Atmospheric Refraction Encyclopedia Article

Atmospheric Refraction

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Atmospheric Refraction

There are three common phenomena that are attributed to atmospheric refraction--the colors of the sky at sunset (and sunrise), mirages, and looming. **Light** traveling from one medium to another will undergo refraction, i.e. it will be bent from its original straight-line path. When traveling from a medium of low **density** to one of a higher density, the light is bent towards the normal. It is bent away from the normal if traveling from high to low density.

Sunlight traveling from **space** into the earth's atmosphere will undergo a large amount of refraction. The amount of refraction is dependent upon the angle of incidence and the **wavelength** of the light. When the **Sun** is overhead, the incident angle is very small and so the Sun appears white. When on the horizon, the sunlight hits at an angle that causes the colors to separate much like a prism separates light into a rainbow. The particles in the atmosphere enhance this separation of **color**. As the Sun dips below the horizon, the sky goes through color changes from red to indigo.

A mirage is caused by a small refraction of light near a hot surface. The hotter, denser air refracts the light coming from the horizon and the viewer sees an image of the sky near the horizon. Since the image is blue or gray, it is commonly mistaken for a pool of water. Here, colors are not separated, since the density difference in the mediums is not high.

Looming is caused by a small refraction of light off a cold surface. Light from a distant mountain is bent downward by the less dense air and the mountain appears to be looming over the observer. The mountain looks bigger and taller and thus closer to the observer on a cold day than on a warm day.