CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Evan L. Bornemann

Project Number
J0701

Project Title
Air Bubble Breakwater

Abstract

Objectives/Goals
All harbors have a stone breakwater to stop waves, thus preventing costly erosion. But these breakwaters are difficult and expensive to construct. My project tests whether air bubbles can be used as a sufficient breakwater, to effectively diminish the height of waves.

Methods/Materials
I built a tank about eight feet long and filled it with water. The side was made of Plexiglas for accurate wave measurement. I hooked an air compressor to the tank to release the air bubbles at the bottom of the tank. The bubbles were released at intervals of 20, 40, 60, and 80 PSI. I measured the height of ten waves before and after the wave reached the air bubbles.

Results
The results were as follows: at 20 PSI, wave height was decreased .9 cm on average. At 40 PSI, wave height was decreased by 2.1 cm on average. At 60 PSI, wave height was decreased by 2.6 cm, and at 80 PSI, wave height was decreased by 3.1 cm.

Conclusions/Discussion
Because the wave height was decreased by 62% at 80 PSI, I came to the conclusion that air bubbles can be used as a sufficient breakwater.

Summary Statement
My project tests whether air bubbles can diminish wave height in order to perform as a breakwater.

Help Received
My Dad helped me with the design and construction of the tank I used to perform the tests.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
David H. Doan

Project Number
J0702

Project Title
Vanishing Water: Science or Mystery?

Abstract

Objectives/Goals
The objective was to see if wind, air temperature, humidity, surface area would effect evaporation in different ways.

Methods/Materials
For surface area, first measure 200 milliliters of water into a graduated cylinder. Second pour the water into a 8 by 8 container and 4 by 4 container. Thrid place containers in a box. Fourth record and observe containers every 15 minutes
For air temperature, first measure 200 milliliters into a graduated cylinder. Second put the 200 mililiters in a two 4 by 4 containers. Third place containers in the same box used for surface area. Fourth divide the box with a piece of cardboard. Fifth place heatlamp above 1 side of the box. Fifth record and observe containers every 15 minutes
For humidity, first change the box used from air temperature and surface area, cut one door in side, and seal that side with tape and plastic wrap. Second put one 4 by 4 container with 200 milliliters of tap water on each side of the divider. Third put containers in the box that was recently changed. Fourth put heat lamp above the box. Fifth record and observe containers every 15 minutes.
For wind, first measure 200 milliliters of tap water in a graduated cylinder. Second pour the water into 4 by 4 containers. Third place containers in the box used in humidity. Fourth place a fan across the container to blow on one side of the box. Fifth place heatlamp over the box. Sixth record and observe the containers

Results
Surface Area: The container with more surface area evaporated faster
Air Temperature: The container with more heat evaporated faster
Humidity: The one with more humidity evaporated faster
Wind: The container with wind blowing evaporated faster

Conclusions/Discussion
It shows that larger surface areas help water evaporate faster
More heat makes evaporation go faster
High humidity makes water evaporate slower
Wind helps evaporation go faster

Summary Statement
My project is to see if Surface Area, Wind, Humidity, Air Temperature effect evaporation in different ways.

Help Received
Friend helped give ideas; Mother bought supplies

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Julia J. Dressel

Project Number
J0703

Project Title
Dune Heroes

Abstract

Objectives/Goals
In Seagrove Beach, Florida, my uncle and a nearby hotel wanted to protect their dunes from further hurricanes after mass destruction during Hurricane Dennis. My uncle and 4 neighboring households chose to install a system of baffles, or sand filled tubes, that are built to absorb and divert the energy of the wave upwards. The hotel decided to build a wooden seawall that is meant to resist the energy of the waves. This project to discover which way was the most efficient way to protect the dunes during a hurricane.

