CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Ian M. Bergman

Project Number
J0601

Project Title
Fog Drip

Abstract

Objectives/Goals
The objective was to find out how much water a Douglas fir tree can pull from fog and turn to drip during the coastal fog season.

Methods/Materials
For seven months I measured the amount of water a Douglas fir tree pulled from fog and turned to drip. I placed a rain gauge beneath the Douglas fir and one in the open. I measured them every day from April to October, which is the fog season.

Results
The Douglas fir created 28.2 inches of water from the fog during a period of time in which 2.8 inches of rain fell.

Conclusions/Discussion
My conclusion is that the Douglas fir pulled 28.2 inches of water to the ground and it created 10 times more water than rain.

Summary Statement
My project is to determine the amount of water a Douglas fir tree can pull from fog and turn to drip.

Help Received
My mom reminded me to measure the rain gauge everyday. My brother helped make the graphs. My dad helped find information for my research report.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Neeraj R. Bhat

Project Number
J0602

Project Title
Air Pollution Variances within an Urban Area

Abstract

Objectives/Goals
To prove that air pollution levels in different areas of a city can vary widely.

Methods/Materials
An air particle collection device was constructed by taping an index card (on which was drawn a 100-square grid and was coated with petroleum jelly) to a large piece of cardboard, which, in turn, was planted in a box of modeling clay. Five such devices were exposed to the environment in different locations of Corona - near a freeway, an industrial zone, a suburban neighborhood, a park, and a control card in an unused room of my home. The number of air particles trapped on the card was counted after each 24-hour period. The process was repeated for 30 days.

Results
Air pollution levels, as measured by the number of air particles trapped on the collection card, were ranked as follows: 1. Freeway 2. Industrial Zone 3. Suburban Neighborhood 4. Park 5. Control Card

Conclusions/Discussion
Air pollution levels in different areas of a city can vary widely.

Summary Statement
My project is a scientific investigation about variances in urban air pollution.

Help Received
Dad cut the cardboard for the experiment with a sharp box-cutter knife and took me to Wal-Mart for developing the photographs. Mom provided transportation to the test locations on each trial date.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Jeffrey J.V. Blake

Project Number
J0603

Project Title
Predicting the Weather

Abstract

Objectives/Goals
The object of the experiment was to find the most accurate way to predict the weather without using advanced technology, like satellites and computers. The two methods compared are the scientific (using homemade instruments) and the traditional (using observations of nature) methods.

Methods/Materials
The scientific method required the usage of three homemade devices to gather data. These instruments were: a hygrometer for humidity, a barometer for air pressure, and a weather vane for wind direction. The traditional techniques were: the "Red Sky" poem, pinecones for humidity, ring around the moon for humidity, and leaves. Data was gathered for each method every morning and evening and predictions were made for each to be compared. The control was the predictions of the LA times.

Results
The scientific method produced 35 correct predictions out of 42 total. The traditional method had 34 correct predictions out of 42. The control (the LA Times) had 35 correct predictions out of 42. However, there was an experimental error involving the traditional method. I made a mistake in one of the predictions, meaning that the traditional method rightfully deserves 35 correct predictions out of 42.

Conclusions/Discussion
It can be concluded that the scientific and the tradional methods are equal in their accuracy. Both had 35 correct predictions showing that my hypothesis (that the scientific method would be more accurate) was null. Science and tradition collide in many fields and I hoped to resolve that conflict with my experiment, to determine which method is truly the best to use. The experiment does settle this conflict. Science and tradition are equal; there is no right or wrong answer between the two of them.

Summary Statement
My project involved the comparison of the scientific and the traditional methods of weather predicting.

Help Received
Brother-in-law assisted in building instruments, Grandfather assisted in finding reliable traditional techniques.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Kristin Breeden; Sarah Luksik

Project Number
J0604

Project Title
Is the Weatherman Reliable?

