



# THE ATMOSPHERIC RESERVOIR

*Examining the Atmosphere and Atmospheric Resource Management*

## Have you seen the **GREEN** flash?

By Aaron Gilstad

No, it's not a new comic book character. If you haven't heard of it before you may not even realize you had seen one. Don't feel bad if you haven't or at least don't think you have seen one, many have not. Green flashes can be easily missed, some last only a couple seconds, while others may last up to fifteen seconds. They can be seen either at sunrise or sunset, although sunset is far more common as it is much easier to locate the sun before it sets than before it rises. Either way, you must be looking directly at the sun to see them, so it is best to use a filter.

According to Andrew T. Young, an astronomy professor at San Diego State University, green flashes are atmospheric phenomena where the top edge of the sun changes color to exhibit a greenish tint. Green flashes are quite variable phenomena, in fact green flashes are not even always green, but can also be blue, yellow, or violet. Why green flashes are often seen as green, is not purely physical, but at least partly a physiological effect on the observer. The rate of light dispersion accounts for the physical coloring, red light disperses fastest, with yellow, blue, and violet dispersing more slowly. Additionally, when looking toward the sunset, your eye is overloaded with red light which has a

bleaching effect on the red sensitive parts of the retina, so the initial flash that would be yellow will be seen as green, effectively intensifying the green vision and lengthening the time that the flash is visibly green.



Photo: Thomas "Hank" Hogan

There are two common types of green flashes that account for 99 percent of all reports, each in response to rays of light bending (called refraction) over a steep temperature gradient. The most common type, called "the last glimpse" appears as a flat bottomed oval just above the horizon. It is most visible just as the sun dips below the horizon as seen from a few yards above sea level. This green flash usually lasts about two to three seconds. The inferior mirage, as seen over asphalt on a hot summer day (hot air below cooler air), is the responsible culprit. Light is refracted such that part of the sun nearest the horizon disappears until it is below the horizon and the reversed image flashes above the horizon.

The second looks like a thin, pointy strip of green which has been pinched off from the top edge of the

sun and is visible before the sun drops over the horizon. It accompanies what is called a mock mirage, which is caused by a strong temperature inversion (warmer air above cold air) below eye level. The refraction distorts the

shape of the sun, such that it appears to have the middle pinched. The effect is caused by looking down through the inversion then back up through it due to the curvature of the earth. The atmospheric conditions help extend the lifespan of the green flash up to as many as fifteen seconds.

This type, especially, should be visible in North Dakota if viewed from above the inversion.

Although, it is far more common to see the green flashes on the coasts, this appears to be mainly due to topographical interference or limitation as opposed to anything to do with the water itself. The flashes are artifacts of refraction not reflection, allowing at least the possibility of seeing a green flash. But, even if you don't see one from home as the sun sets, you'll still be able to enjoy the North Dakota sunset; one of the most beautiful you'll ever find.

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