



CALIFORNIA STATE SCIENCE FAIR 2008 PROJECT SUMMARY

Name(s) Kevin C. Johnston	Project Number J1014
Project Title Suburban Skyglow: Using Astrophotography to Analyze Light Pollution	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my project was to measure the amount of light pollution in a California suburban area. The goal of my project was to compare the light pollution of points at several distances from the center of a small city (population 80,000). My question is: How does the skyglow of a suburban community affect viewing capability? My hypothesis is: Viewing capabilities of the stars and constellations will be drastically reduced by artificial light pollution when a suburban area is compared to an unpopulated area.</p> <p>Methods/Materials In my project, I used a Nikon D40x digital camera and tripod to take pictures of the night sky facing North, South, East, and West. I used three different locations; one in the center of a small city(point A), one at my house just outside of the city limits (point B), and one far from the center of the city in a remote location (point C). I downloaded these images onto my computer and used the histogram tool in Adobe Photoshop Elements to analyze the light intensity. I transferred the data, shown on the histogram, to Microsoft Excel. Once all of the data was transferred, I made several graphs to analyze the light pollution data. I also used Walker's Law, $I=0.01PD^{(-2.5)}$, to find expected values of skyglow from various sources.</p> <p>Results The results of my project turned out to be slightly different than I expected them to be. For one, the point at the remote site had more skyglow than my house on certain days in certain directions (ex: 2/11/08 1.58 times greater skyglow at point C than at point B, south). However, the skyglow at the remote site had the least skyglow for most of the days and directions (ex: 2/11/08 2.72 times greater skyglow at point B than at point C, west). Of course, the city center always had the most skyglow and least viewing capability.</p> <p>Conclusions/Discussion Surprisingly, my hypothesis was not completely correct. In some cases the skyglow was higher at the remote location than at the city limit! This may be caused by the light being blocked by trees or other houses in the suburban area and very open in the unpopulated area. Also, facing South at the remote location there is another very large city (pop. ~1,000,000) 35km away which caused the light pollution to be much higher than if the city was not present. Prior to having done this experiment, I had not realized the effect of light pollution from large cities even at a great distance.</p>	
Summary Statement In my project, I measured and analyzed the light pollution near a suburban area.	
Help Received Parent drove me to the remote locations, Mom proofread the final board.	