CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY

Name(s)
Daniel J. Feeny

Project Number
J1110

Project Title
Can Silicon Spheres Save Our Sphere?

Abstract

Objectives/Goals
This experiment investigates Dr. Field's ICE911 idea to slow the warming of the Arctic glaciers by studying the effect of 0.7-3mm silicon spheres floating on the surface of water - how the size and the clustering of the spheres effects the evaporation and temperature of the water. (Dr. Field's idea is to float small silicon spheres all around the polar ice caps and by increasing the surface area there will be more evaporation, lowering the temperature of the water and preventing the ice from melting.)

Methods/Materials
Seven modified evaporating tanks were built so that two different sized silicon spheres and different amounts of coverage by the spheres on the surface of the water could be investigated at the same time. Evaporation was measured after 24 hours and temperature data was taken several times a day. The experiment ran for five days in order to compare daily evaporation and temperature trends between the 7 tanks. The experiment was run a second time with modifications to get more accurate data: temperature data logger, replacement of sinking spheres, and improved location.

Results
Spheres reduced the temperature of the water but not by evaporation as Dr. Field predicted. Instead the spheres dampened evaporation, yet the water still cooled (probably due to the albedo effect). The experiments showed evaporation decreased linearly with increasing surface coverage, and the larger spheres had slightly more evaporation than the smaller spheres. 100% coverage by the spheres reduced the temperature of the water by 4C. The size of the spheres did not affect the temperature curve. A white plastic sheet covering the surface did not reduce the temperature, but raised it by 5C. Also, the silicon spheres did not remain buoyant as Dr. Field assumed in her design. Up to 50% of the spheres sank within six days. The smaller spheres sank twice as fast as the larger spheres and the spheres sank more quickly in salt water than fresh water.

Conclusions/Discussion
Dr. Field#s floating silicon spheres will reduce the temperature of the water next to the glaciers. She can use smaller sized spheres to minimize the amount of material needed and therefore reduce the cost for her idea. However, Dr. Field will need to find another type of silicon sphere that is more buoyant.

Summary Statement
To investigate Dr. Field#s ICE911 idea to slow the warming of the Arctic glaciers by studying the effect of 0.7-3mm silicon spheres floating on the surface of water on evaporation and temperature.

Help Received
A graduate student at Stanford looked over my proposal and suggested I narrow down the scope. He told me how to get climate data from the Y2E2 building at Stanford and suggested I use data loggers from PGE to get more accurate temperature data.