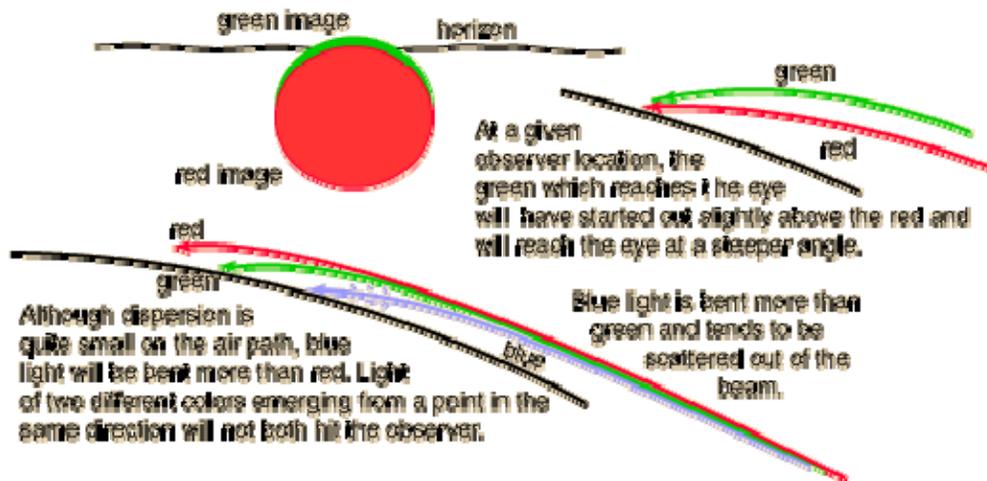


The Famous “Green Flash”

Green Flash - Green flashes and green rays are rare [optical phenomena](#) that occur shortly after [sunset](#) or before [sunrise](#), when a [green](#) spot is visible for a short period of [time](#) above the [sun](#), or a green ray shoots up from the sunset point. The famous but seldom seen "green flash" or "emerald flash" which occurs just before the last part of the sun disappears from view at sunset is caused by the same atmospheric [refraction](#) and [scattering](#) effects which produce the [red sunset](#).



The green flash is the phenomenon that the last bit of the sun colors green when the sun sets below the horizon. The effect is due to atmospheric refraction of light. The refraction angle for the green end of the light spectrum (the shorter wavelengths) is slightly larger than the red part. As a result, the spectrum of colors of the sun is spread over a small vertical distance (a few sec. of arc). So, the top rim of the sun appears green (blue in extremely clear conditions) and red on the lower rim. When the sun sets, the green rim is the last to disappear. During sunrise, the effect can also be seen, but this is a lot harder because one does not know exactly where to look. The actual green flash, a green flame above the point where the sun set below horizon a few seconds after sunset, is extremely rare. However, the green rim can frequently be seen, even if the sun is well above the horizon, as well as small green flashes due to inversions in the atmosphere. Such an inversion may refract the green rim and separate it for a few seconds off the solar disk. Such green flashes are relatively common yet hard to see, even with the aided eye.

A major problem for people who have never seen a green flash is not knowing what to look for. Flashes are not always green; they are not a “flash” in the sense of a sudden burst of brightness (except at sunrise). They do not (usually) light up the sky, but are often small and inconspicuous. Fortunately, there are some [photographs](#) here that show the commoner forms of green flashes. However, green flashes usually are brief: a duration of one or two seconds is typical at moderate latitudes. The [simulations](#) will give you some notion of the time scale of these events. Of course, if you can get to very high latitudes, you can prolong them greatly. Once you know what to look for, you'll find that green flashes are surprisingly [predictable](#), as experienced observers have found. Here's a website with great advice about seeing the green flash:

<http://mintaka.sdsu.edu/GF/observing/advice.html>

A rich subject for debate over the years, the green flash is rarely seen, but its observers wax eloquent about the brilliant green or emerald color when it is seen. In uniform air, the dispersion is apparently so small that the separation of red and green images is not visible. It takes more unusual layering of the atmosphere to enhance the separation.

Such a seldom seen and dramatic effect as the green flash tends to collect myth, so some care must be taken to separate fact from myth. I had reported from another reference that the perceived brilliance of the green might be heightened by the low-light enhancement of green vs the red end of the spectrum (see "[Rods do not see red!](#)" in [color puzzles](#)). Andrew Young contests this, stating that sunsets are so bright and provide so much light even in the green that significant bleaching of the pigment for both red and green may occur, certainly not the conditions for the [scotopic](#) or low-light vision. Young maintains an excellent website of resources about green flashes, "[An Introduction to Green Flashes](#)".

The index of refraction for red is 1.000292 and that for blue is 1.000295. Out of a total refraction of about 0.53° , the dispersion is only 0.006° or about 20 arc seconds, compared to a 120 arc sec resolution for the eye. Thus under normal conditions the eye would not see this.

Jules Verne's 1882 novel "Le Rayon Vert" (The Green Ray) popularized the [green flash](#), described as "a green which no artist could ever obtain on his palette, a green of which neither the varied tints of vegetation nor the shades of the most limpid sea could ever produce the like! If there is a green in Paradise, it cannot be but of this shade, which most surely is the true green of Hope" Legend has it that those who see the green flash never know false love; also occurs just before sunrise but is harder to spot.



We tried to capture the green flash with video and still haven't been successful yet so we Googled "green flash" to get this photo so we know what we should be looking for!