Abstract

Objectives/Goals
We are comparing the observed temperature, barometric pressure, precipition, and humidity from our personal weather stations to what was predicted in our local newspapers which were based on computer modeling. Everyday we wrote down the observations from our weatherstations. We cut out, from the newspaper, the predictions for that day. We then compared on a line graph the actual values to the predicted ones. We assumed that the predictions were going to be wrong and that they would be off of the line of the observed values. Precise weather prediction is important to many people. Weather has a strong impact on agriculture, science, transportation, and our daily lives.

Methods/Materials
Newspaper weather forecasts, home weather stations and monitors, journals. Daily comparisons of forecasts versus actual observations.

Results
Based on our findings by looking at our graphs and analyzing the data, our hypothesis that the predicted forecast is not truly reliable was proven correct. The graphs show the comparisons between the predicted temperatures and the actual daily temperatures.

Conclusions/Discussion
We found that predicting the weather is difficult because it involves human interpretation of computer data. Our results supported our hypothesis.

Summary Statement
Assessing the accuracy of weather predicting.

Help Received
Gary G. Love and Jason Nachamkin of the Meteorology Div. Naval Research Lab. Dan Luksik and Kay Breeden.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Ryan M. Chung

Project Number
J0605

Project Title
What An Impact! How Does Mass and Velocity Affect the Size of an Impact Crater?

Abstract

Objectives/Goals
Impact craters are formed when pieces of asteroids, meteors, or debris strike the surface of a planetary body. This project is to find how both the mass and velocity of an impactor affect the impact crater size. My experiment looked at what the effects of dropping balls of different mass size at a fixed height (constant velocity) will have on the diameter size of the crater that is formed. I also looked at what the effects of dropping these balls at different heights (varying velocity) will have on the crater diameter. My hypothesis is that balls with more mass will create larger impact craters and balls dropped at a higher height will create larger impact craters.

Methods/Materials
Four balls of different weights (23g, 73g, 126g, and 143g) but same size (71mm) were dropped at a fix height and at different heights (0.5m, 1m, and 1.5m) onto a layer of flour covered with cocoa. Measure the diameter of the crater formed each time. There were five trials for each ball drop.

Results
In all three different height drops, ball 1 had the smallest impact crater diameter formed, while ball 4 had the largest impact crater diameter formed. Thus, as the masses of the balls increased, so did the diameter of the crater produced. The second part of my results was looking at each ball dropped at three different heights. For each ball, the crater diameter increased as the height of the ball drop increased.

Conclusions/Discussion
My conclusion is that crater diameter increases with increasing mass. Also as the height of the ball increases, so does the crater diameter. Thus crater diameter is proportional to the mass and velocity of the impactor. Based on the kinetic energy equation, kinetic energy=1/2mv^2, velocity increases have more effect on a crater diameter than mass increases since velocity is squared.

Summary Statement
My project is to show how mass and velocity of an impactor affect the size of an impact crater.

Help Received
My parents supervised me during the set up and the experiment. My mom showed me how to design the graphs.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Lucas E. Crandall

Project Number
J0606

Project Title
The Relationship between Water Temperature and Flow on the Mad River

Abstract

Objectives/Goals
The objective of my project was to see if there was a relationship between water temperature and flow on the Mad River. Because of the Klamath River fish kill that claimed the life of 33,000 adult king salmon this fall, I wanted to see if high water temperature really did come from lack of flow on rivers. My hypothesis was that when the flow is lower, the water temperature will be higher and when the flow is higher, the water temperature will be lower.

Methods/Materials
My materials were a spa thermometer, a 3 ft string, a watch, and internet access to record flow from the California Department of Water Resources (CDWR) site. I recorded my temperatures at the same place and time of day. I left the thermometer in the water for 5 minutes at a depth of 2 feet. Later I recorded the flow in cfs from the CDWR site. I took eleven readings during the months of November, December, January, and February. Flow data were put into groups of low, medium, and high. I found the mean for each group for flow and water temperature.

