CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

35311

Project Title

Thermal Microcosm: A Study of Climate Change and Its Causes

Abstract

Objectives/Goals

I simulated an earth-like climate system, applied temperature forcing agents and observed their relative effects on the system temperature.

Methods/Materials

I simulated the earth-like climate system with a 725ml spherical flask of water with a heat lamp pointed at it.

I simulated two climate forcing agents: Greenhouse Effect (layers of bubble wrap around the flask) and Ice Cap Reflectivity (coverage of the "poles" with white electrical tape). Resulting in 5 configurations:

- 0 layers bubble wrap, 0% cap coverage (CONTROL)
- 0 layers bubble wrap, 25% cap coverage
- 0 layers bubble wrap, 50% cap coverage
- 1 layers bubble wrap, 0% cap coverage
- 2 layers bubble wrap, 0% cap coverage

I recorded the temperatures of each configuration until stabilized, then compared them.

Results

Temperature change relative to control, per configuration:

- 4ºC 0 layers bubble wrap, 25% cap coverage
- 9ºC 0 layers bubble wrap, 50% cap coverage
+ 2ºC 1 layers bubble wrap, 0% cap coverage
+ 2ºC 2 layers bubble wrap, 0% cap coverage

Temperatures stabilized after 7-10 hours.

Conclusions/Discussion

My hypothesis that ice cap coverage would have greater effect on climate temperature proved to be true. However my secondary hypothesis that increasing a forcing agent would further increase the change in temperature was not supported; the addition of a second layer of bubblewrap yielded no further change in temperature than a single layer of bubblewrap.

Extending these findings to draw conclusions about the earth's climate would be an oversimplification of the earth climate system and it's temperature forcing agents. The earth's climate is far more complex and there are many forcing agents I didn't account for in my simulation.

Summary Statement

I simulated an earth-like climate system, applied climate temperature forcing agents and observed their relative effect on the system temperature.

Help Received

My parents helped me get the materials and had my board printed for me.

Preliminary