CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
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Project Number
22577

Project Title
The Effect of Solar Activity on Earth's Magnetic Field

Abstract

Objectives/Goals
To determine if and how solar activities affect the Earth's magnetic field. The independent variable is the€ degree of solar activity. Dependant variables are the changes in the Earth's magnetic field. I predicted th€ as the amount of solar activity increased, changes in the Earth's magnetic field would become mot frequent.

Methods/Materials
A magnetometer was built to observe changes in the Earth's magnetic field. I attached a quartz fiber to a piece of glass that had spacers attached to it at the ends. I then glued two rare earth magnets (back to back) to the quartz fiber, ensuring that the fiber was completely centered between them. I did the same with two small mirrors, gluing them back-to-back with the quartz fiber between them, making sure thex were in contact with the magnets. A second piece of glass was glued to the first, and the sides left open were sealed off with electrical tape, to protect the magnetometer from air currents. I shined a laser beam at the mirror, so that the beam was reflected onto a target on a distant wall. Four doughnut shapedx magnets were used to null the magnetometer. A camcorder on a rear table recorded the activity of thx reflected beam.
The rare earth magnets attached to the fiber moved with earth's changing magnetic field. Since the mirrors are attached to the magnet, they move with the magnets, reflecting the laser beam on the target at different places in correspondence with the magnetic field.

Results
After recording a reflected laser beam and watching the tapes, I discovered that there are genert fluctuations that occur throughout the day. The reflected laser beam moved steadily throughout the various days during which I recorded the reflected beam. However, on March 26, 2002, there weret extreme high frequency movements on the target between 1:52 PM and 1:54 PM. I correlated my resultsx with a graph generated by a magnetometer on satelites GOES 8 and GOES 10, and corresponded the movement with solar activity observed from the same satelites.

Conclusions/Discussion
Through research and my experiments, I learned solar activity does in fact affect the Earth's magnetx field. Solar wind and solar flares release charged particles into space that create their own magnetic field. Their magnetic fields interact with the Earth's, causing small changes as a result. With my experiment I also learned that the magnetic field fluctuates daily.

Summary Statement
My project demonstrates the impact solar activity has on Earth's magnetic field.

Help Received
My advisor assisted me throughout the Science Fair process.