Results
The results were that when the flow was low the water temperature was the highest. When the flow was medium the water temperature was the lowest. When the flow was high the water temperature was medium.

Conclusions/Discussion
My hypothesis was partly correct. When the flow was low, the water temperature was the highest, as I expected. However, when the flow was medium, the water temperature was the lowest, and when the flow was high, the water temperature was medium. The lowest temperature was taken on a cold, frosty morning. I think that air temperature, along with the time of year and time of day affects water temperature also. In further studies I would take more readings and take air and water temperature data all year to get a more complete picture.

Summary Statement
My project was to see if there was a relationship between water temperature and flow on the Mad River during the months of November, December, January, and February.

Help Received
My mother drove me to the river so that I could take my temperature readings.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Scott M. Elder

Project Number
J0607

Project Title
Tracking Storms in the Ionosphere

Abstract

Objectives/Goals
The objective of my experiment is to find a way to track storms in the Ionosphere and then measure storm intensity.
If I can measure Radio Frequency signal delay through the Ionosphere, then I can track storms and measure storm intensity.

Methods/Materials
When Radio Frequency (RF) travels through the Ionosphere, the signal transmission time is delayed due to storms in the ionosphere. The amount of signal delay directly corresponds to the intensity of the storm in the Ionosphere. The Global Positioning System (GPS) is a constellation of 24 satellites which transmit RF signals used for navigation through the Ionosphere to earth. I collected GPS altitude measurement data with my GPS receiver over a one month period. Time of measurements was adjusted 4 minutes each day to always have the same GPS satellite configuration.

Results
I compared my GPS altitude measurement data with the Space Environment Center (SEC) Ionosphere storm data to build a chart I could use to determine ionosphere storm presence and intensity. This chart compared my altitude error measurements with the SEC data for Ionosphere storm intensity. The result was a linear comparison matching my altitude error data to the SEC Ionosphere storm data.

Conclusions/Discussion
During the next few days I made some random measurements to determine if I could now track a storm in the Ionosphere and determine storm intensity. During one of my sample measurements, I determined from the amount of error in the altitude measurement that there was a storm in progress in the ionosphere. I took several readings over the next five hours and analyzed the data to determine the storm intensity. The next day when the SEC data was available, I compared my analyzed reading with the SEC ionosphere storm readings. The results were comparable which meant that I did track a storm in the Ionosphere and was able to measure the storm intensity.

Summary Statement
I tracked storms in the ionosphere and determined storm intensity by measuring Global Positioning System altitude measurement errors.

Help Received
Father helped with the display.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Mallory A. Farrar

Project Number
J0608

Project Title
Discovering the Porosity and Permeability of Different Types of Rocks and Minerals

Abstract

Objectives/Goals
The purpose of my science fair experiment was to test the porosity and permeability of different types of rocks and minerals.

Methods/Materials
The materials that I used were:
-materials to be tested (clay, soil, gravel, sand, and chalk)
-wooden stand (I built it myself.)
-Two measuring cups (a 250 ml measure and a 500 ml measure)
-Coffee filters
-Turkey baster (to add water with)
-timer
-paper and pencil to record data with

These are the steps that I took in doing my experiment:
1. Let all of the materials sit out in the sun. (grind up clay and chalk)
2. Attach the coffee filters to the stand.
3. Measure 250 ml of rock/mineral.
4. Pour rock/mineral into coffee filter.
6. Slowly pour water onto material in coffee filter using a turkey baster.
7. Let materials sit for 30 minutes with 250 ml measuring cup collecting water that drains.
8. Come back after 30 minuts and record the data of the experiment.
*****REPEAT WITH EACH MATERIAL AT LEAST TWO TIMES*****

Results
When I did the experiment with the clay and chalk, they were too heavy for the coffee filters. Because of this, I had to buy a metal screen coffee filter. After a half hour, the clay started getting clumpy and hard. When it was fully dry, it was all one lumpy, hard piece. The same thing happened with the chalk.

