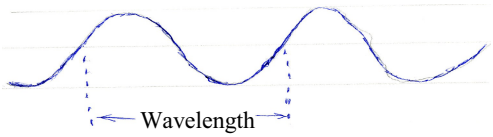
Light

First, I want to explain a little about light. Then I will explain what light will do. Then I will ask a couple of questions.

Light travels as a wave. The length of the single wave is called its wavelength. In a vacuum (outer space), these waves travel at a speed of 300,000,000 meters per second (or 670,600,000 miles per hour) which is very fast.



Different wavelengths of light appear as different colors. If you have seen a rainbow, you will have seen some effects of different wavelengths as raindrops tend to split up the wavelengths into Red, Orange, Yellow, Green, Blue, Indigo and Violet. The Indigo and Violet are never very visible in the sky, but the other colors are clearly there. The Red end of this has a long wavelength while the Blue end has a much shorter wavelength.

The next item I wish to discuss is called "Collision Cross-Section". Imagine trying to throw a ball at an object. The bigger the object is, the easier, and the more often you will be able to hit the object. The term Collision Cross-Section is a measure of the effective target size. Larger cross-sections will get hit a lot more than small cross-sections.

Now, it turns out that in the earth's upper atmosphere the Collision Cross-Section for harmonically bound electrons is much larger for the short wavelengths than it is for the long wavelengths. So, the shorter wavelengths will have collisions with these electrons and bounce all over the place. While the longer wavelengths don't have many of these collisions, and tend to go by or straight through.

Now the questions.

1. If you look up at the sky in daylight, what will you see?

2. If you look towards the horizon as the sun sets, or rises, (early evening or early morning, what will you see?

Answers:

1. You will see the shorter wavelengths, or the color blue. (We call this the blue sky.)
2. Sunsets, or sunrises wil have the longer wavelengths as these go straight through without many collisions so will appear with a lot of reds and oranges in them. Also, from the horizon, the sunlight goes through a lot more atmosphere before it gets to us than when it is more overhead – more collisions space to eliminate the blues.

Final comment.
The theory is correct concerning the cross-section and light wavelength properties. However, in my opinion, there is no way of testing, or absolutely proving that this entirely causes the blue sky and red sunsets. But, it sure fits!