Methods/Materials
This question was tested by scaling the dune and beach in Seagrove Beach, Florida to a scale of 1/20, adding an amount of water that was to scale to the rise in the sea level (storm surge) during a Category 5 Hurricane, and by building a sea wall and baffles to try and protect the dune. (An unprotected dune was also tested.) A wooden wave maker was placed at the back of the trailer, and the board was tilted back and forth to designated points 100 times each test to create waves. Materials include 1.4 tons of Olympia Sand, a 6 ft by 10 ft trailer, water, 2 yard sticks, a shovel, and a wooden wave maker.

Results
The results of multiple tests are as follows; the sea wall allowed for a range of 0 to 3.5 inches of damage to be done to the dune during the wave process, the baffle system allowed for a range of 0 to 4.5 inches of damage to be done to the dune during the wave process, and when the dune was under no protection, a range of 0 to 6.5 inches of damage was done to the dune during the wave process.

Conclusions/Discussion
The results did not support the hypothesis. The sea wall allowed for less damage to be done to the dune than with the baffle system. As stated in the hypothesis, when the waves hit the sand covered baffles it is pushed up onto the dune. It was suggested the when the wave was pushed up onto the dune it would have little effect on the dune; however, damage was made. In the hypothesis it was suggested that the waves# energy would be strong enough to wash the sand away to the point of the wall, but this did not occur. During the tests, when the waves energy hit against the sea wall, the wave did not continue upward onto the top of the dune, but swept away a small amount of sand and receded. This concluded in more damage being done to the dune that was being protected with the baffles than with the sea wall.

Summary Statement
This project was conducted to find the most effective way to protect a dune from a hurricane.

Help Received
Dad helped build wave board and sea wall; mom helped with sewing baffles.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Daniel (D.J.) R. Freeman, Jr.

Project Number
J0704

Project Title
Surfs Up: Will Different Ocean Bottoms Affect the Height of a Breaking Wave? Phase II

Abstract

Objectives/Goals
The purpose of my project was to determine if different ocean bottoms affect the height of a breaking wave. Phase II of this project was to find more accurate data by using a mechanical wave tank machine at Birch Aquarium at the Scripps Institute of Oceanography. The wave machine provided a consistant wave force and by laying out the materials in the area half way between the mechanical paddle and the breaking of the wave, it allowed me to measure the height at the point of the breaking wave. Out of my four bottoms, rocks, gravel, sand, and a simulated reef made up of crushed sea shells and modeling clay, I thought the simulated reef would produce the highest wave. I chose this project to help surfers choose a safe and fun break to ride.

Methods/Materials
I prepared and formed four oceanscapes by laying out the different materials onto a measured piece of hard plastic. The plastic piece was appoximately 2 feet by 2 feet and the rocks, gravel, sand and simulated reef, were attached and it was lowered into the wave machine while it was turned off. A measuring tape was attached outside of the tank at the point where the wave broke. The machine was started and the electronic paddle produce an accurate consistant wave. I collected visual data in centimeters as the wave passed by the ruler. This process was repeated 10 times for each bottom.

Results
The overall results for the highest wave was rocks with an average of 10.5 centimeters. The median was the simulated coral reef with the results of 8 centimeters. In third, the gravel came in with 9.5 centimeters. The lowest result was the sand with an average of 5 centimeters.

Conclusions/Discussion
After completing my investigation on what type of ocean bottoms affect the height of a breaking wave, I found that my overall hypothesis of the simulated reef making the highest wave was incorrect. By using a mechanical wave machine my results differed from Phase I. In Phase I, I manually pushed the waves and did not have as much control on the force of the wave. Therefore, by using a large mechanical wave machine the results showed that the rocks provide the highest wave. The sand shifted so much that the wave had a hard time forming. I met my objective by proving that surfers can now search for new breaks in areas that can be safe and fun. Plus surf shop owners know where to establish a business where sufers can purchase supplies and this can help the economy.

Summary Statement
The purpose of my science project is to show which ocean bottom will produce the highest wave.