The results turned out to be as I expected. As I predicted, the clay and chalk retained the most water. I was also correct that the gravel would retain the least amount of water.

In order from most water retained, to least water retained, is clay, chalk, soil, sand, gravel.

Conclusions/Discussion
From my experiment, I have concluded that my results are very logical. The gravel retained the least

Summary Statement
My project is all about how much water is retained and released from different types of rocks and minerals.

Help Received
Father helped in using screwdriver to build stand; Father also helped with trial experiment to make sure it worked; Father and mother both took pictures.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Nicholas E. Forsburg

Project Number
J0609

Project Title
The Trickle Down Theory: Hydraulic Properties of Soil

Abstract

Objectives/Goals
My project was to determine the hydraulic conductivity (Ksat) of four soil textures, clay, loam, silt, and sand. My hypothesis was that a sandy textured soil would have the highest rate of hydraulic conductivity because of its large particle size and low bulk density.

Methods/Materials
Four soils with different textures were identified in a local agricultural soil survey. Each of these soils was located and then sampled in the field. The soils were then spread out on drying trays and allowed to air dry for two weeks. Any roots or rocks were removed from the samples.

In the mean time, an apparatus was constructed to aid in the measurement of the hydraulic conductivity. Mr. Hooper, a soil scientist with the Natural Resources Conservation Service, provided a diagram for this apparatus. The dry soil samples were then compacted and pre-saturated. Next a hydraulic head was placed over each sample. The time it took for 125 cc of water to move through the soil was measured. The rate of water flux was calculated for each of the samples. Also, samples of each soil were weighed in order to calculate their bulk density.

Results
As expected, the sandy textured soil had the highest rate of water permeability. One unexpected result was that the clay-textured soil did not have the lowest rate of permeability. The silt-textured soil was found to have the lowest hydraulic conductivity. The results from a soil particle size analysis done for me by Mr. Hooper showed that the sand-textured soil had the largest soil particles of the four soil textures. But is also showed that the silt-textured soil had the smallest soil particles, not the clay, which was why the silt-textured soil had the lowest rate of water flux.

Conclusions/Discussion
After completing this experiment I have found that soil texture, particle size and bulk density are the biggest factors influencing the hydraulic conductivity of a soil. My hypothesis was partially correct, however, if the soil samples had a larger difference in particle sizes, the bulk density and hydraulic conductivity of the soils would have had a greater variation.

Summary Statement
My project is about investigating the hydraulic properties of soil.

Help Received
Mr. J. Hooper, Soil Scientist, USDA-NRCS was an advisor; father helped with soil collection and apparatus construction; mother typed log book.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Marie E. Jenkins

Project Number
J0610

Project Title
Determining the Effects on the Stability and Grabbing Ability of Soils with Different Compositions

Abstract

Objectives/Goals
The purpose of my project was to determine which soil of the four basic types was the strongest in its grabbing ability, and then to see if changing the composition of the strongest soil would affect its stability. The reason I performed this investigation was to try to establish what it takes to create a sturdier ground for building structures and holding objects such as fence posts or telephone poles.

Methods/Materials
Using the three basic soils types: clay, sand (two types), and silt, I first determined which was the sturdiest by inserting wooden dowels under eight inches of soil, adding ten pounds of weight on top, then waiting one hour before pulling the dowels out with a force measuring device. I performed eight trials of each soil type. I then added natural and organic elements to the strongest soil to see if the soil stability would be affected. The elements added were grass cuttings, dry leaves and pods, and water (individually).

Results
I discovered that clay was the sturdiest soil and that the sandy soils were the weakest. The addition of the grass cuttings made the clay even stronger. However, the addition of water made the clay very unstable.

Conclusions/Discussion
My most interesting finding was that the presence of moisture can be a major factor in soil stability, which corresponded with my research regarding earthquakes and soil liquefaction. Through this project, I learned the value of evaluating soil strength and stability and the important role that soil can play in construction.

