



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>William G. Thornbury</b>	<b>Project Number</b> <b>S0217</b>
<b>Project Title</b> <b>Passive Solar Air Cooling/Heating Using Geological Insulation</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My goal for this project was to develop a cost efficient, "green" method for cooling or heating ambient air that could be used to remedy problems our environment faces today and in the future with intensifying climate issues.</p> <p><b>Methods/Materials</b> In this experiment I built two U-shaped PVC pipe apparatuses made of two 7 foot segments of 3 inch and 6 inch PVC pipe that were connected by a 2 foot segment and two elbow-joints. I dug a four foot trench into the soil with an auger and buried the 6 inch apparatus. I attached a solar powered fan to one of the open ends and created an airtight seal. From 12:00-1:00 PM and from 1:30-2:30 PM I measured the temperature of the air flowing into the apparatus, the temperature of the air flowing out of the apparatus, the soil temperature on and 4 feet below the surface, and the humidity.</p> <p><b>Results</b> In both the 12:00-1:00 and the 1:30-2:30 time period there was a significant increase in temperature after circulation (supported by a 2-sample t test). The temperature of the soil 4 feet below the surface remained relatively constant throughout the entire experiment ranging from 11-13 degrees celsius.</p> <p><b>Conclusions/Discussion</b> Consequently, future climate change would have little effect on the soil temperature if I were to dig deeper to where the temperature of the soil is even more stable. Therefore, as our planet's climate intensifies, my research can reduce the percentage of crops lost to extreme weather conditions and mitigate temperature fluctuations in new housing developments while cutting energy costs by cooling or heating the surrounding air.</p>	
<b>Summary Statement</b> My project goal was to see if I could change the temperature of air by circulating it through soil using solar power.	
<b>Help Received</b> My brother helped design the board; My mother taught me how to format the data into excel; My father helped me dig the trench; My uncles drove me to UC Berkeley so that I could do outside research in the libraries.	