Help Received
Mother and father supervised; Birch Aquarium Directors allowed me to use their Exhibits Wave Machine in San Diego, CA.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Caroline Frost

Project Number
J0705

Project Title
Fighting Wildfires: It's an Uphill Battle

Abstract

Objectives/Goals

Wildfires are very devastating in California. Every year, they kill people, burn down and damage thousands of homes and force many people to evacuate their homes and neighborhoods. They cause millions of dollars in damages.

Yet, many times, wildfire is a naturally occurring phenomenon. The forests must occasionally be cleared of accumulated vegetation and wildfires assist in this clearing by destroying parts of the wild woodland. With a wildfire, you have to remember that if you suppress it now, the unburned brush will accumulate and today#s small wildfire can become next year#s massive wildfire.

The purpose of this experiment is to study wildfire flame propagation to determine whether uphill or downhill winds cause the greatest speed in flame propagation. The hypothesis is that wildfire always burns faster going uphill than downhill. This is because the wildfire is closer to the fuel going uphill.

Methods/Materials

First build a #hill# with a wooden board and nails jutting out at regular intervals. Put #trees#, or rolled up pieces of newspaper, onto the nails. Set the #hill# at a forty-five degree angle. Set up the fan so it either blows uphill or downhill. Light five strips of newspaper at the top of the hill to start the fire, and time the fire#s starting point to the ending point, which will either be the bottom to top or top to bottom. Record the times.

Results

The downhill burned in 140.1 seconds on average.

The uphill burned in 14.9 seconds on average.

Conclusions/Discussion

My hypothesis was correct: the flame propagation with wind up the slope is faster than it with wind down the slope. With the wind up the slope, the propagation was ten times faster than with wind down the slope. With the wind up the slope, the propagation was 2 inches per second. With the wind down the slope, the propagation was .2 inches per second. Uphill fires burn much faster than downhill fires.

Summary Statement

My project is a study of wilfire flame propagation.

Help Received

Father supervised project

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Alejandra P. Glover

Project Number
J0706

Project Title
Soil Absorption

Abstract

Objectives/Goals
In this science project I will find the mass, volume, texture, and consistency of 4 different types of soil. With this knowledge I will test to see which soil absorbs the most water.

Methods/Materials
1.I will take all of the soil samples and measure their mass, volume, and density to see which soil will absorb the most water. I will also measure each soils texture.
2.When I get the soil samples I will carefully remove all vegetation from the soil.
3.Next I will use colanders to separate the particles of the soil from each different type of soil.
4.Then I will count for example in the mountain soil there are 12 large rocks and 24 small rocks. This I will do for every soil sample.
5.After I will measure the mass of the content of each colander. For example: the beach soil will be separated into different Ziploc bags and I will measure the mass of each bag separately.
6.Once I have the mass of each bag I will make a graph and record all of the data I have researched and discovered.
7.Then I will take my soil samples, place them in a coffee filter and separately I will poor water onto the soil to see how much water each soil will absorb.
8.Next, I will take the sifted soil put the sifted soil in the coffee filter and poor water on each type separately. This test will help me determine which part of the soil is the most absorbent.
9.Then I will make a graph and record all of the data I have discovered.
10.Finally I will organize a board to display the findings for my project.

Results
Sifting each of soil types showed me what size particles each type of soil were made of. Pouring a measured amount of water through each soil helped me determine which type of soils holds water the best.

Conclusions/Discussion
I thought that the mountain soil would be the most water absorbent. The soils that were the most water absorbent were the backyard soil and the beach soil. I found out in further research that the mountain soil consists of many rocks, these rocks cannot absorb much water, and in fact the only part of the mountain soil that can absorb the most water is the silt and clay, and the fine sand. The rest of the water just passes through the rocks.The soils with the smaller overall particle size gave the soil a larger surface area for water to stick to.

Summary Statement
My project is about comparing different types of soils for how much water they will absorb.

Help Received
Mother helped with board; aunt helped with expert advise; school provided experimental equipment

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Marco R. Harding

Project Number
J0707

Project Title
Shifting Sands: The Mystery of How Waves Move Sand Down the Beach: Does the Angle of the Wave Matter?