Summary Statement
My project was about studying the grabbing ability and stability of soils with different compositions.

Help Received
Mom helped with the board and typing. A friend helped drill holes in the bin and supplied one soil type. My mom's colleague (an Agricultural Specialist) identified the soils and supplied two soil types.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Allison N. Julander

Project Number
J0611

Project Title
How Does the Kern River Affect Southwest Bakersfield's Groundwater?

Abstract

Objectives/Goals
The objective of this project is to determine if southwest Bakersfield's groundwater gets less pure (total dissolved solids increase) and the water chemistry (Total Alkalinity, Total Hardness, and pH) changes as you get farther away from the Kern River.

Methods/Materials
A California Water Service Co. engineer was contacted, and permission was obtained to sample 10 city water wells. At each of the ten wells, the valve line was flushed for 30 seconds, and a water sample was collected in a sterilized, quart-sized, mason jar. Each water sample was tested three times using water test strips and three times using water test solutions (with color indicators) for Total Alkalinity, Total Hardness, pH, and Chlorine. Each water sample was also tested for Total Dissolved Solids (TDS) by Leslie's Pool Supply.

Results
I found that one of the most useful ways to show my results was on contour maps. These maps showed: (1) Total Alkalinity is highest in the northeast (NE) and lowest in the southwest (SW), and it ranges from 67 to 90 ppm; (2) Total Hardness is highest in the NE and lowest in the SW, and it ranges from 100 to 208 ppm; (3) pH is lowest in the NE and highest in the SW, and it ranges from 7.47 to 8.17; and (4) TDS is highest in the NE and lowest in the SW, and it ranges from 125 to 225 ppm.

Conclusions/Discussion
My hypothesis was proven incorrect. Total Alkalinity, Total Hardness, and pH did not change as you got farther away from the Kern River. TDS decreased a small amount the farther away you were from the Kern River. Contour maps showed that most of the changes occurred from NE to SW. This corresponds to high groundwater elevation in the NE and low elevation in the SW. The NE area (where Total Alkalinity, Total Hardness, and TDS were highest) is also below a part of the city where houses have stood for a number of years. The SW area (where Total Alkalinity, Total Hardness, and TDS were lowest) is below farmland or at the edge of town. This suggests groundwater is more contaminated below older neighborhoods.

Summary Statement
My project involved determining if groundwater in southwest Bakersfield gets less pure (total dissolved solids increase) and the water chemistry (Total Alkalinity, Total Hardness, and pH) changes as you get farther away from the Kern River.

Help Received
I obtained permission to sample city wells from a Calif. Water Service Co. engineer. My dad drove me to city water wells and Leslie's Pool Supply. My dad showed me how to use water test kits and how to contour a map. Leslie's Pool Supply helped me with TDS tests.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
DeeAnn J. Kroeker

Project Number
J0612

Project Title
Gypsum's Effect on Soil Drainage

Abstract

Objectives/Goals
My objective in this project was to determine how effective gypsum is when applied to the soil in helping an almond tree absorb water. I wanted to discover how much faster this rate of absorption would occur.

Methods/Materials
I used a 24" tensiometer, which is a tube like instrument that measures movement of moisture through the soil. I put one tensiometer in a non gypsum treated area and one tensiometer where 3 tons of gypsum per acre had been applied. I read the guages for 32 days, documenting the results including the rains and one irrigation in my data.

Results
The results of my experiment were that the tensiometers had an average reading of 66.28 centibars for the gypsum treated area and 46.56 centibars for the non treated area. These results indicated that the water was not penetrating as deep in the non-treated area and therefore this water was subject to more evaporation and this would cause the tree to receive less water. Where the gypsum had been applied the almond tree roots were receiving more of the irrigation and rain waters.

Conclusions/Discussion
My research indicated that gypsum would help the soil drainage problems, because with gypsum the sodium in the soil becomes soluable and separates from soil particles, this allows the root from what you are growing to reach all the nutrients in the soil and absorb the water. My hypothesis was correct because the gypsum treated area drained the water lower and faster by 30%.

