CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
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Project Number
J0608

Project Title
How Do Solar Flares Affect Earth's Magnetic Field?

Abstract

Objectives/Goals
The objective is to determine the effect solar flares have on Earth#s magnetic field, using a soda bottle magnetometer.

Methods/Materials
A soda bottle magnetometer was constructed to measure Earth#s magnetic field. The device consisted of a two-liter soda bottle with an index card suspended inside of it. Attached to the index card was a craft mirror and a bar magnet. A laser was shone into the mirror on the index card, and then reflected back onto a wall. At the beginning of the experiment a ruler was taped to the wall so the laser was at the 15cm mark. During the experiment, the centimeter that the laser marked was measured every three hours during experiments 1 and 2 and every hour during experiments 3 and 4. The laser would move because the bar magnet moved from changes in the magnetic field. After the experiment was performed solar flare intensities that corresponded with measurement times were taken from a space weather website.

Results
Four separate experiments were performed, all on different days. During Experiment 1, the highest solar flare intensity was 1.8E-07 watts/m2, and the flare occurred around 9:00am. The centimeters changed the most between 9:00am and 12:00pm. In Experiment 2, the highest solar flare occurred around 6:00am and was 1.35E-06 watts/m2. The greatest solar flare throughout the entire experiment occurred around 9:00am during Experiment 3. It was 5.00E-06watts/m2. Between 9:00am and 10:00am was when the centimeters changed the greatest they ever had in prior experiments. During Experiment 4, the solar flare intensities were low and constant. The centimeters gradually decreased, and there was never a drastic change.

Conclusions/Discussion
In conclusion the higher the solar flare intensity was, the more centimeters the magnetometer moved in a specified time period. Therefore, the higher the solar flare, the more Earth#s magnetic field was affected, and the changes can be measured by a soda bottle magnetometer.

Summary Statement
The purpose of the project was to determine the effect solar flares have on Earth's magnetic field.

Help Received
Science teahcer helped keep me on track. Friends and family provided moral support.