Abstract

Objectives/Goals
The objective for this project was to determine what the angle of the waves had to do with the sand going down the beach.

Methods/Materials
My first experiment was to make a model beach to see how the waves moved the sand. My hypothesis is "IF the angle of the wave is larger THEN the sand will move farther." For my second experiment I went to a real beach to test longshore drift. My hypothesis is "IF the angle of the wave is larger THEN the longshore drift will be faster."

Results
For my model beach my hypothesis was right. For my second hypothesis I couldn't control everything well enough to see if my hypothesis was right. I still think that waves with bigger angles create faster longshore drift on the beach, but I learned that when you control all of the variables it is different from when you are at the beach and you aren't controlling everything.

Conclusions/Discussion
I am interested in the beach because every winter the sand disappears. My project is about how wave angles and longshore drift move sand. I set up two experiments to test this.

Summary Statement
My project is about how longshore drift moves sand down the beach.

Help Received
Godfather helped with model beach; Mom helped with display board; Garry Griggs helped with background info; Mr. Lay helped with scientific method.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Heidi A. Hennesay

Project Number
J0708

Project Title
The Effects of Various Irrigation Systems in Maintaining Water Moisture in Different Soils

Abstract

Objectives/Goals
The purpose of my science project is to determine which type of irrigation benefits different types of soils. The reason I am doing this investigation is to help farmers or gardeners decide which type of irrigation will help the plants grow better.

Methods/Materials
I will take 9 plastic boxes and fill three of them with clay, three with loam, and three with sand. Each set of three boxes will be irrigated with different irrigation processes. Each process is used ,with each type of soil. I will make sure all 9 boxes are watered with the same quantity of water. One hour after irrigation I will take a moisture reading form each box. I will then repeat moisture readings every 12 to 24 hours for the next week. I will compare and chart the moisture readongs by soil type and irrigation type.

Results
After completing my investigation, I found that my hypothesis was correct. My hypothesis stated that the subsurface drip in clay would have the most moisture in the clay. The highest reading was the clay sub drip, which was at a four. The first clay sub drip reading was a ten. That means that the sub drip clay dropped a whole six readings. The lowest moisture was the spray in all three soils. The highest and lowest moisture readings were three readings apart.

Conclusions/Discussion
In conclusion, the subsurface drip would be the best choice for watering your plants. Farmers and gardeners will benefit from using the sub drip to water their plants becuase it saves water.

Summary Statement
I am testing to see which irrigation system promotes moisture in different types of soils.

Help Received
My dad helped to collect the soil and some of the materials.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Kuylea A. Jensen

Project Number
J0709

Project Title
Barometric Pressure Inside and Outside: Is There a Difference?

Abstract

Objectives/Goals
I wanted to know if barometric pressure would register the same inside and outside. I also tested the reliability of a homemade barometer against the weather channel data taken in pressure in inches.

Methods/Materials
My homemade barometer was made with a balloon, a straw, and a 12 oz. glass jar. My data was read and recorded every day from mid-October through late January. Data recorded from the homemade barometer was compared with the data recorded on the weather channel.

Results
My data shows that the outside barometer was much more reliable than the inside barometer. The outside homemade barometer was only .35 inches on average different from the actual weather channel data. The inside homemade barometer was actually far more unreliable with an average difference of 7.29 inches.

Conclusions/Discussion
Humidity changes could have made the homemade barometer more unreliable inside because the air gets trapped easier and gets heavier faster. Also, the dryness of the winter heater blowing through the classroom could have affected its reliability. Maybe the balloon texture was drying out and the balloon wasn't holding air well.
For future projects, I would use a different material such as a heavy latex or silicone.

Summary Statement
Barometric pressure can differ from inside to outside.

Help Received
Teacher as facilitator

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Dylan J. Karlsson

Project Number
J0710

Project Title
Lessons Learned in Levee Construction from Katrina: Which Are More Effective, T-Walls or I-Walls?