Summary Statement
Using gypsum to help drainage problems in an almond orchard and discovering how effective it is.

Help Received
Father

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Eric W. Leidersdorf

Project Number
J0613

Project Title
Use Your Head(land)! An Experiment in Shore Protection

Abstract

Objectives/Goals
The objective of this project was to determine whether a man-made headland could rival the effectiveness of a groin in protecting the shoreline, but maintain a more natural setting.

Methods/Materials
The experiment was conducted in a 1.2 m x 2.4 m rectangular wave basin. Three tests were run: an unprotected beach, a beach with a conventional groin, and a beach with an experimental, triangular headland. The horizontal scale was 1:400 and the vertical scale was 1:80 (5:1 distorted scale). Each test consisted of 6,000 waves run in sets of 60 to prevent recirculation. The wave height was 3 cm and the period was 0.42 seconds. The water depth was 7.6 cm. The slope of the beach was 1 on 6, which equals a 1 on 30 prototype slope. To measure changes in the beach, eleven profiles were surveyed before and after each test from the back of the beach to the toe.

Results
The test results indicated that the groin trapped the most sand. Not many sand grains were able to pass around the end, and a large bar formed on its updrift side. However, since the groin trapped so much sand, it starved the downdrift beach. The headland did a better job of regulating sediment movement. It did not starve the downdrift beach, because it did not block as much sediment. It caused a large, symmetrical bar to develop on its updrift and downdrift sides.

Conclusions/Discussion
The experiment demonstrated that a man-made headland can rival the effectiveness of a groin in protecting the shoreline. Although a groin protects the beach on the updrift side, it causes erosion on the downdrift side. A headland is not as effective on the updrift side, but provides more equal protection for the entire beach.

Summary Statement
This project compares the effectiveness of different methods of protecting the shoreline.

Help Received
Prof. R. Wiegel (U.C. Berkeley) and Prof. W. McDougal (Univ. of Fla.) offered suggestions for literature, preliminary tests, and design of the wave basin. Mr. G.E. Hearon answered questions about the results, and provided guidance on graphing beach profiles. My father assisted in constructing the wave basin.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Adam G Mussell

Project Number
J0614

Project Title
Liquefaction In Action: An Investigation of How Earthquakes Affect Soil Stability

Abstract

Objectives/Goals
The objective is to explore the susceptibility of certain soils in Santa Cruz to liquefaction, a process by which soils that are shaken, most often by earthquakes, liquefy and lose their stability.The goal is to determine which soils are the least safe to build on. I believe that the soils nearest the San Lorenzo River in Santa Cruz will be the least safe and stable when shaken by earthquakes.

Methods/Materials
Five soils samples were taken from around downtown Santa Cruz, from near sea level to 200 feet elevation. They were subjected to three tests; a shake test using a shake table, a grain uniformity test, and a permeability test.I constructed my own shake table, using materials from the hardware store,such as plywood, dowells, and a motor. Soils were shaken for one minute, and I measured the depth a weight sank in wet and dry soils. For the uniformity test, I filled vials with soil, and added vinegar and shook them. When the contents settled, I measured the percentage of different grain sizes. For the permeability test I measured how long it took for water to reach the bottom of a glass jar filled with soil.

Results
The sand from Natural Bridges beach was the most unstable under all three tests. The second most susceptible to liquefaction was silt from the San Lorenzo River.

Conclusions/Discussion
I conclude that sand is the most susceptible to liquefaction, but other silty soil types may be close in instability during an earthquake. During the Loma Prieta earthquake in 1989, structures failed downtown, many because of liquefaction. Engineers rebuilding today may want to take these results into consideration when designing buildings to withstand a similar quake in the future.For my next project, I may use the shake table to test structural integrity of various building types. I may also revise it to test different depths of soil or amounts of water.

