



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Pascale C. Montgomery	Project Number J0810
Project Title Message in a Bottle: Predicting Sea Level Rise from Thermal Expansion	
Abstract Objectives/Goals The objective of my study is to examine the thermal expansion of seawater and how it could impact sea level rise on a global scale. Methods/Materials Plastic water bottle, hard plastic straw, silicone sealant, sea salt, water, digital thermometer, stopwatch, 100 watt light bulb and reflective casing, metric ruler. Changes in water level with increasing temperatures were measured with a clear plastic straw and digital thermometer and recorded every fifteen minutes for a total of 120 minutes. Results From the collected data, thermal expansion coefficients were calculated and averaged. The average coefficient was then applied to the ocean on a global scale, and an estimate of sea level rise was calculated. I found that if the upper one kilometer of the ocean were warmed by one degree Celsius, the sea level would rise 20 cm. These results support my original hypothesis that seawater does expand when warmed and that it is possible to create an estimated climate change model of sea level rise from thermal expansion. Conclusions/Discussion In short, my experiment offers a simple way to demonstrate one aspect of global sea level rise, and it might be used to further assess current predictions. My predictions, however, are from thermal expansion alone, not accounting for melting land ice and are therefore only one part of a climate change model.	
Summary Statement This study examines the thermal expansion of seawater and how such expansion impacts sea level rise, assuming a projected increase in globally averaged surface temperatures.	
Help Received I built the bottle apparatus and ran the trials, and my father helped me understand the thermal expansion equation.	