Abstract

Objectives/Goals
My objective is to see which type of levee wall, an I-Wall Levee or a T-Wall, will better protect against a surge of flood waters as what happened with Hurricane Katrina. The levee system in New Orleans before Katrina had mostly earthen and I-Walls, with a small amount of T-Walls. After Katrina, T-Walls replaced many I-Walls. My project simulated an actual flood surge while testing these three ("3") types of levee walls. My hypothesis is that the T-Wall Levee with its added support, reinforcements, and better construction design will perform better than the I-Wall Levee in protecting against water breaches and in holding up against the water surge and that the I-Wall should provide better protection than an earthen levee. The lessons learned in levee construction from Katrina could be useful in improving the California levee system.

Methods/Materials
The project tests the strength of 3 types of levee walls with a simulated storm surge. These included: (1) an Earthen Wall, a control, (2) an I-Wall Levee, the typical design used for New Orleans# walls, and (3) a T-Wall Levee which has since Katrina been mostly used to better protect against water breaches. Each type of wall was placed in a testing tub and a water surge was sent toward the levee wall. The strength of each of the 3 walls was tested by noting the amount of time it took for the water to breach the wall. Both dry soil and then wet soil were tested.

Results
The T-Wall performed the best in 3 ways: 1) holding back the water surge from breaching the earthen mound and flowing from the water side to the land side of the testing tub,2) preventing a breach of water in the middle of the earthen mound, and 3) in the levee not collapsing. The I-Wall performed better than the earthen wall. The T-Wall Levees 1) horizontal base, 2) larger sheet pile and 3) support pilings were more stable against the simulated storm surge.

Conclusions/Discussion
The testing proved my hypothesis: The T-Wall Levee was better in holding back the water surge from breaching the earthen wall, in preventing a breach of water in the middle and in not collapsing in comparison to the I-Wall. The I-Wall proved better in providing flood protection over the earthen wall. T-Wall Levees are twice as costly than I-Wall Levees but could be money well spent in areas next to cites and where there are many people who could become flood victims, such as in the Sacramento and Stockton areas.

Summary Statement
The rebuilding after Hurricane Katrina showed that T-Walls are better in flood prevention that I-Walls; can California learn from the lessons learned from Katrina ?

Help Received
My parents helped to purchase the materials and to undertake testing of the levee models as more than one person was needed to carry out the testing.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Charlotte M.N. Mayeda

Project Number
J0711

Project Title
Hurricanes: The Heat Diffusers

Abstract

Methods/Materials
Computer with internet access and a printer.

Results
The data I#ve collected shows that after collecting a total of 41 hurricanes and tropical storms. It turned out that the hurricanes supported my hypothesis and the tropical storms didn#t. Out of a total of 22 hurricanes, 13 hurricanes showed coolness on the day it hit the buoy and the day after. This means that 59% of the hurricanes were supportive of my hypothesis. On the other hand the group of tropical storms had a total of 7 supporting and 12 not supporting. This made for a total of 36% of the tropical storms supporting and 63 % not supporting. This shows that the stronger the storm then the cooler the ocean.

Conclusions/Discussion
In conclusion my data showed that 59% of the hurricane data did support my hypothesis, and only 36% of my tropical storm data supported my hypothesis. I feel that this is a good percentage of data in support of my hypothesis. However I do believe that if I would have collected more hurricane and tropical storm data it might have led to a higher percentage of supporting data, which have helped me in the long run for the science fair. Here I used the variables in this experiment were hurricanes verses tropical storms. All together out of my science project I feel that I would have had a better understanding of interpreting the data represented by the graphs. I also wonder what would have happened if I had had more data. Would my hypothesis have been better supported or less well supported. I also have questions about how hurricanes affect sea creatures. Knowing that a stronger storm does cool the ocean has led me to come up with many more questions, and another opportunity to study and learn.

Summary Statement
The purpose of my project was to test if hurricanes cool the ocean.

