I then put a little bit of each kind of rock in a plastic contanier a put it in the freezer over night. The next morning I took the rocks out and took five readings of each rock every 15 minutes to deturmine the thermal inertia. I then repeated that exparament for an oven to test the thermal inertia of the cooling down of rocks.

Results
The size had a major part in determining the thermal inertia. The smaller the rock the the less thermal inertia it had. compositon also made a little bit of difference.

Conclusions/Discussion
On the basis of my results i found out that THEMIS is trust worthy, But THEMIS was looking at bigger ranges of the sizes of rocks.

Summary Statement
To test the thermal inertia of different kinds of rocks to tell if THEMIS's approach was based on solid work.

Help Received
Mother helped buy the infrared thermometer and to design the project.

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Todd K. Sakamoto

Project Number
J0615

Project Title
Determining the Effects of Soil Additives on Soil Stability: Three-Year Study

Abstract

Objectives/Goals
My project's goal was to determine if soil additives better stabilizes a building when it is shaken. My hypothesis stated that sand (base soil) combined with stones would work best.

Methods/Materials
I used two different apparatuses for my experiment. The first dropped the iron rod into the bucket tht contained the soil. It was made out of 2 2x2 plywood boards and spaced by 4 4-foot wood dowels. The iron rod was inserted into a PVC pipe thatdropped it into the bucket. The next apparatus was a shaker table. I used 2 2x2 plywood boards that had 8 springs in between the boards. I used a protractor to measure the amount of force. I started the test at 3 degrees, then went ot 5 degrees if it didn't tip over, and then increased by 5 degrees until it tips over. The test variables that I am using are sand combined with fertilizer, stones, mulch, pumice, potting soil, and sand by itself. First I tested each with the soil additive on the top, then on the bottom, and finally I mixed the two together. I tested each variable 7 times.

Results
The sand combined with the fertilizer worked the best for all of different layerings. It averaged 17.14 degrees of force with it on top, 15.72 degrees of force with it on the bottom, and 12.86 degrees of force with the two combined.

Conclusions/Discussion
The results didn't support my hypothesis and if you were to add a soil additive to a foundation, fertilizer would work best.

Summary Statement
My project is about how soil additives affect a building's soil stability.

Help Received
Uncle let me borrow supplies

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Garrett E. Shepherd

Project Number
J0616

Project Title
Does the pH in the Water of the Kings River Change As It Travels Down Its Course?

Abstract

Objectives/Goals
My objective is to find out if water in the Kings River becomes more acidic or more basic as it flows. I believe the water will become more basic.

Methods/Materials
I took 8 ounce bottles and collected water from different areas of the Kings River. I tested the water with a pH meter.

Results
The water became more basic as it traveled down its course.

Conclusions/Discussion
My conclusion is that water in the Kings River becomes more basic as it travels down its course.

Summary Statement
Determining the change in the pH of the water in the Kings River as it travels through its course.

Help Received
Father helped with collecting water samples and borrowing a pH meter.

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Emily C. Small

Project Number
J0617

Project Title
Can Earthquakes Be Predicted by Lost Pet Ads?

Abstract

Objectives/Goals
The purpose of my project is to determine whether or not pets will run away before earthquakes. If this is true, we will be able to predict when an earthquake is about to occur.

Methods/Materials
I tested my hypothesis by randomly picking thirty different dates, twenty random, and ten days that 4.1 magnitude earthquakes occurred in the San Francisco area. I then looked in the classified section of the San Francisco Chronicle for lost pet advertisements on the selected dates. Then I counted the ads, recorded the data, and graphed it.

Results
Over all, the larger percentage of lost pet ads were on earthquake dates. I started by testing only ten earthquake dates, but the results were so close, it was extremely difficult to reach a conclusion. I decided to expand my testing to see if I could get some more definite results. I picked 10 more earthquake dates between 1980 and 1989 with a magnitude of 4.1 or higher. My further investigation on the predictions of earthquakes by lost pet advertisements indicated that pets do sense earthquakes and then run away.

Conclusions/Discussion
After completing my project, I found that my hypothesis was correct. My hypothesis stated that there will be more lost pet advertisements on an earthquake date than on random control dates. I expected that there would be more pet advertisements on earthquake dates because I thought that pets would be more likely to run away prior to an earthquake. What I found after increasing my testing was that on average, the number of lost pet ads were higher than on the control dates.

Summary Statement
Do pets sense earthquakes and run away before they happen.

Help Received
Dad helped me make graphs, find information and taught me to use the microfilm reader.

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Ariel V. Stone

Project Number
J0618

Project Title
How Much Solid Matter Is in 25ml of Ocean Water from Different Areas of the Pacific Ocean?

Abstract

Objectives/Goals
I initially started my project by trying to figure out how much salt there was in ocean water. Later in doing my project I realized there was more than just salt in the solid remains. Therefore I decided to change my objective to How much solid matter is there in water from the Pacific Ocean?

