

Random Facts by Katie Mullaly

## The Northern Lights: Facts & Myths

The northern lights, or aurora borealis, have inspired myths and legends of northern natives since early times. Some Eskimos of North America consider them the spirits of the dead playing ball with a walrus skull. Others had the idea that they were walrus spirits playing with a human skull. The lights were an omen of war and pestilence for the Fox Indians in Wisconsin. The Point Barrow Eskimos considered the lights an evil thing, carrying knives to keep it away from them. The Mandan of North Dakota explained the northern lights as fires for great pots that the great medicine men and warriors of northern nations used to simmer their dead enemies. These lights were also thought of as great torches used by great, friendly giants in the north, to help spear fish at night.

There is an Algonquin myth that tells of how Nanahbozho, creator of the Earth, after finishing his task of creation, traveled north to retire. He then built large fires to remind his people that he still thinks of them. The east Greenland Eskimos thought that the lights were the spirits of children who died at birth and their dancing caused the continually moving streamers and draperies of the aurora.

Today we know the scientific reason behind the northern lights. Why they glow and dance, and where they come from is no longer a mystery – however, a good myth in today's world would be a welcome change in this day of scientific understanding.

Since the early 15<sup>th</sup> century, scientists have known about sunspots – dark patches on the sun's surface caused by strong inner magnetic fields. But it wasn't until the 18<sup>th</sup> century that astronomers began to make the association between sunspots and the increase of bands of colored lights in the sky, or auroras. There have always been these auroras around the north and south poles, but it took high levels of solar activity to bring the northern lights to the attention of astronomers located in more populated regions.

We now know that the sun has its own weather system. It is so hot and dynamic within the sun that its atmosphere cannot be contained by its gravity. The atmospheric energy flows out from the sun in the form of the solar wind. This solar wind is made up of hot plasma formed from violent collision between hydrogen atoms. These collisions cause them to disintegrate into negatively and positively charged particles. This wind travels away from the sun at a million miles per hour. When the sun is more active, with more sunspots and solar flares (intense explosions on the sun), the solar wind blows harder, causing the auroras to become brighter.

So now we know where the aurora borealis of the Northern Hemisphere and the aurora australis of the Southern Hemisphere come from. But, why do they look the way they do?

The earth has a magnetic field. This magnetic field is stronger at the magnetic poles, which are located near the north and south poles of the earth. As these charged particles are blown out into space, some of them are trapped in the Earth's magnetic field. Once these particles are captured, they speed up as they travel down the magnetic field towards the poles. The particles gain energy as they travel and when they collide with the oxygen and nitrogen in atmosphere, they cause the air to light up and glow.

What causes the colors we see dance through the night during an aurora? The auroral light is similar to the color from a television screen. In a television set, a beam of electrons strike a screen that is coated with different types of chemicals, causing it to glow in different colors. The colors we see in the northern lights are produced in much the same way.

Nitrogen and oxygen in the atmosphere will glow a different color when struck by these solar particles depending on the energy of the particle. High up in the atmosphere, above 125 miles, oxygen molecules glow a dark red when struck. The most common color, greenish-white, is formed by oxygen colliding with these charge particles at about 60 miles up in the atmosphere. Nitrogen molecules, above 60 miles, glow a blue color, and below 60 miles, glow crimson red.

Another phenomenon that can be observed due to the northern lights is auroral sound. Although these sounds are just a theory, there have been observations where groups of people have heard sounds during auroral activity, although very rarely. These sounds are reported to have the sound of crackling, rustling or swishing. The poet, Robert W. Service wrote of the sound of the aurora borealis in his poem *The Ballad of the Northern Lights*: “as they writhed like a brood of angry snakes, hissing and sulphur pale. They rolled around with soundless sounds like softly bruised silk.”

One of the most popular theories for these sounds is the transduced electromagnetic wave theory. This theory tells us that electromagnetic waves (waves possessing both electrical and magnetic properties) can partially transfer their energy into acoustic waves with the help of objects in the vicinity.

Brush discharge is another favorite theory. This involves the discharge of electrons that have been built up on the ends of protruding objects such as trees and bushes. This discharge can produce sounds and a tingling of the skin.

Finally, when and where are the best places to see the aurora? The obvious best places are at the polar regions because of the nature of the magnetic poles. But, during heavy solar activity, the northern lights can be seen as far south as Utah. The best time to observe the lights is at night since they aren't visible during the day, but you could guess that one.

I have never seen these dancing children or the walruses playing with human skulls, but would very much love to. I guess the northern lights are just another reason to visit Alaska.