Summary Statement
My project explores the susceptibility of soils in Santa Cruz to liquefaction during earthquakes.

Help Received
Mother helped type report, an engineer, Aaron Bierman, from Weber and Associates helped design uniformity test.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Erica B. Penunuri

Project Number
J0615

Project Title
Hurricanes

Abstract

Objectives/Goals
How do Hurricanes occur? According to my research I think hurricanes occur over warm waters and when the warm air rises. Cool air will come in and take its place. The rising, spinning air will start spinning counter clockwise and form cyndrical walls of clouds. Water vapor fuels the developing hurricane. As the vapor condenses into clouds heat is released, which causes the air to become less dense. The surrounding air moves into the cyclone faster and faster and repeats the cycle over and over again getting stronger.

Methods/Materials
PROCEDURES:
A: Construct a hurricane machine using the materials listed in science project binder.
B: Pour some water into the pot.
C. Rub liquid soap in the glass bowl (to prevent fogging.
D. Fill each of two plastic containers with ice cubes.
E. Then turn the burner in between 2-4
F. Turn the lamp on for better viewing
G. After filling air compressor with air, open compressor valve slowly to about one PSI.

Results
The rising steaming air from the pot represented the warm air rising from the ocean. also the air compressor blew cool air through the 2 tubes acting like the 2 air currents colliding into each other. The 2 boxes with ice cubes were to produce coldness in the air. The copper tubing conducts the cold air. The soap was to prevent the bowl from fogging up because of surface tension. I found out putting a lamp infront and black paper behind the bowl made it easier to see the hurricane instead of the black light. The grid stationed the bowl.

Conclusions/Discussion
Hirricanes will occur over tropical waters. When the warm air rises and the two air currents collision and then turns counter clockwise(N. Hemisphere only). The water vapor condenses and releases heat which makes it less dense this cycle repeats over and again. I was able to reproduce a hurricane under laboratory conditions and perform experiments. In doing so I found out when the wind pressure increased the height and width decreased in both room and ice temperature conditions. The ice temperature condition had a

Summary Statement
This project is about trying to reproduce a hurricane and study its development and characteristics.

Help Received
My dad helped me construct the hurricane machine. He advised on what materials to use and how to make it safe.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)

Alexander Pherson; Sophie Scheidlinger

Project Number

J0616

Project Title

A Ground-Breaking Revelation: Testing Compression Waves in Various Circumstances

Abstract

Objectives/Goals

Our objective was to learn if types of soil or sand decreased the magnitude of compression waves to a larger extent. In addition, we aspired to learn if placing a wooden box over a low-g accelerometer decreased the acceleration with which the accelerometer was hit. We hypothesized that the sand would decrease the waves to a greater extent, as it has a higher semi fluidity content than does soil. We hypothesized that the box would also lower the acceleration of the waves.

Methods/Materials

In order to test our hypothesis, a wave tank for solids was constructed. A loudspeaker was mounted at the base of the tank and a sound generator and amplifier were connected to the loudspeaker to create vibrations similar to that of an earthquake. An accelerometer connected to computer probeware was used to measure wave amplitude. Variations of both sand and soil were tested, separately, and a wooden box was placed over the accelerometer in half of the 105 tests. LoggerPro and FreqGenie softwares were also initialized. LoggerPro was primarily used to collect and graph the data, while FreqGenie was used to initiate the waves and control the amplitude of the speaker. The accelerometer was placed in three separate positions to ensure that conclusions would prove accurate.

Results

When each high crest count and low trough count was averaged, it was evident that the sand did decrease the acceleration of the waveds in a larger way. In addition, the box actually increased the acceleration of the waves in all cases other than those in position B, at 12.03 centimeters from the epicenter. These results pertained to our research in that they proved, with no doubt, our hypothesis right of wrong.