Help Received
Mother helped type report and paste up board. Father helped with information and testing. Advisor guided me through the scientific process.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Emily L. Schweigert

Project Number
J0712

Project Title
Soil Saturation

Abstract

Objectives/Goals
My project was to determine which soil samples could hold the largest amount of water. I believe that the fine sand will absorb the most water and take the longest to fill with water.

Methods/Materials
Four measuring cups the (exactly the same) filled with the same amount of each different soil. One measuring cup had coarse sand, another had potting soil, the third had fine sand, and the last had clay. The soils were measured with the same amount of soil in the measuring cup and water was injected in three trials.

Results
The particles in the potting soil were larger and had more space between them, and consistently held the most water while the particles in the clay consistently held the least because the particles are smaller and more compacted.

Conclusions/Discussion
My conclusion is that is that potting soil overall held the most amount water, my hypothesis was wrong. The fine sand did not hold the most water. When you go to build a house you need to make sure you have soil composition tests and also soil compaction results. Land can shift because of soil saturation.

Summary Statement
This project looks at a variety of soil types and the differences in soil saturation .

Help Received
Mother took and printed pictures.

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Kirill Slobodyanyuk

Project Number
J0713

Project Title
Geomagnetic Storms on GPS Devices

Abstract

Objectives/Goals
I want to see how geomagnetic storms affect GPS precision.

Methods/Materials
I used a Garmin GPS device, NOAA Space Weather Now, and a computer. I went on Google maps to find the precise coordinates of my location. Every Monday, Wednesday, and Saturday, I took three tests measuring my coordinates. Then, I checked on NOAA to see if there was a storm. If there was a storm, I marked the font red. Then, I compiled the data into graphs.

Results
My results showed that on average, the storm days were off more than the non-storm days. The coordinates were off on average 24 feet.

Conclusions/Discussion
From this, I conclude that geomagnetic storms do interfere with GPS reception. Therefore, when using a GPS, it is impossible to know how accurate the coordinates are. I would also like to test wether cellphone reception is affected by geomagnetic storms.

Summary Statement
My project was done to find if Geomagnetic storms in the ionosphere affect handheld GPS device precision

Help Received

CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Alisa Smith

Project Number
J0714

Project Title
Do North-Facing Beaches in Northern California Have Larger Sand Grains than South-Facing Beaches?

Abstract

Objectives/Goals
My project was to see if sand grains from the more northernly facing beaches in Northern California were on average larger than the sand grains on the more southernly facing beaches.

Methods/Materials
I used sample containers, a copper tube, a shovel, a rope, a GPS device, a back pack, a compass, rinsing water, aluminum pans, a sand sieve set, a funnel, a flash light, and a paper towel. I went out to the beaches, collected the sand, then brought it back. I used the sand sieves to measure the sand grains' size and was able to determine the average grain size of each sample. With that knowledge, I could compare the sands from the different beaches and figure out what type of beaches had the larger sand grains.

Results
The grain size averages measured from a low of .68 millimeters to a high of 2.04 millimeters, and there seemed to be a correlation between beach orientation. My correlation coefficient (the number that tells how consistent my results were) was .61, a moderate correlation, meaning there was moderate support for my hypothesis.

Conclusions/Discussion
While I did find a correlation, I am not entirely sure that I can make a definite conclusion due to lack of samples. I collected 15 samples on just one day, and, while that may seem like a lot, it would have been much better if I had had the opportunity to gather more. There are plenty of uncontrollable variables existing in the natural world, as well, though I was careful and very consistent. Next time, I certainly would collect more sand, that way my analysis would be more reliable.

Summary Statement
When testing to see if sand grains are larger on the more northern-orientated beaches of Northern California, my data showed a moderate correlation that the sand grains were slightly larger than the sand from the more south-facing beaches.

Help Received
My grandpa helped me gather my sand data, my dad helped me use programs on the computer to analyze my data, and my mom helped me organize my board.