



**CALIFORNIA STATE SCIENCE FAIR  
2005 PROJECT SUMMARY**

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| <b>Name(s)</b><br><b>Eric E. Eyre</b>   | <b>Project Number</b><br><b>J0612</b> |
| <b>Project Title</b><br><b>Polar Auroras: Is the Season the Reason?</b>   |                                       |
| <p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b><br/>Before modern-day science, different cultures tried to explain what Polar Auroras were. Eskimos thought that polar auroras were the souls of deer, seals, salmon, or whales. Now we know that Auroras are not made of the souls of animals, but that they are made by excited atoms emitting photons of light. I wanted to make a model that would simulate Polar Auroras. Additionally, I wanted to know if my Aurora model would show that different seasons caused Auroras to be more frequent or stronger.</p> <p><b>Methods/Materials</b><br/>To make an Aurora model, I simulated three things: solar activity, the earth's upper atmosphere, and its magnetosphere. I researched experiments that successfully created an aurora. For example, Kirkland made a vacuum-sealed box with a terella in the middle. When he fired particles at the terella, he created an aurora. Based on this research, I built a model using a tesla coil to simulate the energy of solar activity, a plasma globe for the earth's upper atmosphere, and foil rings to mimic the magnetosphere. Further research showed that auroras are most frequent on the equinoxes, so I planned an experiment wherein the independent variable would be eight different dates selected at 45-day intervals with the earth in its corresponding seasonal rotation, and the dependent variable would be the rate and strength of auroral occurrence.</p> <p><b>Results</b><br/>When I completed my experiment, I found that the model's auroral high points were different from the natural auroral high points. In reality, the best time for viewing is during the spring and fall equinoxes, but my simulated results showed high points in the summer and the winter. To explain the results of my experiment, I did some more research and found that while Auroras are viewed most often in the spring and fall they actually occur every day and night, whenever there is solar activity. It is just that they are easier to see at certain times. Another thing that could explain my results is that the model I made does not have an actual magnetosphere. The foil rings merely mimic the lines of a magnetic field.</p> <p><b>Conclusions/Discussion</b><br/>A new question did arise from my results. Were my results correct that high points of auroral activity are actually in the summer and winter? For this question, I would not be able to look at actual aurora sightings because while auroras may be present in the summer and winter, they are not as easy to see during these times.</p> |                                       |
| <b>Summary Statement</b><br>I built a model that simulated polar auroras, and then I tested to see if the different seasons of the year affected the frequency or strength of auroral occurrence.   |                                       |
| <b>Help Received</b><br>Mother helped find and purchase the equipment for the simulation model.   |                                       |