Conclusions/Discussion

Our results did support our hypotheses in one sense. The result that the sand did decrease the acceleration of the compression waves did prove our hypothesis accurate. However, finding that the box increased the acceleration of the waves in all but one-third of the tests did prove our second hypothesis far from true. The results of this experiment are highly relevent to our category subject in that they are vital for improving the seismic constant, or arbitrarily set acceleration value that a building must withstand during seismic activity. This research also improved our knowledge of this category in that it proves that sand is a better resister to compression waves than soil is.

Summary Statement

This project is focused on whether or not sand or soil decreases the acceleration of compression waves to a larger extent and if placing a wooden box over a low-g accelerometer decreases the force with which the accelerometer is hit.

Help Received

Mr. Louis Garcia helped with software usage, overall suggestions, and lab equiptment usage; Professor John Claerbout assisted by increasing our knowledge of seismology and by giving suggestions; Mrs. Cathy Pherson purchases materials and aided by setting up the tank.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Keerit K. Purewal

Project Number
J0617

Project Title
Hard Rock?

Abstract

Objectives/Goals
My objective was a comparative study on four different types of rocks to determine which type of rock is the hardest based on how fast it erodes.

Methods/Materials
Four different types of rocks orthoquartzite, basalt, sandstone, and granite were selected. A rock tumbler was used to simulate erosion. Each rock was individually weighed on a triple beam balance scale. Several pieces of each individual rock were placed in the rock tumbler along with coarse grit and water for 24 hours each. This process was repeated for each various type of rock. Rocks were weighed before and after to determine how much erosion occurred.

Results
In the tests that I conducted sandstone lost the most amount of mass, followed by orthoquartzite. Unexpectedly granite lost more weight that the basalt, making basalt the hardest type of rock.

Conclusions/Discussion
The test runs confirmed that sandstone was the softest rock followed by orthoquartzite, but what my study did not confirm was the hypothesis that granite was the hardest rock

Summary Statement
My experiment was executed to observe which rock erodes the most.

Help Received
mother helped paste bard together; father helped cut matting; rock tumbler borrowed from the school lab; science teacher helped with supplies, support, and advice when needed

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Nancy A. Sanchez

Project Number
J0618

Project Title
Particulates and Air Pollution

Abstract

Objectives/Goals
My goal was to find out which city in Mendocino had the cleanest air. And how clean is the air that we breath.

Methods/Materials
microscope
microscope slides
push pins
vaseline
cardboard

Results
The particles were sticking to the microscope slides and it help me see which city had the most pollution in the air.

Conclusions/Discussion
According to the slides Philo, CA had the cleanest air, and Hopland, CA had the dirtiest air in Mendocino County.

Summary Statement
My project was to find out which city had the cleanest in Mendocino.

Help Received
My dad help me get samples from the trees for my slides.

CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
Connor S. Worley

Project Number
J0619

Project Title
Mudslide Mayhem

Abstract

Objectives/Goals
The factors I will correlate to determine the soil's susceptibility to mudslides are the grain size of the soil, the water absorbency of the soil and the speed at which the mud slides when water is systematically added to the mud. I believe the more fine soil there is, the less water it will absorb and the faster the mud will slide.

Methods/Materials
I tested and measured with various sized filters the grain size of five soil samples (taken in 5 random spots in each forest, 15 samples in all) from three separate coastal forests: a redwood forest, a pine forest, and a eucalyptus forest. I also measured the soil's ability to absorb water and finally I tested the speed at which the mud slides and the amount of water needed to make it slide. After the experiment I graphed the correlation between average grain size of soil, water absorbency and how fast the mud slid.

Results
The water absorbency depended on the amount of fine soil-- the more fine soil present, the less water absorbed. For the mudslides, the speed depended on medium pebbles, the more medium pebbles present, the slower it slid.

Conclusions/Discussion
My conclusion is that the more large rocks there are in the soil and the less fine soil there is, the less chance of a mudslide.

Summary Statement
With this project, I analyzed the key factors in soil to determine it's susceptibility to mudslides.

Help Received