Methods/Materials
I got water from Maui, Morro Bay, San Dieo, San Francisco Bay, Eureka, Humboldt Bay, and Redondo Beach. Then I measured out the water to 25ml and weighed the beaker. Then the beaker plus the water and then placed the beaker on the hotplate.After the water boiled and evaporated I removed the beaker and weighed it on the triple beam balance. When I got the results of all my data I logged it in my record book.

Results
My results came out to be: Maui was an average of about .45g of solid matter, Arcata averaged at about .5g, Sand Diego averaged at about .5g, Redondo Beach averaged at about .7g, Eureka averaged at about .6g, San Francisco Bay averaged at about .75g, and lastly Morro Bay averaged at about .9g of solid matter.

Conclusions/Discussion
My hypothesis was that the water from Maui would have a higher concentration of solid matter; when in reality the water from Morro Bay came out on top. The first trial was 1g, the second trial was 1g, and the third trial was .8g of solid matter. In conclusion my hypothesis was proven wrong scientifically.

Summary Statement
I found out how much solid matter there was in 25ml of Pacific Ocean water from different sources.

Help Received
Parents and sisters for advice, and Mr. Librizzi (my science teacher) for equipment.

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Eric W. Strege

Project Number
J0619

Project Title
Shake Down: The Effects of Liquefaction on Desert Soils

Abstract

Objectives/Goals
My objective was to test the strength and stiffness of the soil when exposed to vibratory, shock loading, such as explosives and earthquakes. Liquefaction is a condition when the soil momentarily liquefies and tends to behave as a dense liquid. Seismic waves cause ground vibrations that can cause liquefaction. I collected soils from the desert cities of San Bernardino County and Riverside County, testing the soil texture and the soil liquefaction percentage and the sink rate percentage.

Methods/Materials
A testing platform was built with saw horses and plywood, with a testing frame secured onto the plywood so that the testing container would not fall off the platform. A concrete vibrator was bolted down onto the plywood 32 centimeters away from the testing frame. Each liquefaction test consisted of placing 4 gallons, 15.137 liters of soil in a 5 gallon, 18.921 liter sterilite plastic container, measuring the level of dry soil in centimeters, then filling the container with water, letting it soak down to just under the top level of soil. Next the structure was placed on top of the soil. With a stop watch set for one minute the vibrations from the concrete vibrator began. At the end of one minute the depth in centimeters were measured on how far down the structure sank into the liquefied soil. Also the level of the liquified soil was measured on how far down the structure sank into the liquified soil. The soil from each desert city was tested three times.

Results
To the results were a study of 1)Testing the centimeters of the dry soil,
2)Testing the centimeters of the liquefied soil, 3)Testing the soil texture, percentage of sand, silt, clay. The soils with a high percentage of clay, Coachella, Salton Sea, Thermal had a high percentage of liquefaction and sink rate. Equally a soil that has a lower percentage of sand to silt and clay also liqufies at a greater rate. The soils that have a higher percentage of silt to sand and a small percentage of clay has lower percentage of liquefaction.

Conclusions/Discussion
Soil Liquefaction can be devastating to life and property and the more we learn about it by studying what happened in earthquakes past and testing soil reactions to vibrations,will help us build safer structures and minimize loss of life and destruction.

Summary Statement
Testing Soil Liquefaction and soil textures for Landers, Yucca Valley, Desert Hot Springs, Palm Springs, Palm Desert, La Quinta, Indio, Coachella, Thermal, Salton Sea, comparing liquefaction rate, with sink rate, with soil texture.

Help Received
Dad helped me build my testing platform and mom drove me to all the desert cities to collect the soil.

CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
Joao V.C. Teixeira

Project Number
J0620

Project Title
Does the Wind Change with Height?

Abstract

Objectives/Goals
My objective is to answer the question: How does the wind speed change with height? My hypothesis was that the wind speed increases with height in a fairly similar way from one day to the other.

Methods/Materials
To answer this question, I measured the wind speed at 4 different heights (0.5, 1.0, 1.5 and 2.0 m) for 3 days. I used 2 different methods: method A uses an anemometer that I built and in method B I release a piece of paper many times at a certain height and then measure the time and the distance until it falls onto the ground (the speed is the distance divided by the time and the final result is an average).

Results
The results show that in general the wind speed increases with height from 0.5 m to 2 m above the ground. The intensity of the wind is very different from one day to the other. However, if for each day we divide the wind speed at the different heights by the wind speed at 2 m (the maximum value), we obtain a similar profile for the wind for each day. This means that the growth of the wind speed with height follows a similar pattern every day. Also, the two different methods give different results but show a similar qualitative behavior

Conclusions/Discussion
My conclusions are that: (1) the wind speed increases with height, (2) the wind speed changes with height in a similar way from day to day, and (3) the wind speed is very difficult to measure because it changes every second or less.

Summary Statement
My project is about measuring how the wind speed changes with height.

Help Received
Father helped printing; All family (mother ,father and younger brother) helped with the measurements.